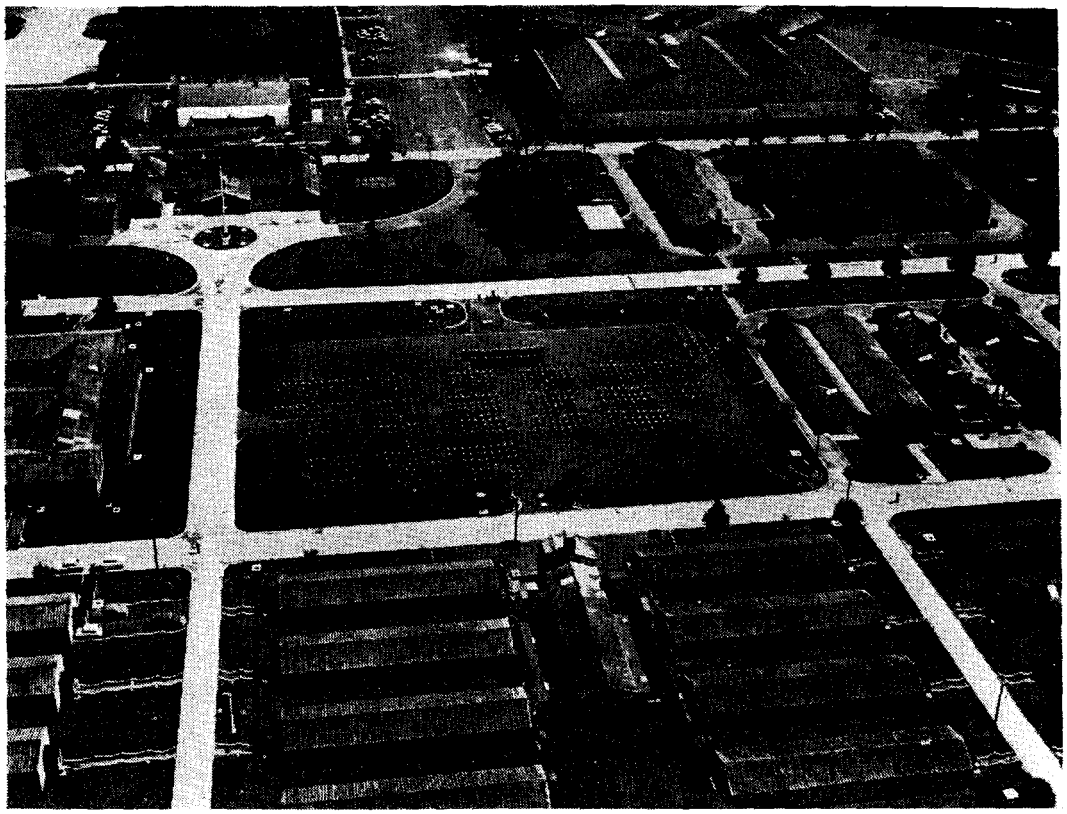

FIG. 1—R.N.A.S. ARBROATH—PARADE GROUND, ACCOMMODATION BUILDINGS, CINEMA, WORKSHOPS AND TRAINING HANGARS

H.M.S. CONDOR

THE ROYAL NAVAL AIR ENGINEERING SCHOOL R.N. AIR STATION ARBROATH

BY

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The last full article on the Royal Naval Air Station, Arbroath, appeared in the *Journal* in 1953, and 1965 is a fitting occasion to bring the story up to date since this year marks the twenty-fifth anniversary of the establishment. It was first commissioned on 19th June, 1940, and the first commanding officer was Captain E. M. Connolly Abel Smith, R.N.

R.N.A.S. Arbroath is the fourth ship to bear the name of *Condor* and is larger than and has remained in commission longer than the three previous ships, which ranged from 227 tons to 980 tons, the first commissioned in 1876 and the third in 1914.

THE WAR YEARS AND AFTER

During the period 1940–1945, R.N.A.S. Arbroath was an operational Flying Training School and many air crews passed through the establishment. Deck landing, observer, and air gunner training together with the Air Signal School in Ashbrooke House on the perimeter of Arbroath airfield, were the main training tasks but a number of Front Line Squadrons were based on the Air Station from time to time throughout the war. Towards the end of the war the flying training commitment decreased and the Observer School moved away.

By 1945 a number of aircraft still remained but the Air Station's future hung in the balance. It was then that the decision was made to move to Arbroath the Aircraft Artificer Apprentices under training at Newcastle-under-Lyme. They arrived in January, 1946, over one thousand of them, of the Airframe/Engine (AE) and Electrical/Ordnance (L/O) trades. Many were accommodated at Easthaven, a satellite airfield, although training was carried out only at Arbroath.

In 1949 all (L) apprentices had moved to H.M.S. *Ariel* at Warrington, the Air Electrical School. Apprentices (O) remained, but their training was discontinued in 1949. From then on R.N.A.S. Arbroath was concerned only with the training of Fleet Air Arm maintenance ratings in the mechanical trades, and this has been the prime task ever since.

By 1949 the only courses at R.N.A.S. Arbroath were for aircraft apprentices (AE) and aircraft mechanicians, the latter having recently been introduced. Training of other aircraft maintenance ratings in the mechanical trades was spread between Bramcote, St. Merryn, and Yeovilton. By 1958 all of these tasks had been removed to Arbroath where they are now firmly established and fully integrated.

Sadly the airfield was too small for jet aircraft of the post-war era and runway extension was not a practical proposition. The flying capability has therefore been limited in more recent years but the airfield is still in active use and, it is hoped, will remain so for many years to come.

If unsuitable for fixed-wing jet aircraft it has great potential for dispersed training of helicopter squadrons, is a useful transit base, and, perhaps most important of all, provides the means of maintaining the interest in aviation of our young trainees. It allows them to be given air experience in the establishment's Sea Prince aircraft and in any other aircraft which may be available, and this experience, for certain courses, can be phased in with lectures on the principles of flight. A very active gliding club makes full use of the airfield and helps to emphasize still more the air atmosphere of the establishment.

