THE DE HAVILLAND AERONAUTICAL TECHNICAL SCHOOL

PROSPECTUS

April 1945

THIS handbook explains the de Havilland technical training organisation as it is in the sixth year of war, more active than at any stage in its past history and preparing for greater responsibilities in the future. The return to peace, the rise of civil aviation and the implementing of the new Government legislation aimed at improving Great Britain's educational system as a whole may be expected to bring about further developments.

The training needs of young men entering the School at different educational levels are outlined in the first chapter, on pages 1 to 5, and the channels of training and opportunity available to them are shown in Figures 1 and 2 on page 6.

The principle of conducting the practical training within the de Havilland factories and technical departments, and the breadth of instructional opportunity afforded by the enterprise, are discussed in the second chapter, on pages 7 to 11.

Chapters 3 and 4, on pages 12 and 13, explain the apprenticeship courses in detail, and are followed by charts of the theoretical and practical training, Figures 3 to 8, and by several pages of pictures illustrating the instruction in the classroom and at the bench. All these charts, like those on page 6, show the full peace-time apprenticeships, not the shortened courses introduced as a war-time measure.

Chapter 5, on page 22, gives details of living arrangements, welfare, sports and recreations.

By way of background a brief outline of de Havilland history, on pages 24 to 30, concludes the Prospectus.

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THE DE HAVILLAND AERONAUTICAL TECHNICAL SCHOOL

THE organised training of young men within The de Havilland Aircraft Co., Ltd., began with the introduction of trade apprenticeships in the company's earliest years. Then in 1928 The de Havilland Aeronautical Technical School was founded to provide a comprehensive course of theoretical study as well as the practical workshop training. Thus a grade of engineering apprentices came into being whom the School trained to become qualified aeronautical engineers for all branches of the industry.

There have been great developments in the subsequent seventeen years, and the training system has grown to a mature establishment. The de Havilland Enterprise has become a group of companies extending to all the principal Dominions and embracing research, design and the large-scale production of civil and military aircraft in a wide range of categories, as well as piston engines and gas turbines, propellers, components and accessories. This is significant in that it has been a fundamental principle of the system to conduct the practical side of the training in the factories themselves.

Although by no means a matter of policy it is natural that a growing enterprise should have absorbed a large proportion of the young men it has trained. Many have gone out to the branch companies overseas. Many have found careers in government service, air transport and flying-school activity at home and abroad. In seventeen years the School has passed out over 1,250 men, prepared and qualified for technical positions in aviation.

When the war came numbers of apprentices left their training unfinished and joined the Forces, most of them to become airmen and engineer officers, but the demands for technical instruction increased beyond all previous experience and exemption from military service was granted for indentured apprentices up to the age of twenty. The School adapted itself to new conditions, and, as a war-time measure in line with other educational establishments, concentrated the engineering apprenticeship into a course of about three years ending at that age.

The headquarters of the de Havilland enterprise in the days of peace.

As the industry settled into its war effort a longer view could be taken, and in the Summer of 1943 an Education Board of senior executives from the various de Havilland divisions was formed to examine the existing training organisation and to frame its future policy in pace with the rise in status of the industry, the expansion of de Havilland responsibilities within it, and the plans of the Government for educational reform.

Some years previously the de Havilland trade apprenticeship training had been brought under the wing of the Technical School, so that the Board was called upon to review a unified scheme of education for both engineering and trade apprentices. It considered the position of all youths entering the works and offices and the need to bring home to parents and to the boys themselves the advantages of training for a career, as against the idea of getting a job and picking up a trade.

Besides the engineering and trade apprentices there is a third class of entrant, the post-graduate engineering student. The three categories will be discussed in turn.

THE ENGINEERING APPRENTICE

The intake of engineering apprentices has consisted mainly of boys entering from secondary or public schools at about 17 years of age, with a general education to the matriculation standard. This class of youth offers promising material, being moderately well founded in basic knowledge, sufficiently unfixed in his notions to be receptive, and broadly speaking at the right age and educational level to pick up engineering and aeronautics with eagerness. He can be comprehensively trained in practice and theory in 4 or 5 years and should have no difficulty in qualifying as a corporate member of the aeronautical or other engineering institutions at the end of that time. The war-time measure condensing the training into three years will be dropped at the earliest opportunity.

At the end of the course the young engineer is potentially useful in any branch of the industry although he will have specialised in the department for which he has shown himself to be best fitted. There is no distinct course for the business departments but the general technical training is an excellent grounding for the commercial side of aviation, perhaps more so than is the case in other industries.

This class of youth, the engineering apprentice, represents the backbone of the whole training system and provides the main pool from which the industry's future executives will be drawn.

It is not a tenet of the School policy that trainees should remain in the de Havilland organisation after graduating. A change of scene broadens the knowledge and character and it is good for the industry to exchange its younger members.

THE ENGINEERING STUDENT

There have always been some opportunities for a quite different category of entrant, the University-trained men coming into the aircraft companies with a science degree at the age of about 21 years. Their background and mental attitude are normally more academic than practical and the tendency is for them to be absorbed into the laboratories, aerodynamic and stress departments of the industry. The design side, which is larger in size and scope, as a rule demands a more practical training, and the production side holds little opportunity for them.

On the other hand, the fundamental knowledge of such men should be at a high level and it is possible to convert them into the more generally useful technicians and potential executives if they can arrange, after graduating, to spend two years in a technical school in the course of which they are able to acquire a broader outlook and essential practical experience in the various departments, as well as to round off their aeronautical theory and their study of materials, structures, production subjects, industrial organisation and other such matters. It is especially good for them to have done some work in the industry during University vacations.

The de Havilland School likes to make first acquaintance with these men early in their University career, to encourage and assist them to take up mechanical work in their holidays (not necessarily at de Havillands) and to guide them according to their aptitude, so that when they come down after graduating a plan for their training in the School may already have been formulated. They are usually ready to take one or other of the engineering institutions' examinations after two years—and if they should be fit to do so earlier it is nevertheless generally unwise to reduce their final training to less than two years.

Young graduates requiring training in only one or two subjects—for instance, specialists not desiring a broad engineering experience—

Salisbury Hall, Hertfordshire, the war-time headquarters of the School.

Salisbury Hall, the main building.

The war-time hostel for apprentices.

may spend only a short time as students in the School. Whether remaining with the company thereafter or not it is usually found desirable that they should retain a contact with the School principal for a year or two so as to have the benefit of his guidance in the early stages of their careers.

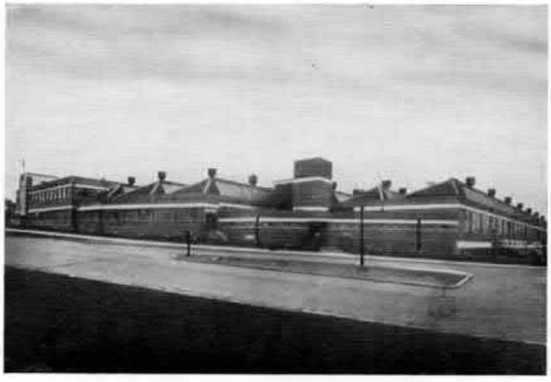
The post-graduate type of student has naturally been less evident during the war but will appear again, and it is expected that our Universities will be giving more attention to the aeronautical subjects than hitherto. As a rule, however, it will always be advisable for such men to seek general and practical training in the industry under the supervision of a school authority, rather than to take up ordinary employment straight from the University.

THE TRADE APPRENTICE

The third class of trainee is the boy who leaves school at 15 or 16, usually without having sat for the School Certificate examination, and applies to be taken on as a trade apprentice. With him may be considered the youngster who has to turn out into a factory even earlier, and who is encouraged to take up an apprenticeship after he has been at the bench for a year or so.

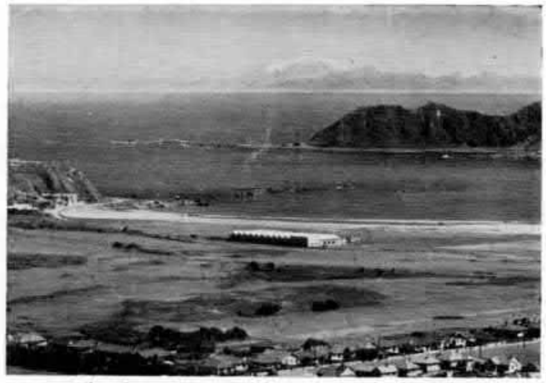
The 1944 legislation centres around the need to raise the minimum school-leaving age, for ordinary industrial surroundings are unsuitable for boys so young. But while the national problems of shortage of teachers and school premises persist the industrial training schemes are faced with the responsibility of doing their best for this numerically large class. The factory boy of 14 years or so stands most in need of general teaching and physical care, and should not take up a trade apprenticeship until he is about 16. The desirability of some preparatory educational classes is recognised at de Havillands and apprentice candidates are directed in such study and told that without it they will have little chance of being accepted as apprentices.

The main engine factory before the war.



A de Havilland flying school in England.


The Toronto factory before war-time expansion.


The factory at Wellington, New Zealand.

It is felt that every young person in the shops and offices should come under the watchful eye of the educational staff and be made to appreciate the advantages of apprenticeship.

The de Havilland School, taking over the boy's training when he is accepted as an apprentice, endeavours to continue the general subjects while steadily initiating his aeronautical studies. Classes in general subjects are arranged in conjunction with the County authorities, and the policy is to give more attention than hitherto to Empire history, citizenship, current ideas and ideals. More interest is being shown, particularly, in the history of the de Havilland enterprise. It is useless filling boys' heads with technicalities until the basic education has taken root. They must learn about and take pride in their country and their industry, and, in a word, must know where they are heading.

The younger the boy when he enters industry the more difficult it obviously is to train him for an executive post, but by expansion of the classroom curriculum during apprenticeship the door can be and has been opened. Serving trade apprentices in de Havilland factories have the opportunity of upgrading by scholarship at the age of 17 years (or a little later in peace-time conditions) to the full status of the engineering apprentice, which enables them to take the complete training of an aeronautical engineer.