The past history of R.N.A.S. Arbroath would not be complete without mention of Rear-Admiral, Reserve Aircraft, later to become in 1956 Flag Officer Reserve Aircraft. The Rear-Admiral Reserve Aircraft was the Administrative Authority for what was, then, a very large Reserve Aircraft Holding, Repair and Maintenance Task, which was carried out at three major Aircraft Repair Yards, at several air stations known as Aircraft Holding Units, and at a number of other air stations where Holding Sections were established. The Admiral and his staff moved into Ashbrooke House in 1945 when the Air Signal School closed down and remained in sole possession until they moved to Lee-on-Solent in 1959 to become part of the Staff of Flag Officer Air (Home). After their departure Ashbrooke House became something of a white elephant for a few years but in 1964 the lower floor of the house was refurbished and put back into full use as the Instructional Technique School for Scotland. In the Summer of 1965 the upper floors were similarly redecorated, and then equipped as the home of R.N.A.S. Arbroath's Leadership School for Leading Rates, a school which is now being developed to run in exactly the same way as the other recently established schools for this purpose at Portsmouth, Plymouth, Rosyth and Singapore.

THE PRESENT TASK

At the present time the task of R.N.A.S. Arbroath is a diverse one (see FIG. 2) with courses ranging from those of a few days in length to one spread over four years. In all there are ten different career courses, as follows:-

Course

1. Naval Air Mechanic (AE) (i.e. Airframe and Engine) and Wren Air

THE TASK OF H.M.S. CONDOR

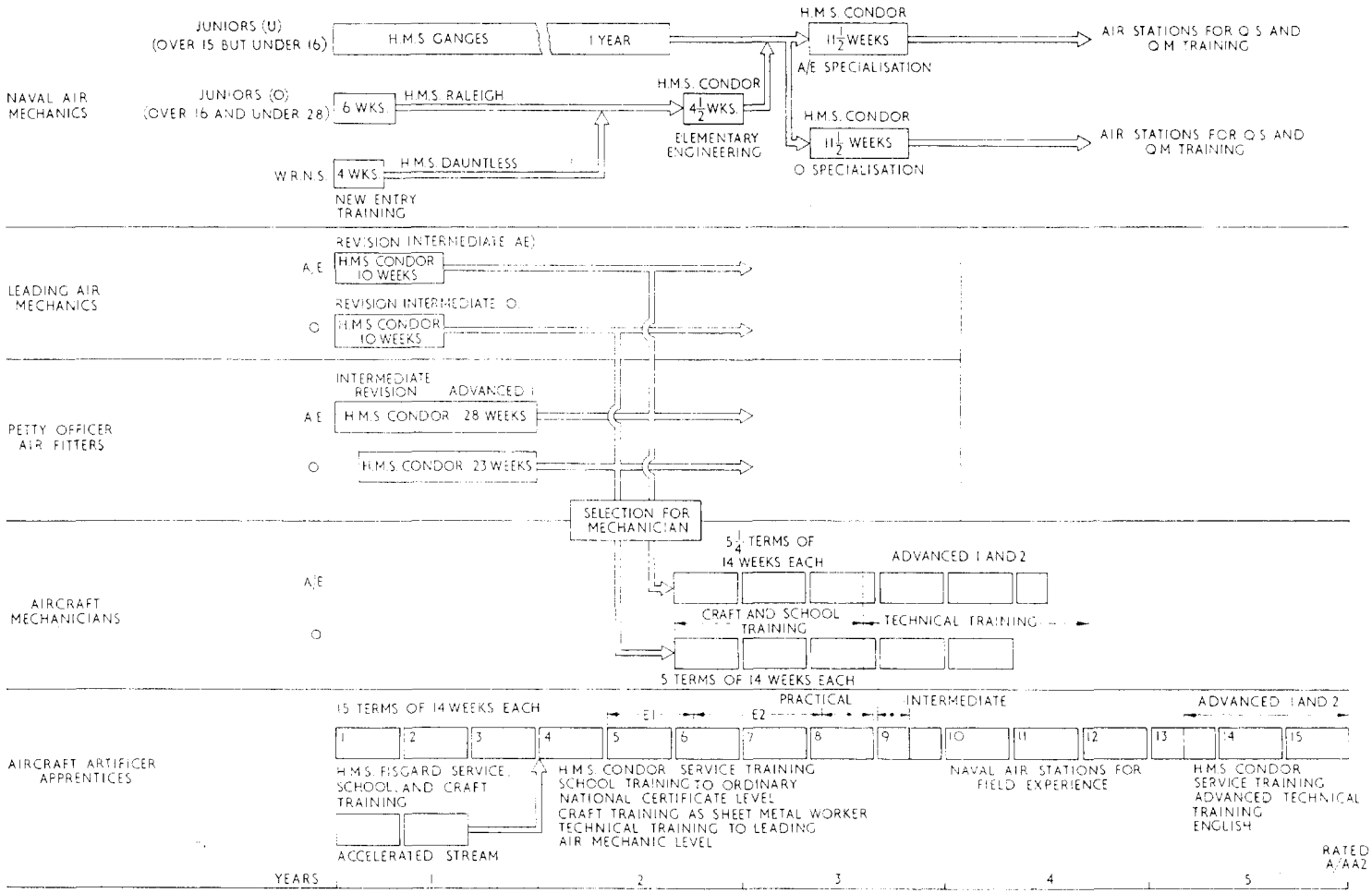

FIG. 2

Mechanic (AE)
2. Naval Air Mechanic (O) (i.e. Air Ordnance)
3. Leading Air Mechanic (AE) and Leading Wren Air Mechanic (AE)
4. Leading Air Mechanic (O)
5. Petty Officer Air Fitter (AE) and Petty Officer Wren Air Fitter (AE)
6. Petty Officer Air Fitter (O)
7. Aircraft Mechanician (AE)
8. Aircraft Mechanician (O)
9. Aircraft Artificer Apprentice (AE)
10. Aircraft Artificer (AE) 3rd Class.

At any one time there may be up to 29 of these courses under training with a total of up to 650 trainees. This is a comparatively steady task which can be forecast well ahead and planned carefully to enable the most economic and efficient use to be made of instructors, classrooms and equipment.

In addition there are available at Arbroath 38 Short Aircraft Maintenance Courses (SAMCOs) of from $2\frac{1}{2}$ days to 12 weeks in length designed to familiarize officers and ratings on new aircraft, engines, equipment, and techniques. These SAMCOs are similar to pre-commissioning courses and personnel are normally sent to them prior to joining ships and squadrons. The number requiring such SAMCOs varies considerably from month to month and cannot be easily forecast, and this gives rise to uneconomic peaks and troughs in the training task. During 1965, 15 officers and 1,165 ratings are scheduled to attend these courses.

The Fleet Air Arm School of Management, although coming under the category of a 'SAMCO' deserves special mention. Designed for senior aircraft maintenance ratings of all trades particularly for those going as C.A.A.s, C.E.A.s, C.R.E.A.s, etc., of carriers or squadrons, and for senior rates of small ships' helicopter flights, the course is of three weeks duration. The first week is devoted to the principles of management, the second to maintenance procedures and documentation, and the final week to work-study, related where possible to the aircraft maintenance and repair task. The school has also a steady throughput of officers and ratings for short refresher courses on aircraft maintenance procedures and documentation.

Other important SAMCOs additional to those concerned with particular types of aircraft, engines and equipment include:-

Aircraft Husbandry

This is one week in length and is designed to instruct senior ratings in the techniques of good aircraft husbandry, corrosion prevention and rectification. Officers are given an abbreviated course of approximately two days.

Corrosion of naval aircraft has latterly reached more serious proportions with the ships and carriers now operating for the majority of their time in the hot, humid, salty conditions east of Suez. A better understanding of the problem and the need for timely measures to combat corrosion is essential, and as many air technical officers and ratings as possible are therefore being spared to attend this course. It is hoped that this will contribute to a general improvement in aircraft availability and a marked reduction in the maintenance and rectification work which results from corrosion.

Aircraft husbandry lectures are also included in all SAMCOs on aircraft and engines and in all career courses.

High Speed Finish

This course which lasts two weeks is designed to instruct ratings in the application of high speed finishes and the touching-up or complete refinishing of aircraft.

FIG. 3—COURSE PLANNING IN THE PLANNING CENTRE

Welding

Basic and advanced welding courses are available of four weeks' and six weeks' duration respectively. These provide welding refresher training, and continuation practice and training in advanced welding techniques.

Air Engineer Officers' Writers' Course

This is five weeks in length.

Aircraft Decontamination

This course is designed to train Air engineer officers and senior aircraft maintenance ratings in the general principles and methods of aircraft decon-

tamination, and lasts four days.

Airframe Repairs

This is a four-week course to provide refresher training in the skills associated with airframe repairs and to give instruction and practice in the latest techniques using modern materials.

There is an additional annual throughput of 300 officers and cadets of the Sea Cadet Corps, the latter who come for one week Air Badge Courses in aircraft maintenance.

Finally there are courses at R.N.A.S. Arbroath for AE and AL officers from Manadon phased in with their advanced specialist training, and a cross-training course for AL officers.

PLANNING AND INTEGRATION OF THE TRAINING TASK

The Planning Centre

With such a diversity of training tasks careful planning is essential. Inevitably, as each training school transferred to Arbroath during the period 1950–1958 it brought with it its own organization and tended to remain a separate entity in its new surroundings, having its own classrooms, hangars, instructors and domestic accommodation. This inhibited flexibility and was clearly uneconomic.

In 1963, a work-study of the training task and its administration was carried out. Resulting from this the Co-ordinated Planning Centre (FIG. 3) was established based on a system previously started at H.M.S. *Vernon*. All data required for effective control of the training task is assembled under one roof and all plans and proposals affecting this task are channelled through the Planning Centre. This is shown on a centralized display and provides an objective basis for the acceptance of courses, the economic planning of resources and the flexible allocation of instructors and classrooms needed. It enables the planning staff to determine the true content of the available training capacity and to make proposals for improving 'training efficiency'. The Planning Centre is also responsible for producing term time-tables, and for maintaining records of instructor and classroom loading.

It is difficult to measure the value of this organization in quantitative terms although there were, initially, obvious savings in manpower when the various separate course planning centres were centralized. However the fact that it has been possible to maintain the training task over the past eighteen months without any drop in efficiency in the face of the recent reduction of the long accustomed overbearing of Fleet Air Arm senior maintenance ratings is sufficient alone to prove the worth of the Planning Centre. It has, in fact, since its installation in 1963, been found by all departments to be a most valuable management tool. The effects of any out-of-routine proposal may be readily gauged and appropriate action quickly decided upon.

Administration of Technical Training Aids

In parallel with the work-study of planning and control of instructional resources a study of the administration of technical training aids was also carried out. Resulting from this, training aids, including aircraft, engines, equipment and components, have been made the responsibility of one section only. This section carries out all maintenance except light servicing operations scheduled to be done by user sections, maintains a register of equipment, records utilization, and controls allocation of aircraft. Responsibilities also include acquisition of all new equipment and manufacture of new aids. The best use can now be made of equipment available, surpluses are readily apparent and the requirements for new equipment and its priorities are properly co-ordinated.