It is possible, although not easy in the circumstances, for them to matriculate ; the de Havilland School does not prepare them for Matriculation, and they are able to qualify for the engineering diplomas without it, if satisfactorily reported by the School. This usually involves taking an extra section in the engineering institution's examination.

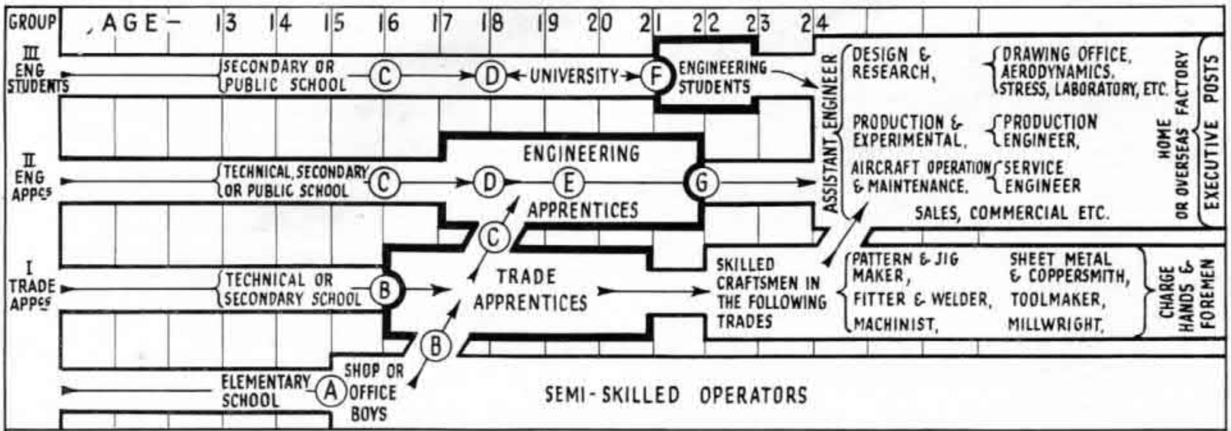
This system of upgrading the promising trade apprentice has proved valuable in every way and is yielding excellent results.

A propeller factory at Sydney, Australia.

Sydney servicing hangars before the expansion.

TRAINING AND OPPORTUNITY

Aircraft Division



QUALIFICATIONS AT ENTRY

(A) Works Entrance Examination.
(B) Apprenticeship Examination.
(C) School Certificate with Matriculation Exemption, or 3rd Year Junior Technical School Certificate, or Promotion Examination held at Works.
(D) Higher School Certificate or Inter B.Sc.
(E) National Certificate.
(F) University Degree or Diploma, or Higher National Certificate plus proof of Vacations spent in Factory

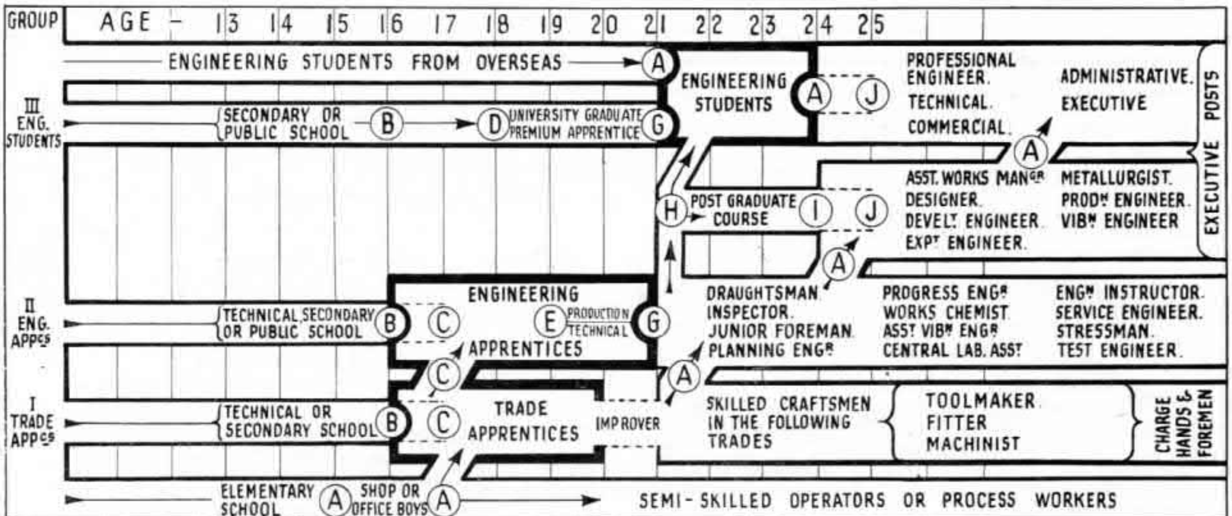
QUALIFICATIONS AT EXIT

(G) R.Ae.S. Diploma,
Or Inst. Prod. Engineers Diploma,
Or Air Ministry Licence for A/C Operation and Maintenance.
Or Higher National Certificate

Note : The age scale along the top of the chart is intended to represent an average . it is movable to the extent of about one year either way. Entry is subject to satisfactory Selection Board interview : for Trade Apprentices at (B), or Engineering Apprentices at (C) and for Engineering Students somewhere between (D) and (F).

Figure One

Engine Company and Propeller Division



KEY TO QUALIFYING EXAMINATIONS

(A) Works Interview and Test.
(B) School Certificate ; Matric ; or Works Entrance Exam.
(C) Trade and Engr. Apprenticeship Indenture Exam.
(D) Higher Certificate or Inter B.Sc.
(E) Engineering Apprenticeship Grading Exam.
(F) Works Final Examination for Trade Apprentices.
(G) University Degree ; Technical College Diploma ; or Works Final Exam. for Engineering Apprentices.
(H) de Havilland Scholarship or equivalent External Scholarship Exam.
(I) M.Sc. or Works Interview and Test.
(J) Professional Exam., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., etc.

Figure Two

TRAINING AND OPPORTUNITY

THE charts on page 6, Figures 1 and 2, show the channels of opportunity for the different classes of entrant. They represent the general peace-time plan, without regard for the shortening of courses that has been necessitated by the war. The ages indicated are not rigid; indeed, some flexibility is necessary throughout. The distinctive training requirements for the aircraft side and the engine and propeller sides of the industry make two charts necessary.

Except for elementary instruction in handicraft and the use of tools, which is conducted in the School workshops, the entire practical training is undertaken in the de Havilland factories. This, together with the fact that de Havilland activities embrace the whole field of aircraft design—the propulsion system as well as the airframe—is of paramount advantage to the training which the School is able to offer. The power-unit occupies so high a place in aeronautical science that the closest working association between the two sides has always been essential. In a creative and productive organisation which encompasses both sides there is this excellent feature that the apprentices, in the course of their daily work in inter-related departments, find themselves engaged upon the problems of the aircraft and its power-thrust system, in both current and experimental projects.

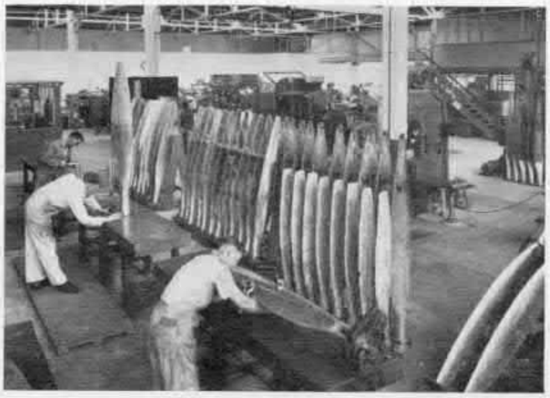
This is a situation that exists in the works of only two or three major aircraft builders in the world, and in the case of de Havilland special circumstances broaden the scope still further. The versatility of the company's Aircraft Division, for example, which designs and manufactures widely different kinds of aeroplane from basic trainers and small touring varieties to light and medium transports and high-performance military types, ensures unique opportunities to the trainee, and especially so by reason of the company's interest in advanced forms of construction, both in metal and in wood. No other builder, for instance, has ventured to design a high-performance combat aircraft in wood, or to employ combined metal, wood and plastic structures in a major project.

This comprehensiveness of aircraft type and structural method render the design, stress and aerodynamic departments, the detail shops and laboratories, especially valuable from the instructional standpoint. Light-alloy part fabrication includes the range of drop hammer, stretcher press and rubber press methods, foundry work and so forth. A branch unit is the de Havilland Forge, which is equipped with hammers large enough for the manufacture of any aircraft component. The organisation is unusual, also, in that it designs and makes much of its own accessory equipment.

Mosquito assembly, England.

Mosquito assembly, Canada.

Mosquito assembly, Australia.



Propeller manufacture, Australia.

The compass of the de Havilland Engine Company, again, is exceptionally wide, extending into the most advanced channels of heat-engine development. The work which the Engine Company has been doing in the field of jet propulsion since 1941 was made known to the public only in March, 1945, by which time de Havilland gas turbines had been flying successfully in British and American aircraft for two years. The de Havilland jet-propelled fighter, driven by a gas turbine of entirely de Havilland design, was by then in an advanced stage of development, and bidding for world leadership in the role of interception. The creation "under one roof" of a highly advanced jet-propulsion fighter together with its power unit is historic in itself, and the facility for apprentices to take their training in the technique of this revolutionary method of propulsion within an organisation so actively engaged in its development is of the highest significance having regard to the vista of fresh opportunities now opening up in commercial as well as military aviation.

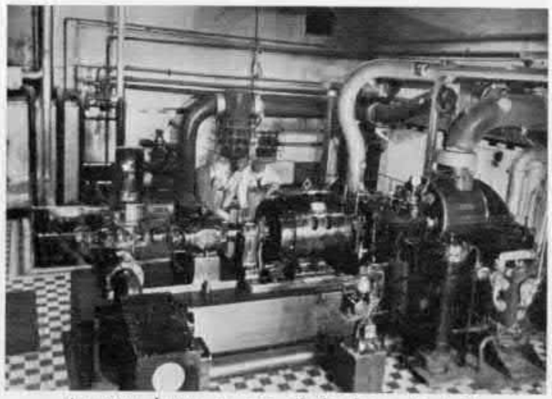
In piston-type engines de Havilland experience goes back to 1926, and the range of Gipsy engines then initiated holds to-day a position unrivalled in the lighter transport and training categories anywhere in the world.