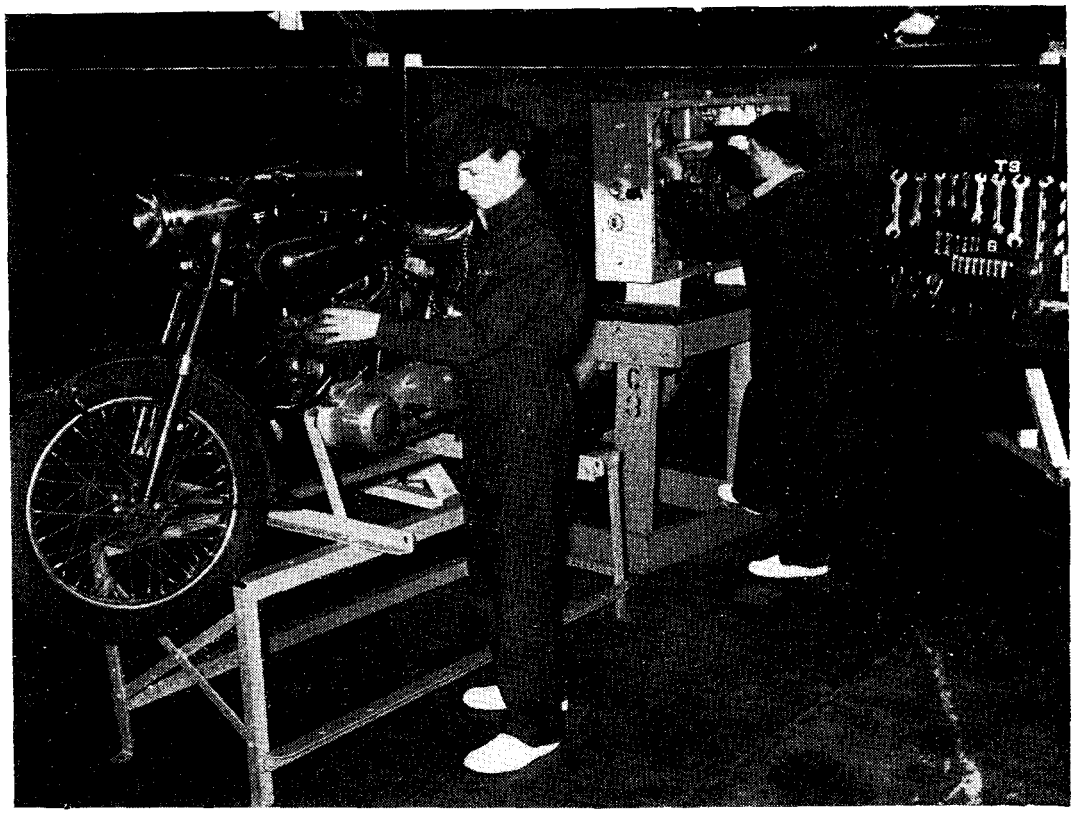

FIG. 4—NAVAL AIR MECHANICS (AE) AND (O) LEARNING TO USE TOOLS BY WORKING ON A MOTOR CYCLE ENGINE AND ON A MILL TRAINER

The Elements of Training

There are three main elements of training in all career courses:-

Technical,
Academic, and
General Service.

Craft training, an extension of technical training, is included only in aircraft mechanicians' and aircraft artificers' courses.

No one is less important than the others but the amount of time devoted to each varies from course to course. Each element has a Commander as head of department responsible for it:-

Technical and Craft	—	Commander (Training)
Academic	—	The Senior Instructor Officer
General Service	—	The Executive Officer.

Technical Training Syllabuses

In parallel with the setting up of the Planning Centre efforts have been made to integrate and rationalize as much of the technical training as possible. The solution to the problem of running ten quite different career courses, with the least confusion, lay in a detailed examination of every syllabus to discover the common grounds. This examination led to the following generalizations:-

Technical training can be divided into three basic levels of instruction:-

Elementary—equivalent to the Air Mechanic level
Intermediate— ,, ,, ,, Leading Rate level
Advanced— ,, ,, ,, Petty Officer level.

Resulting from this the following syllabuses have been or are in the course of being produced:-

(*a*) *Elementary 1*—For Naval Air Mechanics and Apprentices.

This training is given in H.M.S. *Ganges* to naval air mechanics of the under 16 years of age entry, and at R.N.A.S. Arbroath to naval air mechanics ex H.M.S. *Raleigh*, and to apprentices.

The total hours spent on this syllabus, and on others mentioned later, are the same for each type of trainee but the instruction is spread over a different period of time for each.

The Elementary 1 syllabus introduces ratings to the basic principles of their work and includes the use and care of tools (FIG. 4), Fleet Air Arm organization, airmanship, and safety precautions.

(*b*) *Elementary 2 (AE)*—For Naval Air Mechanics (AE) and Apprentices
Elementary 2 (O)—For Naval Air Mechanics (O).

On completion of the Elementary 1 Course, naval air mechanics are categorized AE or O and are then given the Elementary 2 Course applicable to their specialization to enable them to understand and carry out basic servicing operations on aircraft under appropriate supervision (FIG. 5).

(*c*) *Intermediate (AE)*—For Leading Air Mechanics (AE) and Apprentices
Intermediate (O)—For Leading Air Mechanics (O).

At the present time air mechanic (AE) ratings starting the leading air mechanic (AE) course will have, on average, 4–5 years' practical experience in the field since completing Part II training as in (*b*) above. Apprentices (AE) on the other hand will have had none and, therefore, to make up for this in some measure and to allow them to better understand the course they are given a practical phase of 189 hours beforehand.

These courses are designed so that those who pass the NAMEB final examination are qualified professionally to take charge of and coordinate flight servicing of aircraft, to supervise aircraft routine inspections and simple rectification tasks if specially authorized, and to maintain more complex ground equipment and motor transport.

(*d*) *Advanced 1 (AE)*—For Petty Officer Air Fitter (AE),
Aircraft Mechanician (AE),
Aircraft Artificer 3rd Class.
Advanced 1 (O) —For Petty Officer Air Fitter (O),
Aircraft Mechanician (O).

These courses are designed to give more extensive training in the details of aircraft and engine systems, or aircraft armament assemblies and systems, and their common faults, maintenance procedures, etc., and to enable these ratings to supervise the work of junior ratings as authorized by the Air Engineer Officer and to carry out, in a supervisory or working capacity, more advanced routine work on aircraft, arming of aircraft, diagnosis of defects in aircraft, systems and components, or in armament equipment, rectification work and embodiment of modifications, and to take on maintenance administration responsibilities.

(*e*) *Advanced 2 (AE)* —For Aircraft Mechanician (AE),
Aircraft Artificer 3rd Class.
Advanced 2(O) —For Aircraft Mechanicians (O).

On completion of the course these ratings, subject to experience and additional qualifications gained after training, will be competent to undertake the more advanced aspects of aircraft maintenance either in a supervisory or in a working capacity. These aspects will include non-routine inspections and survey of aircraft, or aircraft armament and armament equipment, diagnosis and rectification of more complex defects, embodiment of modifications, selection and carrying out of

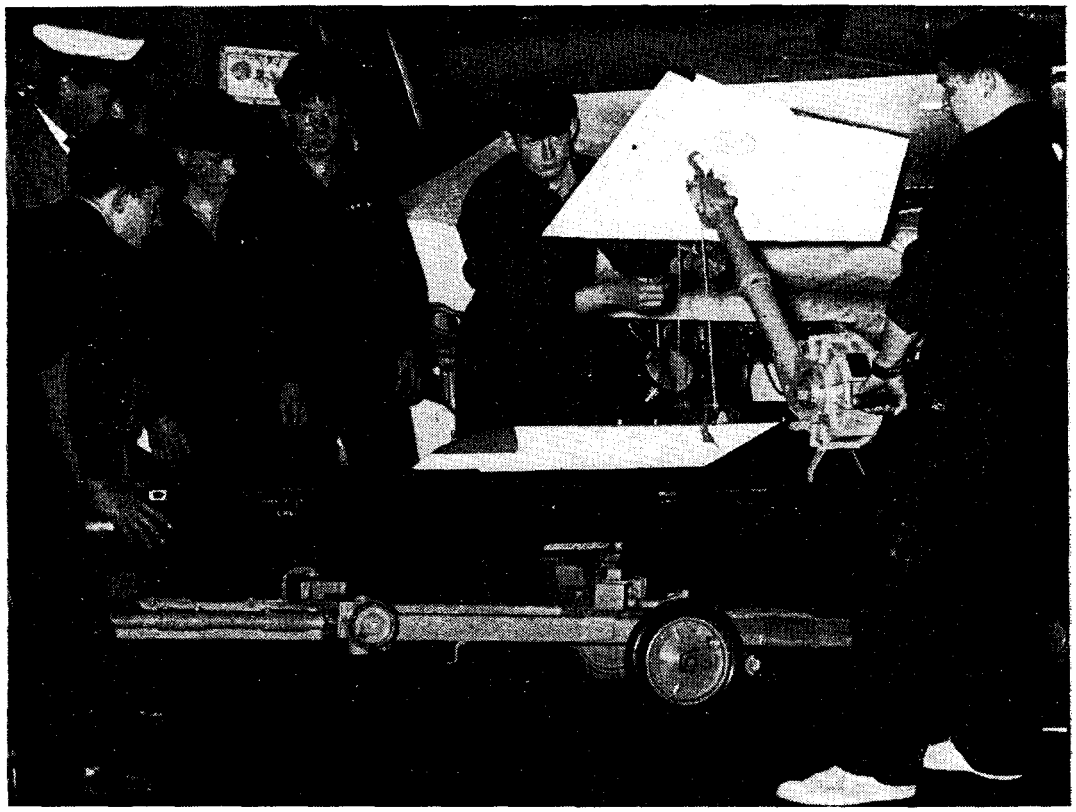

FIG. 5—NAVAL AIR MECHANICS (O) BEING TAUGHT TO ASSIST IN ARMING AN AIRCRAFT WITH A FIRESTREAK MISSILE

repair schemes, functional and performance checks, inspection, etc.

It will be seen that from a technical point of view the Aircraft Artificer 2nd Class will have covered an identical syllabus to that which the Aircraft Mechanician (AE) 3rd Class has covered during his training. In this connection the question of intermingling aircraft mechanician candidates with the A.A.3s for the advanced technical course is now under active consideration.

Each syllabus now shows to within half an hour how much time should be spent on each subject and to what level it should be taught. The level of knowledge to be imparted at each step is specified as—'Acquaintance', 'Basic', 'Working', 'Full', or 'Detailed'.

To further standardize instruction, text books appropriate to each level have been prepared for use by all ratings, and all instructors are given study plans which explain the syllabuses in detail. The text books are in due course to be issued as Air Publications.

The aim at each level is to train the rating to undertake the duties he will be expected to perform on completion of training. Although this may be stating the obvious many of the old courses were found to contain much detailed knowledge required only by more senior ratings. Men under training were in no position to select the 'must know' from the 'nice to know' knowledge and tried to learn it all. The result was that many failed to reach even the minimum pass mark of 45 per cent. The 'must know' knowledge is now deliberately emphasized with the result that class averages of 70 per cent are not uncommon.

As far as possible in all career courses the general principles of aircraft maintenance are taught and are illustrated on as many types of aircraft, engines, and equipment as are available. The aim of this generalized training is to avoid gaps in essential knowledge and to develop broader and more versatile minds. Specific details of particular types are more properly taught on SAMCOs.

Length of Courses

With the increasing complexity of modern aircraft, much closer attention has to be paid to the planning of courses to avoid unreasonable increases in length and therefore in training costs. Training time will 'grow like Topsy' unless kept constantly under review. What must be done is to decide what the untrained man already knows and what he needs to know when trained. The result is the syllabus. The most efficient means of teaching this syllabus must then be found and from this the length of time needed to train a man may be measured. When this was applied to air mechanic training in 1957 an average course time of 35 weeks, which was required at that time for each of the single trades of (A) or (E), fell to less than 20 for the dual (AE) trade, and the failure rate reduced considerably.

Phase and Team Training

For elementary technical training it is feasible for one instructor to teach a class the whole of the technical syllabus. Naval air mechanic training was at one time divided into weekly or fortnightly phases for, say, hydraulics, oxygen systems, engines, etc., each with a different instructor, and these instructors became so expert in their subject that they tried to impart too high a level of knowledge to their classes. Each phase was watertight with little or no support from other phases.

Each class for elementary and intermediate technical training (naval air mechanics, leading air mechanics and apprentices) now has a team of only two instructors who share the training between them. This avoids the inherent disadvantages of phase training and at the same time allows a much improved instructor/men-under-training relationship.

As a general rule team training is not practicable for advanced courses and in this case phase training is the normal system used.

CAREER COURSES

A summary of all Career Courses now in being at Arbroath is given in FIG. 6 and the latter shows the amount of time devoted to each element of training.

Naval Air Mechanics and Wren Air Mechanics

Part II training of (AE) and (O) air mechanics is carried out at Arbroath with courses normally arriving at two-weekly intervals, either from *Ganges* or from *Raleigh*. Those from *Raleigh* (62 per cent of the total Naval Air Mechanic entry) and Wrens from *Dauntless* are given 16 weeks' technical training (i.e. Elementary 1 and Elementary 2, see above). Since the first part of the air mechanics' technical course is given at *Ganges*, ratings of this entry need only 11 weeks' training at Arbroath, for the Elementary 2 course.

The course is primarily technical but with a small element of educational training for those from *Raleigh* who have failed to reach the minimum educational standard of Mathematics 6/English 6 in the Naval Mathematics and English Test (NAMET) taken at the end of their Part I training. Unfortunately some 5 per cent of the entry is currently unable to reach this standard on re-examination and does not display sufficient technical aptitude in the Elementary 1 phase of the course to make up for their educational shortcomings and to justify continuation with training as a mechanic. The failure rate on the technical course is a further 5 per cent. Air mechanic ratings of the under 16 years of age entry all qualify educationally during training at *Ganges*.