The Propeller Division of the de Havilland Enterprise represents another very important branch of the industry, for the propeller is the third principal aircraft component, and there is great scope for turbine-driven propellers in the aircraft of the future. The de Havilland Company has built the major share of all the controllable-pitch propellers for the Royal Air Force in the present war and is in the forefront of propeller design advancement.

Gipsy engine repair, Australia.

Propeller assembly, England.

Gipsy engine assembly, England.



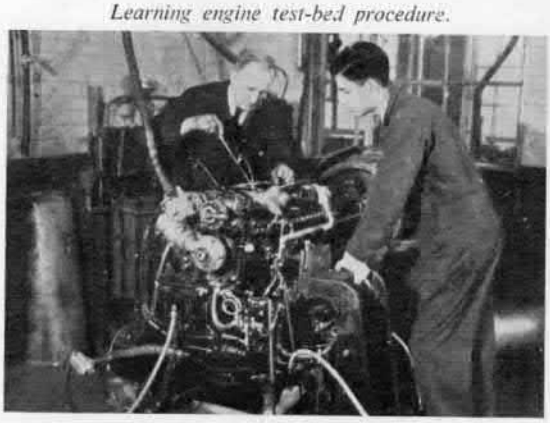
A power house at one of the home factories.

On the side of research, contributions which de Havilland have made to scientific progress have penetrated beyond the aircraft industry, notably in the field of plastics and in the study of vibration—good examples, incidentally, of the intimate collaboration between the airframe, engine and propeller technology.

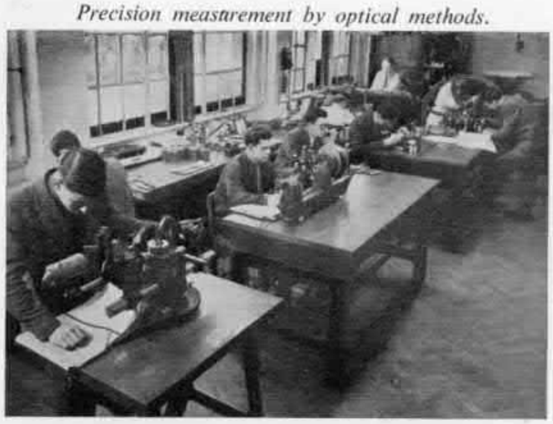
Outside the design, research and manufacturing groups there is a flying school organisation in Great Britain which de Havilland have operated since 1923 ; it was the original Civil Reserve School for the Royal Air Force and has continued with high activity throughout the present war as No. 1 Elementary Flying Training School. In peace-time the company are also concerned in the administration of civilian flying schools in England and abroad. Useful training opportunities in the routine of aircraft operation and maintenance are thus provided, as well as facilities for learning to fly, although these are not available in war-time.

Maintenance has necessarily held a high place in the de Havilland marketing policy. Parts distribution and servicing of the company's products in use in nearly every part of the world were the prime functions of the overseas companies of the "family", until they began to mature into manufacturing units. Nowadays there is full-scale aircraft production at de Havilland factories in three continents. Mosquito fighters and bombers are being built in Canada and Australia, trainers in the New Zealand factory, major components in the Indian servicing depot. There are de Havilland propeller factories in Australia, and the de Havilland Gipsy engines are made under licence in that country.

Learning engine test-bed procedure.



Precision measurement by optical methods.



Apprentices on one of the assembly lines.

Servicing work at a de Havilland flying school.

It can be appreciated that the School has never been without apprentices from overseas, and has acquired a traditionally world-wide outlook.

A small booklet entitled "de Havilland To-day" which was prepared for employee distribution outlines the main activities of the enterprise as they were in September, 1944.

THE EDUCATIONAL AUTHORITIES

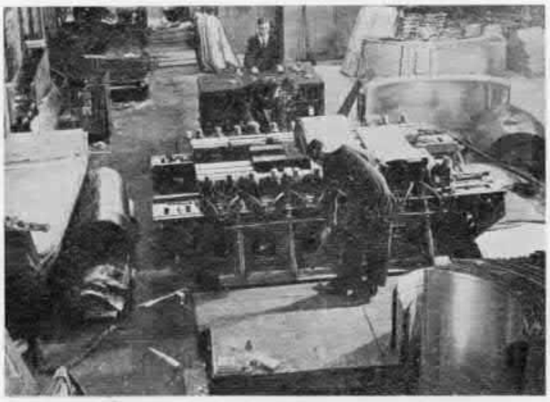
The de Havilland School has always worked in close relationship with the Board of Education and the county education authorities. Its staff, facilities and methods are officially inspected and approved, just as its syllabuses are examined and recognised by the Royal Aeronautical Society and other academic bodies.

Collaboration with the municipal education officers is extending in two directions. They are giving all the help and supervision they can in the general teaching of the very young people in industry, and they are making available the amenities of their polytechnics for the more advanced subjects. It is logical that with their larger resources the counties can provide more elaborately equipped physical laboratories for the general engineering studies than any one industrial company is able to afford, and it becomes more satisfactory for aviation and other industries to use the county facilities for these particular subjects.

The betterment of technical training on a county and national basis is part of the Government's main plan, and the de Havilland system will be closely concerned in the steps that are taken. In the county of Hertford a site which

Learning propeller-blade inspection.

Apprentices on stretcher-press operation.



Instruction in the flight-test department.

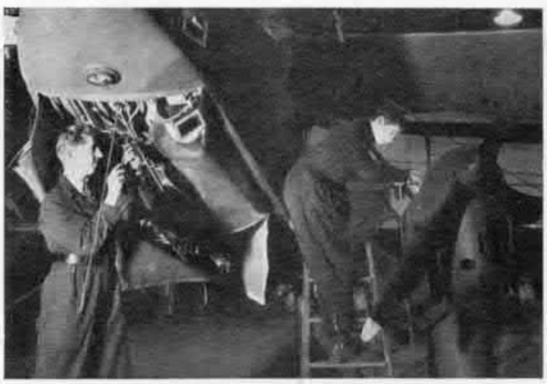
Instruction on Hurricane overhaul and repair.

is owned by Mr. Alan S. Butler, Chairman of the de Havilland Company, has been offered to the authorities for the building of a modern and well-equipped technical school. It is close to the de Havilland headquarters and is admirably situated from a county point of view, besides being within 20 miles or so of London. This scheme is taking shape, and particular attention will be given to aeronautical subjects. It is well known that the Government has under study a plan for a national university of aeronautics.

It is clear that the function of any industrial training scheme is a double process of filtration. The intake consists of young men of varying ages, character, ability and educational level. The duty of the school is to sort them and provide the instruction needed to fill the educational gaps. As they progress the outward filtering process must be applied, selecting and developing the individuals for careers according to their bent. The school must strive to equalise the opportunity and to appreciate the maturing personality.

Aviation is our biggest industry to-day. That is because it is one of the most potent scientific instruments that mankind possesses, and in war its power is naturally exploited to the utmost. It is not essentially an instrument of destruction any more than chemistry is. Indeed, it has immense opportunities in broadening the outlook by travel and intercourse, and thereby promoting co-operation—which, after all, is civilisation. The very experience of flying engenders a sense of the unity of men. Great tasks of reconstruction await aviation, and no industry has a more responsible part to play in the shaping of the future.

Apprentices on Dominie overhaul routine.



The lofting process in aircraft layout.

Chapter 3. ENGINEERING APPRENTICESHIP

THE peace-time engineering apprenticeship is for approximately 4½ years from the age of about 17 years—rather earlier in the case of engine and propeller apprentices. It is preceded by a probationary period of six months before the indentures are signed, so that normally the complete course takes five years.

War conditions have made it necessary to complete the training by the age of twenty and the apprenticeship course is condensed accordingly. The engineering apprentice is exempted from national service until he is twenty provided that he has been indentured by the age of 17½. At the age of twenty each case is considered by the local Manpower Board and the young man may then be directed into military or industrial service.

In practice, therefore, in order that the training period may not be reduced to less than three years, it is necessary for the boy to enter the School at about 16 years 9 months so that a short probationary period may be completed before he reaches the age of 17. At the very latest he *must* complete his probation by the time he is 17½, and a decision must by then be taken by the parents, in conjunction with the School principal, as to the signing of his apprenticeship indentures. Such are the conditions ruling in the Spring of 1945.

Entrant application forms and details of fees are available from The Principal, The de Havilland Aeronautical Technical School, Hatfield, Hertfordshire. A certain number of free engineering apprenticeships are granted annually by scholarship among the serving trade apprentices, and, in a very limited extent, to outside applications. Additionally, some scholarships for the de Havilland and other schools are available through the Society of British Aircraft Constructors and through certain county councils.

Education to the Matriculation or equivalent standard is a necessary qualification for entrance. Applications are considered by a selection committee comprising one member of the de Havilland Education Board, the School principal, his chief education officer, the apprentice superviser, and appropriate de Havilland executives drawn from a panel. Each candidate is interviewed by this committee.

The entrant is apprenticed either to the Aircraft Division or to the Engine Company and Propeller Division. The curriculum of practical and theoretical training is partially common to both groups, especially in the early stages.

For the probationary period and the first few months of apprenticeship the practical work is done in the School workshops, and consists of basic instruction in methods of fabrication and the use of hand and machine tools. In peace conditions as much as a year is spent in these shops. Experience has shown that "practice work" loses its interest and value once the initial training has taken root, and a fundamental feature of the de Havilland system (as explained in Chapter 2) is that the youth spends the remainder of his time in the productive workshops and departments of the organisation, giving him a very wide, realistic and authentic experience. All his work is subjected to the routine inspection of the factory and must therefore satisfy the full Air Ministry standards.