Professional Course for Leading Air Mechanic

This course is of ten weeks duration, which includes a period of up to three weeks at the beginning for revision of the knowledge covered by the naval

Career Course	*Length*	*Frequency*	*Average No. Under Training*	*Annual Throughput*	*Current Failure Rates*	*Approximate Time Spent in Training (Per Cent)*				
						Technical	*Academic*	*General Service*	*Craft*	*Other*
Naval Air Mechanics (AE) and (O) Ex *Raleigh* Wren Air Mechanics	16 weeks	4 Classes per Term (5 in Spring Term) Intermittent 1 Class per Term	151	250	5% educational plus	63	30 hours for those with NA-MET grade less than 6/6	23	NIL	14
Naval Air Mechanics (AE) and (O) ex *Ganges*	11½ weeks	3 Classes per Term		150	5% technical	62	NIL	24	NIL	14
Leading Air Mechanics (AE) and (O)	10 weeks	(AE)—4 courses per term	60	219	A/E 0·5%	70	10	7	NIL	13
Leading Wren Air Mechanics		(O)—1 course per term	12	38	0 2%					
Petty Officer Air Fitters (AE) P.O. Wren Air Mechanics	28 weeks	Every 4 months	40	60	6·1%	79	8·5	5·5	NIL	7
Petty Officer Air Fitters (O)	23 weeks	Every 8 months	12	18	7·3%	67·5	10	15·5	NIL	7
Aircraft Mechanicians (AE)	90 weeks (1 year 8 months + 3 weeks)	Every 8 months	57	28	3%	35	17	13	29·5	5·5
Aircraft Mechanicians (O)	87 weeks (1 year 8 months)	Every year	24	12	2%	35	18	13	31	3
Aircraft Apprentices	22 months at Arbroath (5½ terms)	Every 4 months	125	75	5·2%	22	23	22	25	8
Aircraft Artificers 3rd Class	10 months (2½ terms)	Every 4 months	62	62		61	1	22	6	10

FIG. 6—DETAILS OF CAREER COURSES

air mechanics' syllabus. This is necessary to cater for ratings who have been 'misemployed' or, for example, who have been confined to one type of aircraft since completion of Part II training. The introduction of the Provisional Professional Examination (PPE) for Leading Rate (DCI 989/65) should, in time, enable this period for revision to be reduced.

A small element of academic training is included in the course primarily to assist in the selection of aircraft mechanician candidates.

Professional Courses for Petty Officer Air Fitter (AE) and (O)

The content of these courses is largely technical with a small academic element, again primarily to assist in the selection of aircraft mechanician candidates. The (AE) course is 28 weeks and the (O) course 23 weeks in length. No skill-of-hand training is given.

Aircraft Artificer Apprentices

The young artificer cannot be considered to be fully trained until he is rated Acting Aircraft Artificer 2nd Class with the rate of Petty Officer. Even then his practical experience will be limited and he will have had few opportunities previously to take charge of men or of carrying out maintenance tasks on aircraft. To reach this rate takes him five years and during this time he is continuously under training.

After one year of Part I training at *Fisgard*, aircraft artificer apprentices spend 22 months ($5\frac{1}{2}$ terms) at Arbroath followed by a period of 16 months (4 terms) in the field for practical experience at naval air stations. The first four months in the field are spent on a general introduction to the work of all Sections of the Air Engineering Department of the naval air station and for the following year the apprentices are drafted to a complement billet in a second line squadron. They then return to R.N.A.S. Arbroath as Aircraft Artificers 3rd Class for a further ten months of advanced technical training, with a final NAMEB examination at the end to qualify for advancement to Acting Aircraft Artificer 2nd Class.

Technical Training

As shown previously, the syllabuses of technical training for aircraft artificer apprentices are identical to those covered by naval air mechanics and leading air mechanics, but with the inclusion of a $4\frac{1}{2}$-week practical phase after completing the air mechanic syllabus. When the apprentice leaves R.N.A.S. Arbroath after 22 months, for field experience at a naval air station, he has thus been trained up to leading air mechanic's standard and has passed the NAMEB examination appropriate to that rate.

The period of field training in mid-course, which has recently been increased from one year to sixteen months, was first recommended by the Tyndale-Biscoe Working Party in 1959 and was undoubtedly a most worthwhile step forward. It broadens the apprentice's background, gives him a better knowledge of men in other branches and, most important of all, provides a basis of practical experience upon which to build his advanced training, which takes a further ten months at R.N.A.S. Arbroath. His advanced technical training during this latter period is identical to that given to aircraft mechanician (AE) candidates.

Craft Training

Craft training in sheet metal work (some 780 hours) is given in the first 16 months at Arbroath culminating in a NAMEB trade test in the 7th term. The current failure rate at first attempt is 11 per cent. Those who are back-classed and pass at the second attempt reduce this to 1·7 per cent. Prior to this between 600 and 700 hours of workshop training, mostly fitting, is given at