He spends a period in each of the appropriate departments (See Figures 5 and 6), beginning with those which afford groundwork of the least specialised nature. He is regularly visited and his progress is controlled and recorded by the apprentice supervisor. He is subject to the routine and discipline of the factory like any ordinary employee, and as a war-time measure he is paid at the hourly rates for his trade and age, in the same way as trade apprentices. The rates vary slightly from time to time. In April, 1945, they worked out approximately as follows :—

1st year per week ... £1 : 10	3rd year per week ... £2 : 2
2nd year per week ... £1 : 15	4th year per week ... £2 : 10

Overtime is very carefully watched, and never allowed to interfere with class-room work.

In the latter part of his time and as his aptitude develops the boy's practical training becomes more specialised, and he spends longer periods in the departments concerned specifically with design or production or operation and maintenance. He is by then doing quite serious and responsible work. A feature of the aviation industry is the relatively high sense of responsibility which it engenders.

Figures 3 and 4 on page 14 show the plan of theoretical study, as spread over the five years of the peace-time course, from 17 to 22 years in the Aircraft Division, from 16 to 21 years in the Engine Company and Propeller Division. They also show the year of preliminary theory (from 16 to 17) for all young apprentices.

The war-time course is based upon Figures 3 and 4 but is condensed into the three years from 17 to 20. There are both day-time and evening classes but in the less intense curriculum planned for after the war the aim will be to minimize evening work. Attendance throughout the course is required of all engineering apprentices.

The war-time curriculum, although necessarily condensed, does not over-tax the average boy, and covers adequately the examination syllabuses of the Aeronautical and Production Engineering institutions, the National Certificate and the Ground Engineering Licences. It is not an easy matter, however, to attain the Higher National standard by the age of twenty. In the case of ground engineers' licences, also, it is not permissible to sit for the Air Ministry exams before the age of 21. The course will most certainly be extended to the full time at the earliest opportunity.

ENGINEERING STUDENTSHIP

Arrangements and fees for post-graduate training must be considered for each case individually and there is not much that need be added to the discussion of this category in the opening chapter of the Prospectus.

Students conform to the discipline of the departments to which they are attached, and are paid wages.

Chapter 4. TRADE APPRENTICESHIP

THE peace-time trade apprenticeship is for approximately 4½ years from the age of about 16½ years, this applying to aircraft, engine and propeller apprentices alike. It is preceded (as is the engineering apprenticeship) by a probationary period of six months before the indentures are signed, so normally the complete course takes five years from the age of sixteen.

The war-time course must be completed by the age of twenty and is condensed accordingly. The National Service regulations apply as to engineering apprentices ; the trade apprentice is exempted from national service until he is twenty provided that he has been indentured by the age of 17 (six months earlier than in the case of the engineering apprentice), and at the age of twenty each case is considered by the local Manpower Board and the young man may then be directed into military or industrial service.

In practice, therefore, the boy should enter the School at 16, and the latest that he should enter, in order that the training period may not be reduced to less than three years, is 16½ (16¾ if he has special qualifications) so that he may complete a short probationary period and be indentured by his 17th birthday.

The trade apprentice is accepted in the first place to be trained for artisan employment. As a trained craftsman he naturally has a better opportunity for promotion to the supervision staff than a young man who is not apprenticed. Boys who had joined the company as ordinary employees also are encouraged to apply for apprenticeship, the object being to discourage the practice of putting young boys out to work with no particular plan for their training for a recognised trade and status in industry.

Applicants must have had elementary schooling with manual and practical classwork, or secondary schooling, and must show mechanical aptitude. Each candidate is interviewed by a selection board. The vacancies are limited and usually there is a waiting list.

The entrant is apprenticed either to the Aircraft Division or to the Engine Company and Propeller Division. The early practical training is largely common but in later stages there are many differences and the Divisions are separate organisations several miles apart.

For the probationary period and the first few months of apprenticeship the practical work is done in the School workshops and consists of basic instruction in workshop procedure and the use of tools.

In peace conditions as much as a year is spent in the School workshops—in the present times the basic use of tools is taught in about eight months, varying with the boy's ability. When the workshop instructors are satisfied, and provided that the progress in general and technical classes is satisfactory and the boy is physically fit and suitable for factory work, he is passed into the production workshops of the company in the trade for which he has been apprenticed. The practical training for the various trades is shown in Figures 7 and 8 on page 17.

All the apprentice's work, from the time he is promoted to work in the factories, is subject to the routine inspection so that his sense of responsibility is developed from the earliest stage. He is regularly visited and his progress is controlled and reported by the apprentice superviser in consultation with the shop foreman. He is subject to the discipline of the factory and is paid at the hourly rates for his trade and age. The rates vary slightly from time to time, but in April, 1945, they were as follows :—

Age				*Hourly rate*
16	...	...	...	6¾d.
17	...	...	...	8d.
18	...	...	...	11d.
19	...	...	...	1s. 15/16d.
20	...	...	...	1s. 3¾d.

Overtime is carefully watched and never allowed to interfere with class-room work.

During his probationary period and onward the boy is required to attend day-time theoretical classes in general and technical subjects, amounting to as much as two days in the 5½-day week. In the later years he must also attend evening classes in technical subjects, amounting to a maximum of 2 hours on three evenings per week. In the less intense curriculum planned for after the war the aim will be to minimize evening work. This theoretical training is arranged in conjunction with the county educational authorities.

The curriculum of theoretical training is given in Figures 3 and 4 on page 14 and is common to both engineering and trade apprentices. The trade apprentice is required to attend these courses so far as his ability allows, and individual attention is given (for instance, special classes at polytechnics outside the usual curriculum) to help promising young apprentices along in their weaker subjects and to make up for their early school leaving, so far as possible.

Boys who can assimilate the teaching in mathematics, engineering science, draughtsmanship, etc., stand a good chance of obtaining a scholarship which will upgrade them to the engineering apprenticeship, making available without fees the full training of an aeronautical engineer. Thus there is every possible opportunity for the trade apprentice, provided that his original schooling was soundly conducted and that he has the grounding and ability to keep pace with his general and technical teaching during apprenticeship. Examinations are held for these scholarships but the general character, personality and all-round qualities of each boy are taken into account as well as his examination achievement. There is nothing to prevent a trade apprentice from rising to the top of the industry.

THEORETICAL TRAINING

Engineering Student, Engineering Apprentice and Trade Apprentice

Aircraft Division

16 Years	Pre-training for Trade Apprentices in all divisions of the Enterprise.	English, English Literature, Industrial History, Commercial Geography, Mathematics, Engineering Science, Engineering Drawing, Workshop Practice, Physical Training.	
17 Years	Mathematics, Mechanics, Drawing Practice, Workshop Practice, Physics (Heat, Light and Sound).		
18 Years	Mathematics, Mechanics, Drawing Practice, Workshop Technology, Physics (Electricity and Magnetism).		
	Design, Stressing & Aerodynamics	*Production Engineering*	*Aircraft Operation & Maintenance*
19 Years	Mathematics, Mechanics, Drawing and Design, Aerodynamics, Metallurgy.	Mathematics, Mechanics, Jig and Tool Design, Metallurgy.	Mathematics, Mechanics, Theory of I.C. Engines, Ground Engineering A and C, Aerodynamics, Electrical Technology.
20 Years	Mathematics, Drawing and Design, Aerodynamics, Structures, Metallurgy.	Mathematics, Jig and Tool Design, Factory Organization, Metallurgy, Materials Laboratory.	Ground Engineering A, C and X, Electrical Technology, Metallurgy, Thermodynamics and Theory of I.C. Engines, Theory of Machines and Hydraulics.
21 Years	Mathematics, Drawing and Design, Structures, Aircraft Materials (Plastics, Dopes, Cements, etc.).	Jig and Tool Design, Commercial Practice, Aircraft Materials (Plastics, Dopes, Cements, etc.).	Ground Engineering B and D, Radio Communication, Aircraft Materials, (Plastics, Dopes, Cements, etc.), Commercial Practice.
22 Years	**Associate Fellowship Examination, Royal Aeronautical Society**	**Graduate Examination, Institution of Production Engineers**	**Ground Engineers' A, B, C, D & X Licences Examination, Air Ministry**

Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty. For that reason it is not possible for apprentices on the Design Side of the Aircraft Division to take all the subjects listed. Instead, by an arrangement which is acceptable to the R.Ae.S., they specialize in either Stressing or Aerodynamics.

Figure Three

Engine Company and Propeller Division

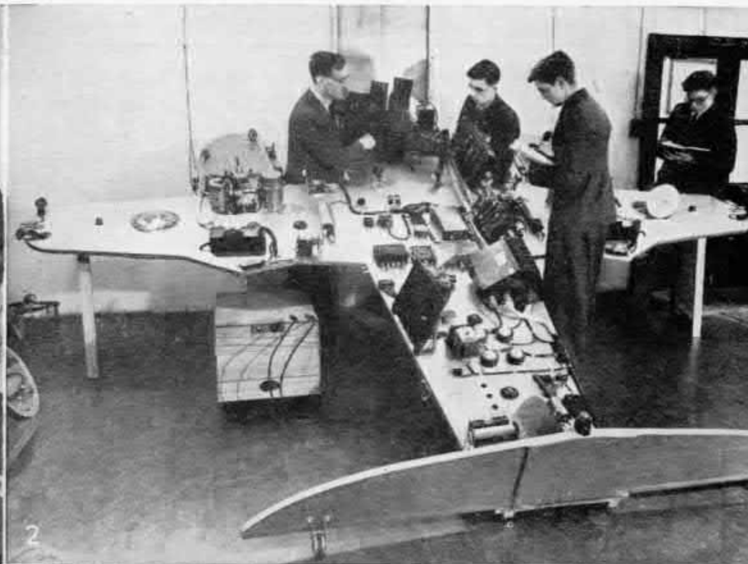
16 Years	Pre-training for apprentices in all divisions of the Enterprise.	English, English Literature, Industrial History, Commercial Geography, Mathematics, Engineering Science, Engineering Drawing, Workshop Practice, Physical Training.	
17 Years	Mathematics, Engineering Science, Engineering Drawing, Jig and Tool Drawing.		
18 Years	Mathematics, Applied Mechanics, Heat Engines, Metallurgy, Jig & Tool Design.		
	National Certificate Examination		
	Design and Stress (Piston and Turbine Engine)	*Design and Stress (Propeller)*	*Production (Engine and Propeller)*
19 Years	Mathematics, Theory of I.C. Engines (piston and turbine), Theory of Machines and Hydraulics, Metallurgy, Factory Organization, Materials (Fuels, Plastics, Rubber, Timber, Dopes, etc.).	Mathematics, Theory of I.C. Engines (piston and turbine), Theory of Machines and Hydraulics, Metallurgy, Factory Organization, Aerodynamics.	Mathematics, Factory Organization, Theory of Machines and Hydraulics, Jig and Tool Design, Metallurgy.
20 Years	Mathematics, Theory of Machines, Strength of Materials, Theory of Structures, Piston and Turbine Engine Design, Materials Laboratory.	Mathematics, Theory of Machines, Strength of Materials, Theory of Structures, Materials Laboratory, Aerodynamics.	Commercial Practice, Workshop Technology, Materials Laboratory.
21 Years	**Higher National Certificate Examination, Associate Membership Examination of the Institution of Mechanical Engineers, and Associate Fellowship Examination of the Royal Aeronautical Society**		**Graduate Examination of the Institution of Production Engineers**

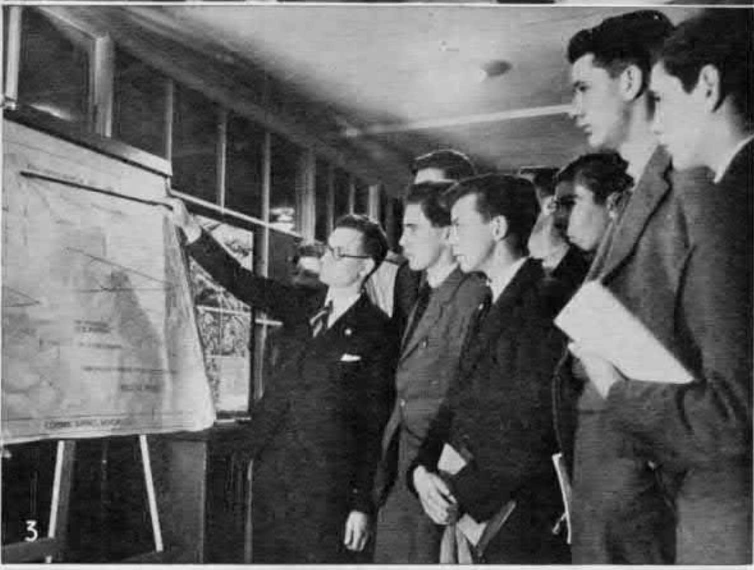
Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty.

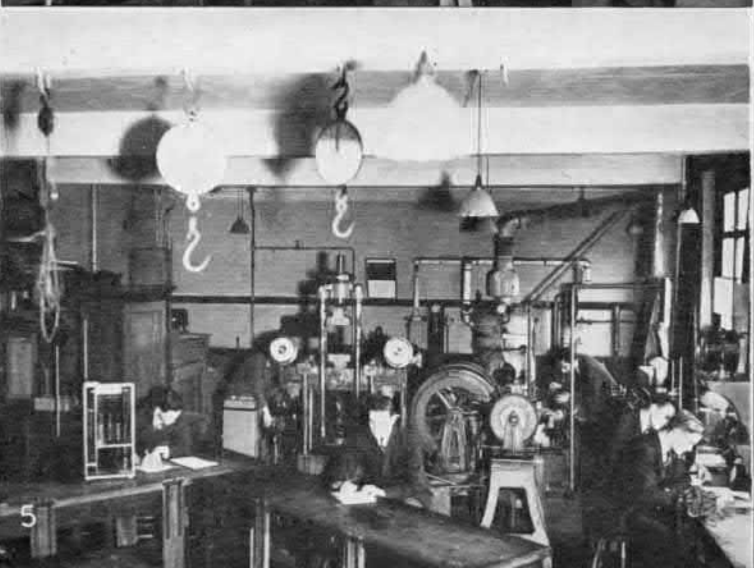
Figure Four

THEORETICAL TRAINING

1. *A design class in the Aircraft Division.*
2. *Ground engineers studying electrical services.*
3. *Ground engineering instruction on airframes.*
4. *An advanced mathematics class in progress.*
5. *Laboratory work at a county technical school.*
6. *A lecture on highly stressed metal structures.*







PRACTICAL TRAINING

Engineering Apprentices

Aircraft Division

1st Year in D.H. School Workshops	Basic use of tools in each of the following sections :— Woodwork, Fitting, Sheet Metal Work, Machining, Drawing.		The first half-year is a probationary period.
2nd Year in D.H. Factories	Timber Inspection, Wood Detail, Fitting Shop, Machine Shop, Foundry, Pattern Making, Casting, Rubber and Stretcher Press, Drop Hammer, Jigs and Fixtures.		
	Design.	*Production.*	*Aircraft Operation and Maintenance*
3rd Year in D.H. Factories	Material Test Laboratory, Heat Treatment, Processes, Fabric and Dope, Hydraulic and Electrical Departments, Propeller Course, Instrument Test Laboratory.	Materials Test Laboratory, Heat Treatment, Processes, Fabric and Dope, Hydraulic and Electrical Departments, Tool Room, Works Maintenance Dept.	Materials Test Laboratory, Heat Treatment, Processes, Fabric and Dope, Hydraulic and Electrical Departments, Engine Cowling, Erecting.
4th Year in D.H. Factories	Erecting Shops, Piston and Turbine Engine Installation, Loft, Flight Test, Structural Test Laboratory.	Erecting Shop, Stores Control, Production Machining, Methods and Rate Fixing.	Erecting Shop, Piston and Turbine Engine Build, Repair and Installation, Magneto and Carburettor Test, Propeller Course.
5th Year in D.H. Factories	Drawing Office, Aerodynamics Department, Stress Office.	Cost Estimating and Accounts, Jig and Tool Drawing Office.	Instrument Test Laboratory, Flight Test, Aircraft Repair and Maintenance.

Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty.

Figure Five

Engine Company and Propeller Division

1st Year in D.H. School Workshops	Basic use of tools in each of the following sections :— Fitting, Machining, Drawing, Internal-combustion Engines.		The first half-year is a probationary period.
2nd Year in D.H. Factories	Treatments, Fitting, Machining, Tool Room.		
	Piston and Turbine Engine Design.	*Propeller Design.*	*Engine and Propeller Production and Maintenance.*
3rd Year in D.H. Factories	Engine Assembly, Propeller Course, Engine Test, Engine Repair, Laboratory, Magneto and Carburettor Overhaul and Test, Inspection.	Propeller Course, Engine Assembly, Propeller Test, Propeller Repair, Inspection, Laboratory.	Production Machining, Engine and Propeller Assembly, Engine and Propeller Test, Plant Maintenance, Inspection, Stores.
4th and 5th Years in D.H. Factories	Engine Development, Drawing Office, Vibration Test.	Propeller Development, Vibration Test, Drawing Office.	Methods and Rate Fixing, Planning, Jig and Tool Drawing Office.

Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty.

Figure Six

PRACTICAL TRAINING

Trade Apprentices

Aircraft Division

Ist Year in D.H. School Workshops	Basic use of tools in each of the following sections :— Woodwork, Fitting, Sheet Metal Work, Machining.			The first half-year is a probationary period.	
2nd to 5th Years in D.H. Factories	*Pattern and Jig Maker.*	*Fitter (Aircraft).*	*Toolmaker.*	*Machinist.*	*Coppersmith and Sheet Metal Worker.*
	Wood Mill, Wood Detail, Timber Inspection, Pattern Making, Aero Jigs, Advanced Aircraft Construction Work as in Experimental Shop.	**Fitting Shop :—** General, Bench Fitting, Welding, Pipe Bending, Heat Treatment, Processes, Inspection, Aero Tools, Experimental, Press, Foundry, Specialized Aircraft Fitting.	**Tool Room and Aero Tools :—** Shaping, Turning and Milling, Surface and Universal Grinding, Setting-up and Marking-off, Templates, Layout and Development, Bend Blocks, Press Tools, Drilling Fixtures, Precision Tools, Jig Boring, Tool Inspection.	**Machine Shop :—** Shaping, Horizontal and Vertical Milling, Boring, Drilling, Grinding, Planing, Slotting. Capstans : Operating and Setting, Turning, including Screw Cutting, Face-plate Setting. Machine Repairs, Inspection. **Experimental Shop :** Machining from solid.	**Sheet Metal Shop:** General Sheet Metal Work, including :— Drop Hammer, Rubber and Stretcher Presses, Tank Making, Coppersmithing, Cowl Fixing, Panel Beating, Marking-off and Setting-out, Inspection. **Experimental Shop**

Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty.

Figure Seven

Engine Company and Propeller Division

Ist Year in D.H. School Workshops	Basic use of tools in each of the following sections :— Fitting, Machining, Internal Combustion Engines.		The first half-year is a probationary period.
2nd to 5th Years in D.H. Factories	*Fitter (Piston and Turbine Engines and Propellers).*	*Toolmaker.*	*Machinist.*
	Fitting Shop :— General, Bench Fitting, Heat Treatment, Anti-corrosive Treatment and Plating, Processes, Inspection. **Engine—** Assembly, Repair, Testing. **Propeller—** Assembly, Repair. **Experimental Shops.**	Cutter Grinding, Tool Hardening. **Tool Room :—** Shaping, Turning, Milling, Surface, Universal and Internal Grinding. Setting-up and Marking-off Templates, Press Tools, Drilling Fixtures, Tool Inspection.	Heat Treatment, Cutter Grinding. **Machine Shop :—** Shaping, Horizontal and Vertical Milling. Boring, Drilling, Grinding, Planing, Slotting. Capstans :—Operating and Setting, including Screw Cutting, Face-plate Setting. Machine Tool Repairs, Inspection. **Experimental Shops :—** Machining from solid.