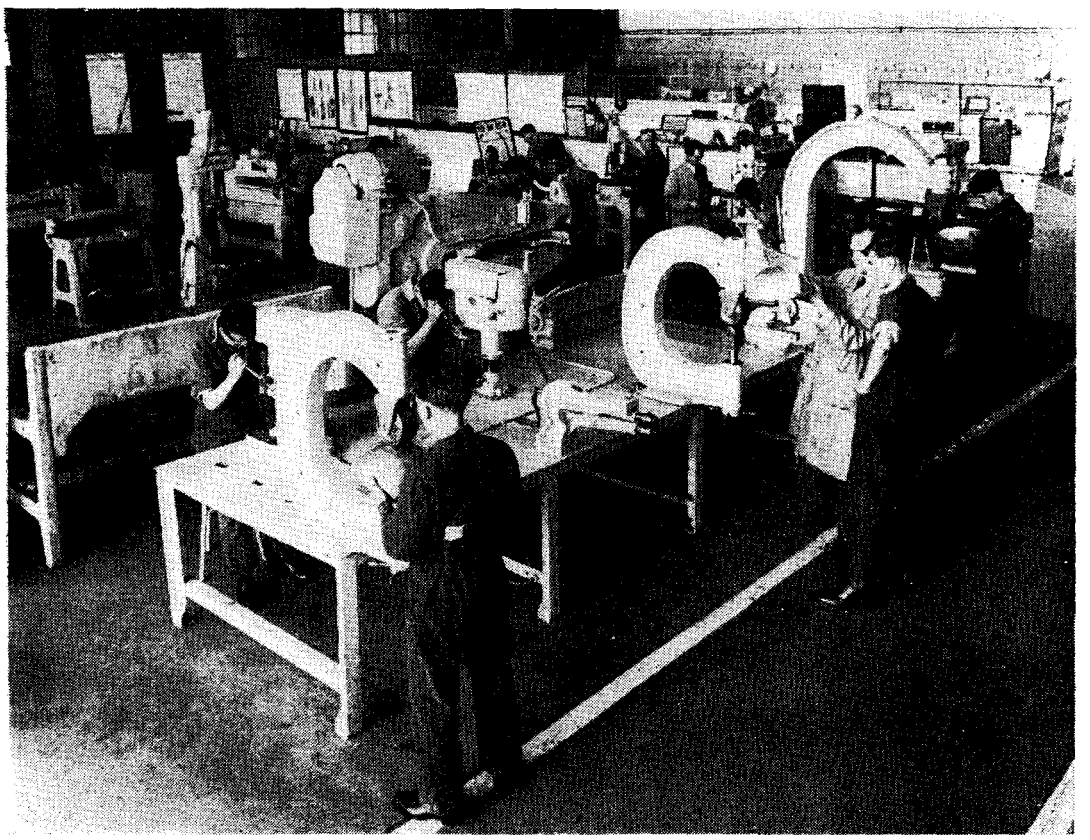

FIG. 7—SHEET METAL WORK TRAINING IN THE WORKSHOPS

Fisgard. During the advanced course the A.A.3s spend 100 hours on advanced metal repairs on aircraft.

One often hears criticism of craft training for aircraft artificers and aircraft mechanicians, that it is too long, too advanced and is of value only to the very few who have the opportunity to practise it again. There is also a fairly widespread belief that field repairs to aircraft of the future will be less and less possible. This has not proved to be true of current comparatively complex types which already employ entirely modern methods of construction and it is certainly untrue, of course, of helicopters which are (*a*) prone to damage, and (*b*) very amenable to repair. Craft training teaches patience, accuracy, manual dexterity and knowledge of materials, and this alone fully justifies the time spent on it. But the prime reason is still that all aircraft artificers and aircraft mechanicians should have the ability to assess damage, to draw up repair schemes and to carry out repairs on aircraft, and this policy has paid handsome dividends in many operational situations, not the least being the Borneo campaign. It is believed that such work may increase rather than decrease and that much more could and should be made of our skilled men for it, all of whom have reached the required standard in training to carry out such work. The training time allowed is now considered to be the minimum to bring an average apprentice up to this standard. Among the major reasons for the Fleet Air Arm's existence are its mobility and capability of operating aircraft in far distant places for long periods without shore support. Unless maintenance ratings are capable of rectifying all types of repairable damage in the difficult environment of the aircraft carrier, the small ship, or even the jungle, the *raison d'être* of the Fleet Air Arm would be nullified.

Academic Training (FIG. 8)

Academic training for apprentices is carried out in two phases, with Ad-

miralty Board examinations at the end of each. The subjects studied and the time allocated to them are as follows:-

01 Phase — $2\frac{1}{2}$ terms — common to all apprentices

1.	Mathematics	100 hours
2.	Engineering Science (*a*) Mechanics (*b*) Heat (*c*) Electricity	180 hours
3.	Engineering Drawing	70 hours
4.	English	30 hours
		380 hours

Admiralty Board Part II Examinations are held at the end of this phase (6th term), in the following subjects: mathematics, engineering science I, engineering science II and engineering drawing. The minimum pass mark in each subject is 40 per cent.

02 Phase — $2\frac{1}{2}$ terms for the Advanced Stream and 2 terms for the Normal Stream

		Advanced Stream	*Normal Stream*
1.	Mathematics	120 hours	
2.	Applied Mechanics (Aircraft)	120 hours	160 hours
3.	Aeronautical Engineering Science	120 hours	160 hours
4.	English	30 hours	28 hours
		390 hours	348 hours

Admiralty Board Part III Examinations are held at the end of the Normal Stream phase (8th term) in applied mechanics (aircraft) and aeronautical engineering science. The minimum pass mark in each subject is 40 per cent. All apprentices take these examinations.

The Ordinary National Certificate examinations (02) are held at the end of the Advanced Stream phase (also in the 8th term) in mathematics, applied mechanics (aircraft), aeronautical engineering science and workshop technology. The national rules for O.N.C. apply to these examinations and experience is showing that about 40 per cent of the aircraft apprentice entry succeed in obtaining Ordinary National Certificates.

Aircraft Mechanicians

Selection for aircraft mechanician (AE) and (O) is made from ratings completing the Leading Air Mechanics' and Petty Officer Air Fitters' professional courses.

Aircraft mechanicians' course lengths are 70 weeks for the O trade, 73 weeks for the AE trade.

The first year is devoted entirely to academic and craft training and the remaining time is confined to technical work. The aircraft mechanician (AE) has a three weeks practical phase at the end of his technical course for training in aircraft repairs. Academic training culminates in an Admiralty examination,