Note.—In the war-time course the training outlined above is condensed into about three years, ending at the age of twenty.

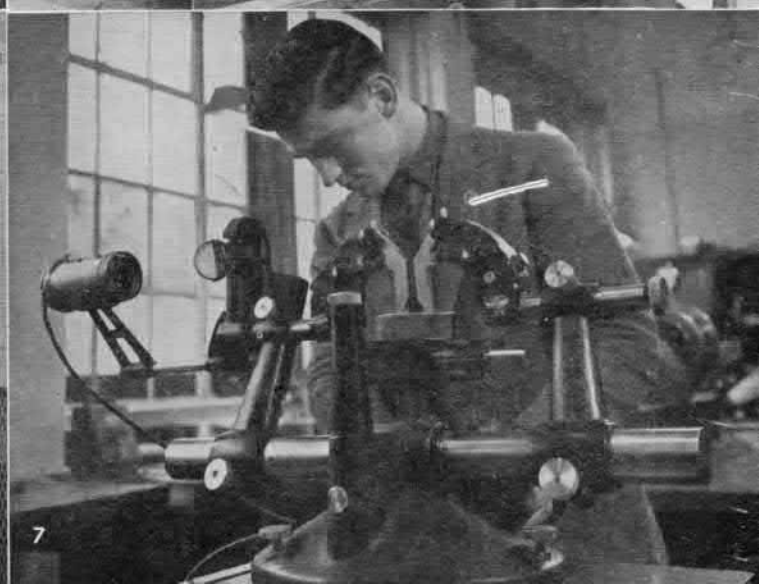
Figure Eight

PRACTICAL TRAINING

1 *Finishing a drop-hammer die in the foundry.* 2. *Wood-pattern making in the foundry.* 3. *Sheet-metal craftsmanship in the School workshop.*

4. *The coppersmith section in the School workshop.* 5. *A shear-testing machine made by the apprentices.*

6. *A Brinell-testing machine made by the apprentices.* 7. *Routine laboratory work in one of the factories.*

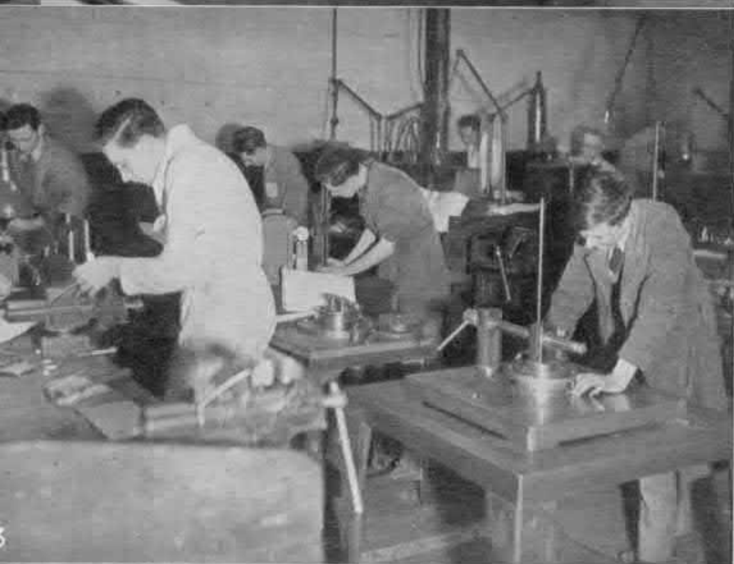


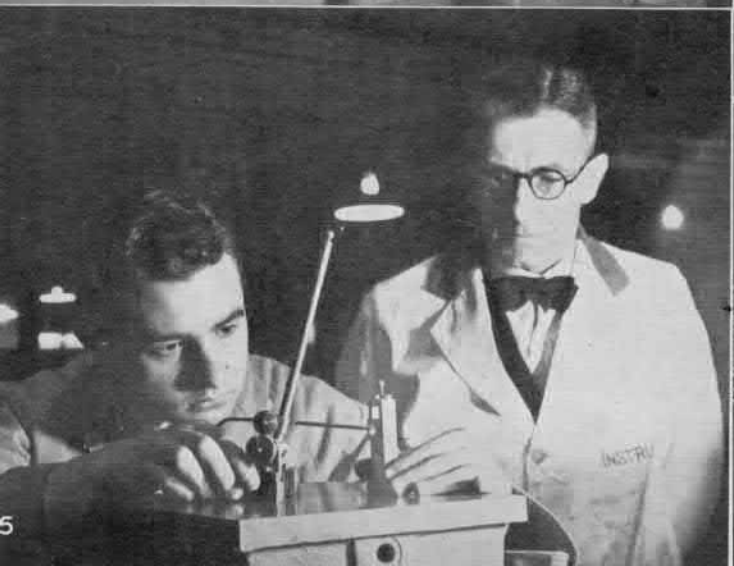
PRACTICAL TRAINING

1. *Testing moisture content in the wood mill.*
2. *Early wood-working instruction.*
3. *Fine work in the machine repair section.*
4. *Jig-boring instruction in one of the factories.*
5. *Learning routine engine overhaul methods.*
6. *Grinding, part of the machine-shop experience.*
7. *Learning to operate a typical capstan lathe.*

PRACTICAL TRAINING

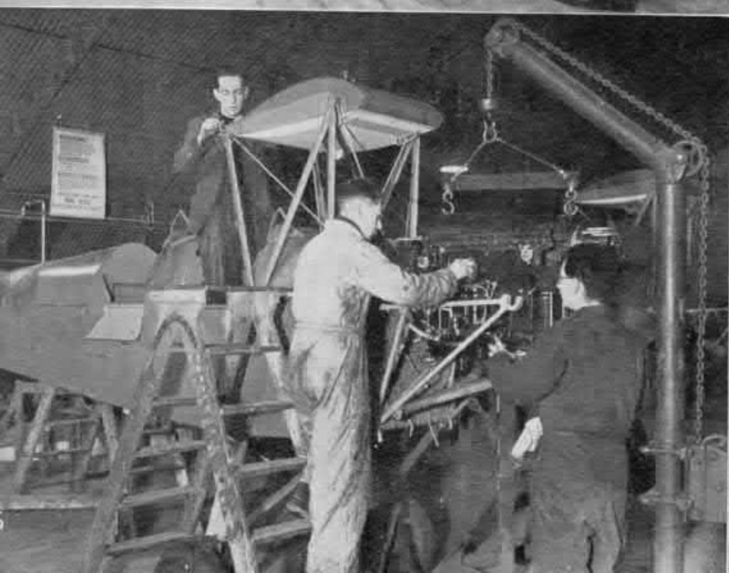
1. *A woodworking class in one of the School shops.*
2. *An assembly class on piston-type in-line engines.*
3. *Advanced technique in an Engine Company tool room.*
4. *Precision measurement of propeller blade profile.*
5. *Marking off in the fitting section of the School shops.*
6. *Sheet metal forming by the rubber-press method.*





PRACTICAL TRAINING

1. *The original Mosquito prototype, presented to the School.*
2. *Ground-engineer apprentices at a D.H. flying school.*
3. *Engineering apprentices studying typical biplane structure.*
4. *Day-to-day maintenance on the Gipsy Major I engine.*
5. *Complete overhaul of Tiger Moths in the flying school.*
6. *Mosquito Repair Organisation: field repair work.*



Chapter 5.

WELFARE

BILLETING

In peace-time it has been customary for all apprentices and students to make their own living arrangements. They were provided with lists of approved guest houses and lodging accommodation, but they or their parents made all arrangements themselves.

This practice has continued during the war but the increased demand for accommodation near the main de Havilland factories made it necessary to provide additional facilities.

The School therefore took over a small country house which is run as a hostel for apprentices. It is in excellent surroundings, competently staffed and comfortable, but limited in capacity. Boys living in the house have all meals there except the mid-day meal on week-days. The hostel is shown in a picture on page 4.

MESSING

Mid-day meals and other light refreshments are taken at any of the factory canteens and are available at low prices.

WELFARE

The Medical Officer, with a large staff of trained personnel, is in touch with the conditions under which all students and apprentices live and work. In addition the School, as distinct from the works, has a First Aid and Welfare Section and the boys are encouraged to seek its advice freely. Those from overseas or otherwise separated from their parents particularly find this section helpful. Free milk is available for the juniors.

SPORTS AND RECREATIONS

Facilities are available for boys to participate in most outdoor games, and they are encouraged to take part in games which engender the team spirit. Playing fields are provided for Rugby and Association football, there are both grass and hard tennis courts, squash courts, a swimming pool and a bowling green, all on the premises. There is also a gymnasium and there are regular classes in gymnastics and physical training under a qualified instructor.

There are many clubs and societies within the organisation covering such subjects as art, photography, music, amateur dramatics. All of these are open to trainees—indeed, apprentices are keenly welcomed into their membership and activities.

FLYING

In the years of peace there were facilities for learning to fly at the de Havilland flying training schools, with special terms for apprentices. These arrangements are, of course, suspended but they will be revived as quickly as possible after the war.

LIBRARY

An excellent general library, at which almost any book, technical or otherwise, can be obtained, is available on company premises, with reading rooms open to all who are under training. The engineering section covers all the technical subjects required whilst attending the School. Daily and weekly periodicals and other publications are provided in the reading rooms.

CLOTHING

Clothing coupons are issued from time to time to enable boys to obtain overalls. The practical work in the shops is hard on clothing, even when overalls are worn, and each boy should be in possession of an old suit for this purpose. Those accommodated in the hostel may take advantage of mending facilities on the premises.

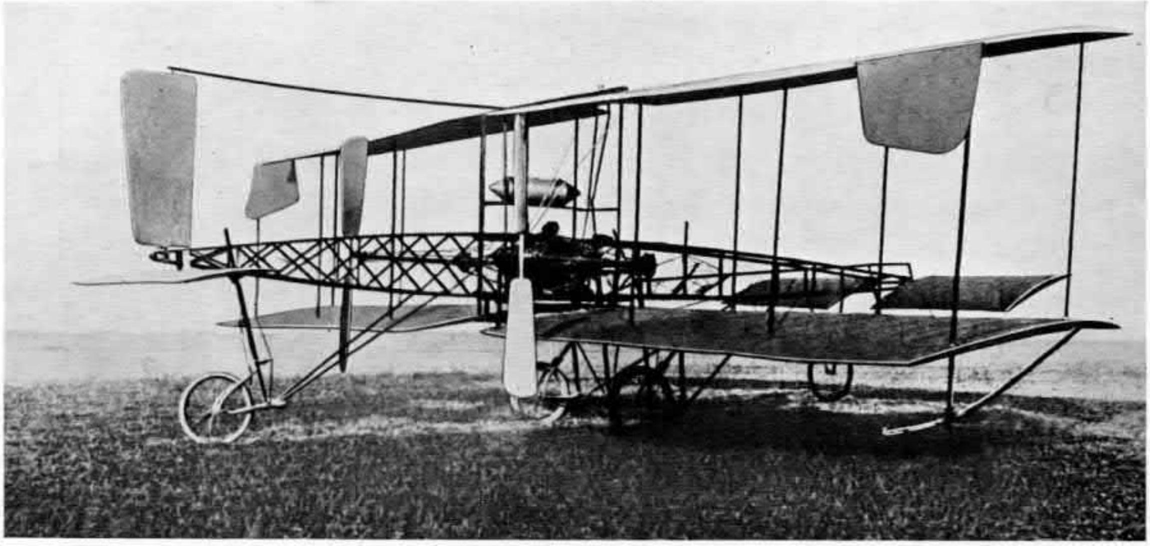
HOLIDAYS

In war-time the School has the same holidays as those arranged by the Government for workers in aircraft factories. As most of the boys are of military age, and are deferred from call-up only whilst undergoing their apprenticeship course, they come under the same holiday regulations as other workers within the industry.

WELFARE

1. *The football field at the Company Headquarters.*
2. *Physical training for apprentices by the swimming pool.*
3. *The principal surgery of the Aircraft Division.*
4. *A dormitory at the war-time hostel for apprentices.*
5. *Plain midday fare in one of the works canteens.*
6. *The Aircraft Division library in war-time premises.*

AN OUTLINE OF D.H. HISTORY



1908—1909. *The first de Havilland aeroplane.*

THE de Havilland Aircraft Co., Ltd., came into being on September 25, 1920. Fourteen men and one woman still with the enterprise at the end of 1944 were among the fifty or sixty individuals who 24 years previously moved into a couple of sheds and a wooden office hut which formed the original home of the company on Stag Lane Aerodrome, Edgware. That old hut, brought from Stag Lane a few years ago, is still in use as an office building in the Aircraft Division.

The men who got the company going in a humble way in 1920 have guided its development throughout the subsequent years and are its active leaders to-day. They are Sir Geoffrey de Havilland, Mr. F. T. Hearle, Mr. C. C. Walker, Mr. W. E. Nixon and Mr. F. E. N. St. Barbe. Mr. A. S. Butler, a keen airman, joined the company as a director in 1921, and has been Chairman of the Board since 1922.

At the end of each year since the company's twentieth birthday in 1940 a gathering has been held of those who have served it for an unbroken spell of twenty years. Many of these veterans had been working together before 1920 at the Hendon factory of The Aircraft Manufacturing Co., Ltd., of which Sir Geoffrey (then Captain de Havilland) was Chief Designer during the last war. In all there were, early in 1945, 32 twenty-year employees who were previously at "Airco."

Mr. Hearle joined the Captain very much earlier still, in 1908, and helped to build his first aeroplane. This historic machine had a four-cylinder, horizontally opposed, water-cooled engine of de Havilland's own design, driving through bevel gearing two propellers of which the aluminium blades were "adjustable as to pitch and as to twist." On its first flight this aeroplane came to grief, but luckily de Havilland was not hurt, neither was his ardour dampened, and the two men at once set about constructing around the undamaged engine an improved aeroplane on which de Havilland successfully taught himself to fly.

1910. *The second de Havilland aeroplane, at Highclere.*

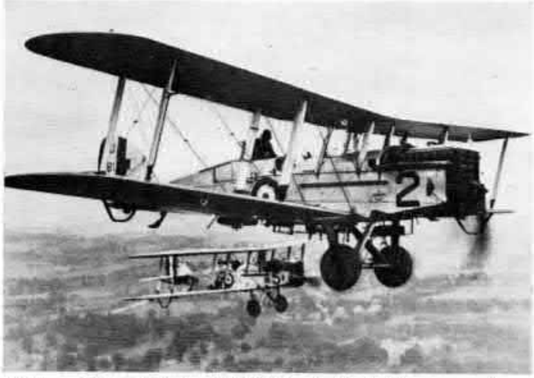
1914. *The D.H.1 two-seat fighter designed at Hendon.*

When their little money was nearly all gone, and it looked like a return to motor-car engineering, the two men were offered positions at the Government Balloon Factory at Farnborough, and the " de Havilland No. 2 " was purchased as well. That was in 1910. At Farnborough de Havilland was mainly responsible for the design of a military canard-type pusher biplane, and of the better-known B.E. series of tractor biplanes for the Army. Early in 1914 he joined Mr. Holt Thomas's firm, The Aircraft Manufacturing Co., Ltd., at Hendon.

Before war broke out with Germany in August that year he was well on with the design of the D.H.1 two-seat pusher biplane fighter, and he followed it with the single-seat D.H.2, the twin-engined D.H.3 bomber prototype and, in 1916, the tractor biplane (D.H.4) which, first appearing as a bomber with fighter performance (as did the Mosquito 24 years later), was developed also for fighting, photographic reconnaissance and other functions and became a famous multi-purpose machine. In prototype form it was fitted with the B.H.P. 230 h.p. engine designed by Major Frank B. Halford, whose association with de Havilland has continued progressively throughout the subsequent years so that to-day he is Technical Director of The de Havilland Engine Co., Ltd., which was " budded off " from the parent concern on February 1, 1944.

It is often said that no aircraft did so much towards the defeat of Germany in the 1914–18 war as the D.H.4 and the D.H.9 that was developed from it. By October, 1918, Airco were building over 250 aircraft per month, mostly D.H.9's. They were just going on to the D.H.10, developed from the D.H.3 for the purpose of bombing German industries, when the war came to an end. A third of the total Allied air forces (and 95 per cent. of all the American production for the war) were aircraft of de Havilland design.

Official cross-Channel air services, and later public air lines, were run with D.H.4's and 4A's and 16's (adaptations of the war-time D.H.4's and 9's) but they were lean times for aviation and in 1920 when



1918. *General-duty D.H.9A's, built in large numbers.*

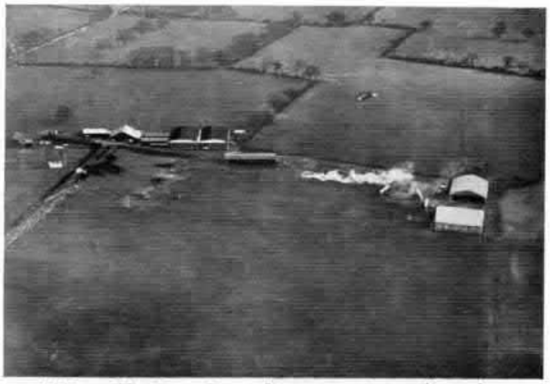
1918. *The D.H.10 for bombing German industries.*

1919. *D.H.4A's inaugurate the London–Paris airway.*

1916. *D.H.4's for the R.F.C.—bombers with fighter speed.*

1920. *The D.H.18, improved air-line equipment.*

1920. *The original " general offices " of the Company.*



1921. *The Stag Lane factory in its earliest days.*

1922. *The D.H.34 8-passenger European airliner.*

Capt. de Havilland and Mr. Walker were designing the D.H.18, an 8-seater cabin machine which was the first proper attempt at a transport aeroplane, the Airco concern decided to close down their Aviation Department. Unable to believe that there could be no future in civil flying, Capt. de Havilland and his colleagues managed to form a little company on their own, again with Mr. Holt Thomas's help, and from that the present world-wide organisation has grown.

In the office hut of the new company at Stag Lane the " Design Department " (comprising Capt. de Havilland and Mr. Walker) occupied a small room on the left of the entrance. On the right was a little office from which Mr. Hearle controlled production—though the only job on hand at first was an order from the Ministry to finish off a couple of D.H.18's that had been started by Airco. Next to Mr. Hearle's office was a small room which Mr. St. Barbe, the Business Manager, shared with Mr. Nixon, the Secretary.

To-day, Sir Geoffrey de Havilland and Mr. Walker, as Technical Director and Chief Engineer of the Aircraft Company, have charge of all design and technical matters, Mr. Hearle is the Director particularly concerned with educational matters and was Managing Director for several years, Mr. Nixon is Managing Director, and Mr. St. Barbe is Business Director. Of the separate Engine Company, Major F. B. Halford is the Technical Director (as mentioned above) and Mr. J. L. Brodie, who has been at Major Halford's right hand since 1922, is the Director in charge of the Engineering Division.

From 1920 until Germany's second attempt at world domination brought war again in 1939, the company's effort and enthusiasm were concentrated in the development of aviation for civil and commercial uses. The D.H.18 was followed by a long cavalcade of transports through the nineteen-twenties and 'thirties, notably the D.H.34 for the cross-Channel services of 1922, the D.H.50 of two years later, famed for its transport service in Australia, the three-engined Hercules (D.H.66)

1926. *The D.H.50J after Cobham's famous flights.*

1927. *The Moth made private flying practicable.*

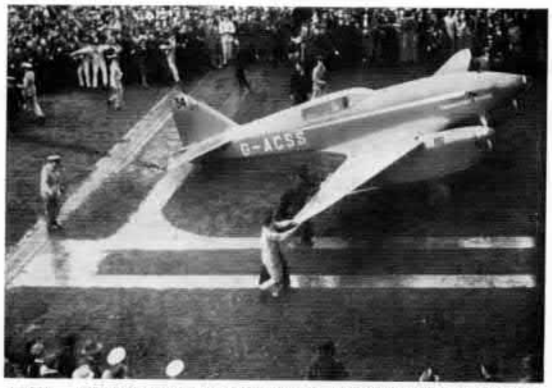
of 1926 for Imperial Airways, the economical Dragon series starting with the D.H.84 in 1932, the modern 22-passenger four-engined Albatross (D.H.91) of 1938, and the all-metal 12–20-passenger Flamingo (D.H.95), which was ready for world markets in 1939, when the war put a stop to its career.

The other strong line of development was in training and touring aeroplanes. From the early nineteen-twenties the company pioneered the development of reliable, safe trainers whose design, as it were, crystallised in 1925 in the Moth. The name " Moth " became a household word throughout the world and many variations of the Moth theme (some trainers, others cabin touring types) were built in small and large numbers. The Tiger Moth, numbered to-day in many thousands, has earned fame as the standard trainer for the Royal Air Force and the Dominion and Colonial Air Forces throughout the present war, and was adopted by several foreign governments as well.

The first Moths had Cirrus engines, designed by Major Halford in collaboration with Capt. de Havilland, and in 1927, partly owing to the difficulty of getting deliveries, the company began to feel that they should develop their own range of engines. The association with Major Halford was then established on a more serious footing and he created the 100 h.p. four-cylinder Gipsy One, the prototype of which, developing 120 h.p., created a stir by establishing a world speed record for light aeroplanes (187 m.p.h.) in the little Tiger Moth racing monoplane (D.H.71, not to be confused with the D.H.82 trainer) piloted by Hubert Broad. One of the early Gipsy One's did 600 hours' flying in a Moth under Air Ministry seal. When overhauled it called for only about £7 worth of replacements. Durability and reliability were thus the essence of the Gipsy designs from the outset. The Gipsy One started its career with an overhaul period of no less than 450 hours. From 1927 onward (and earlier if we include the Cirrus) Major Halford has designed every de Havilland engine, the largest in the Gipsy series so far being the 525 h.p.

1928. *The D.H.71 (Gipsy One) which did 187 m.p.h.*

1933. *The Dragon on Hillman's London–Paris service.*



1934. *The Comet at Melbourne—11,000 miles in 71 hrs.*

1927. *The King's Cup won by the Moth.*

1934. *Stag Lane celebrates the triumph of the Comet.*

1934. *D.H.61 on first scheduled Australia–England mail.*

1935. *Learning the new technique of propeller production.*

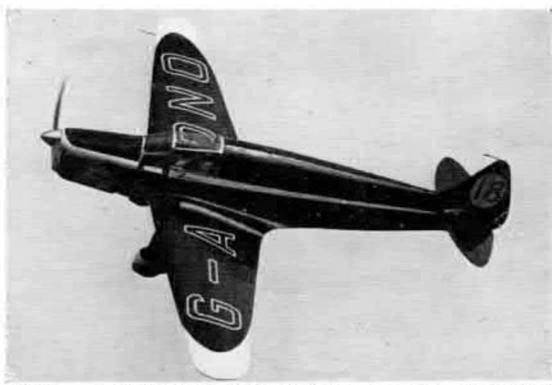
1935. *The D.H.86 early in its long and world-wide career.*

Gipsy Twelve, while his new gas turbines are among the most powerful aero engines in the world. Tens of thousands of Gipsies have been made and used the world over. They are noted for long life and reliability without equal in the world of aeronautics.

Another landmark in D.H. history was the England–Australia race of 1934. The British Government policy throughout the inter-war period was one of disarmament and appeasement, and partly for this reason artificial aids and subsidies to civil aviation (which might have been suspected of concealed militarism) were kept to the minimum, so that the Empire did not boast any fast transport aircraft at the time when this race was announced. It looked as if the honours would go to America, but de Havillands, feeling that some financial risk in producing a special British racer for this event was justifiable, created the Comet (D.H.88) with two Gipsy Six 200 h.p. engines and a speed of about 225 m.p.h. By flying from England to Australia in 71 hours this graceful little two-seat monoplane won the race against big American liners traversing their regular route in comfort with full navigational aids.

The Comet was the first British aeroplane to be designed around the combination of variable - pitch propellers, wing flaps and retractable undercarriage, and it was in designing it that the company became convinced of the enormous future for variable-pitch propellers. Mr. Hearle went to America and at once secured the licence for the British Empire for the only tried and successful v.p. propeller then in existence, namely, the Hamilton. It is a significant memory that there was thought to be " no military use " for variable - pitch propellers at the time ! Despite such opinions they soon became standard equipment for almost all aeroplanes except little trainers and touring machines, and, thanks to this foresight, Britain entered the war five years later with a range of thoroughly sound variable-pitch propellers already in enormous production. Indeed, de Havillands had by then become the biggest manufacturers of v.p. propellers in the world, a very fortunate thing for democracy.

1936. *A Tata Dragon Rapide at Bombay airport.*



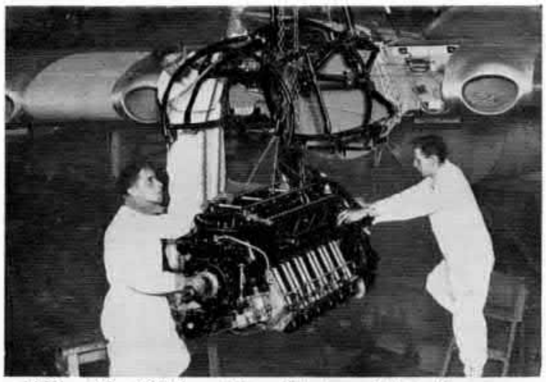
1936. *A D.H. Tech. School design exercise, the T.K.2.*

AN OUTLINE OF D.H. HISTORY

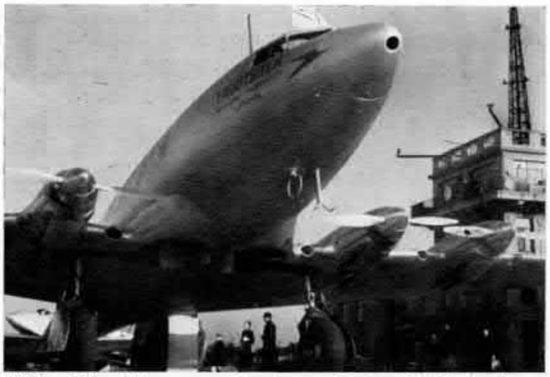
An outstanding aspect of D.H. history has been the development of overseas trade and manufacture. In 1927 a small branch company was formed in Australia, now a large manufacturing concern building Mosquito and other aircraft and propellers for the war with Japan. In 1928 the company in Canada was inaugurated, now a great establishment devoted to the production of Mosquitoes. In 1929 the branch in India was opened; a small establishment in pre-war days, it is now much enlarged and is engaged in overhaul and repair work and component manufacture. In 1930 and 1935 were formed the de Havilland companies in South Africa and Rhodesia; mainly distributing and servicing concerns, they have been taken over by the authorities to serve the war effort. Early in 1939, specifically to serve the Empire Air Training Scheme, a branch factory was established in New Zealand to build Tiger Moths.

From the earliest years the company have also taken care to appoint good agents for distributing and servicing their products everywhere.

In the present war de Havilland have produced on their own initiative an outstanding aircraft in the Mosquito, fastest, most versatile and most efficient combat aircraft of its day. It has been built in thousands for service with every command of the Royal Air Force, is one of the most successful aircraft of the war, and has been adopted by the United States Army Air Forces as well for reconnaissance and other duties calling for specially high performance with long range. Soon after the prototype Mosquito made its first flight at the end of 1940 de Havilland designers headed by Major Halford set to work and produced a gas-turbine jet engine of high output, entering upon a new and virtually unknown field of propulsion development. Concurrently, and in closest collaboration, the de Havilland Aircraft Division designed an interception fighter aircraft, necessarily to an entirely novel formula, to be powered by the gas turbine on which Halford was engaged. Despite wartime difficulties less than four years have seen the new aircraft and its revolutionary power unit designed, built



1937. *The 525 h.p. Gipsy Twelve of the Albatross.*



1938. *The Albatross: London to Paris within the hour.*

1939. *Tiger Moths and the new Moth Minor.*

1937. *Another School design—the 230 m.p.h. T.K.4.*

1939. *The Flamingo, on the London–Jersey service.*

1940. *After the Mosquito's first flight, November 25.*

1944. *The Mosquito and its 4,000-pound blockbuster.*

and test flown exhaustively to an advanced stage of development where it comes to be looked upon as the probable mainstay of the British fighter force for some years to come. Furthermore, the work done and the success accomplished have placed the de Havilland Enterprise in the lead of a new development which has remarkable possibilities in every branch of aeronautics.

In less spectacular but vital ways de Havilland have served the prosecution of the present war. The main part in the supply of variable-pitch propellers for the Royal Air Force has been contributed by the de Havilland Propeller Division. The basic trainer on which the great mass of pilots of the Empire air forces learned to fly for the present struggle was a de Havilland machine with a de Havilland engine of Major Halford's design.

Further new aircraft are in development early in 1945, one a small passenger transport of highly advanced design for humble but most necessary service in the era of reconstruction. This all-metal aeroplane, the Dove, D.H.104, will be powered by a larger, supercharged and developed version of the well-known Gipsy Queen six-cylinder unit, with a new de Havilland constant-speed, feathering and braking propeller. This latest engine is the largest of a completely new range of Gipsy piston engines which have been under development steadily throughout the war period for the next generation of aircraft in the smaller categories.

The de Havilland Enterprise in 1945 occupies a leading position among the creative organisations of the aviation industry of the world, and is in fact the only builder of the three major units—aircraft, engines (including turbines) and propellers—to hold a place of eminence in both civil and military fields and to possess full-scale manufacturing establishments in three continents.

1945. *The most efficient air weapon yet.*