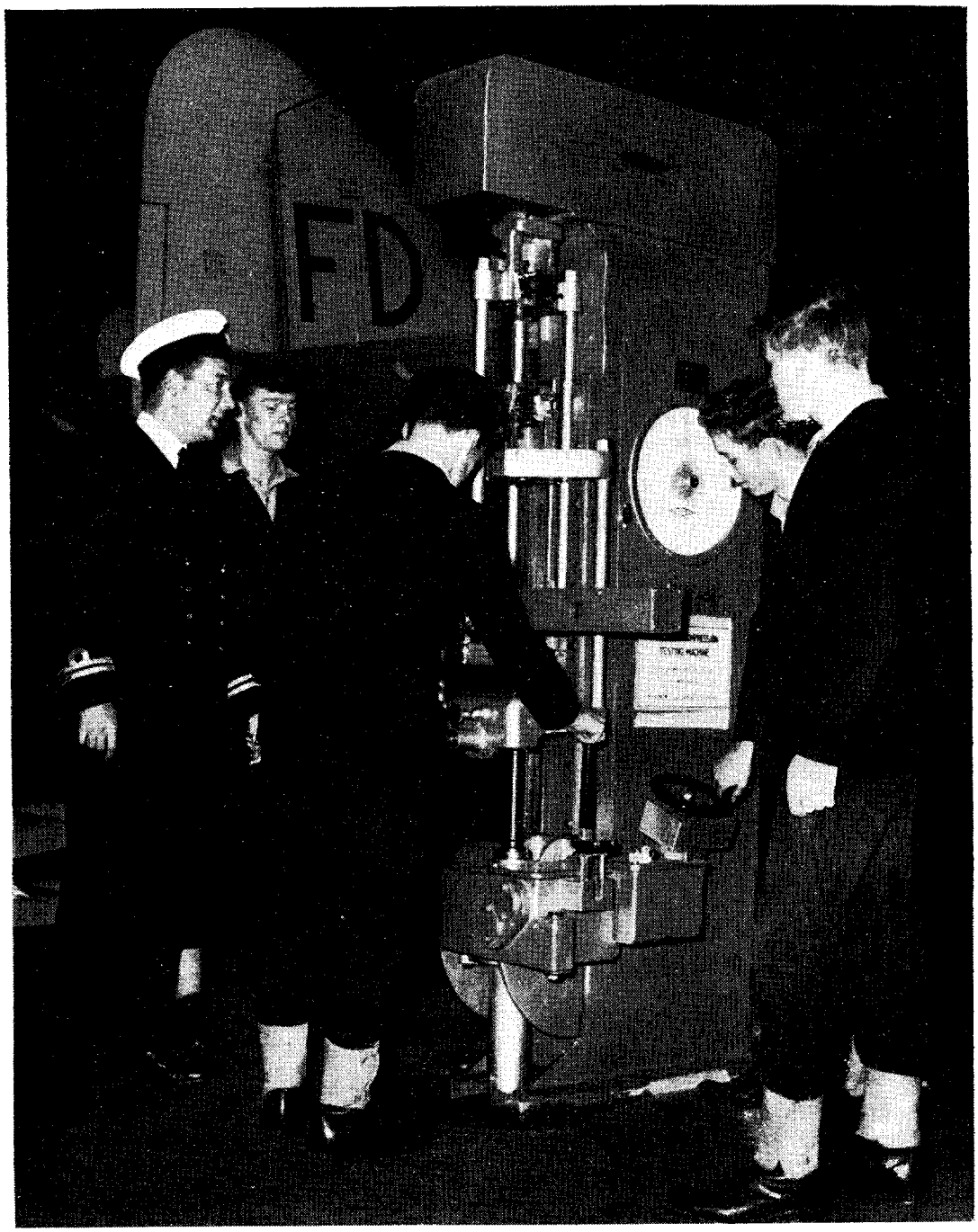

FIG. 8—AIRCRAFT APPRENTICES (AE) CARRYING OUT PRACTICAL EXPERIMENTS ON STRENGTH OF MATERIALS

the standard achieved being roughly equivalent to G.C.E. 'O' level in mathematics, science, and engineering drawing.

Craft training for aircraft mechanicians (AE) is largely sheet metal work (82 per cent S.M.W. and 18 per cent fitting—total 780 hours), with the NAMEB trade test at the end being identical with that taken by the aircraft apprentice. It is of interest that the aircraft mechanician in one year reaches the same standard as the apprentice who has a slightly longer training in sheet metal work and, in addition, a full year at *Fisgard* for basic fitting beforehand. That this is possible is due to the greater maturity of the aircraft mechanician, his determination to give his best since, for him so much is at stake if he fails,

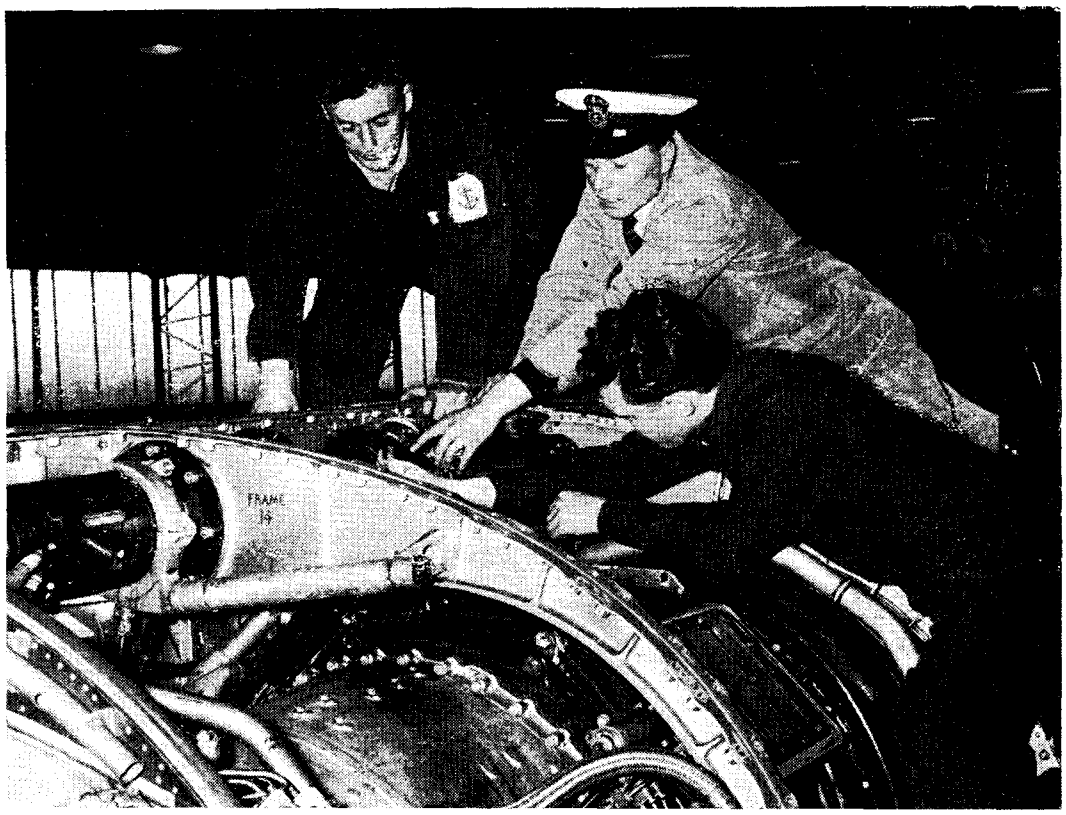

FIG 9.—AIRCRAFT ARTIFICERS 3RD CLASS LEARNING ADVANCED FAULT FINDING ON A SCIMITAR AIRCRAFT. IDENTICAL TRAINING IS GIVEN TO AIRCRAFT MECHANICIAN (AE) CANDIDATES

and the experience he has gained in the field before undertaking the course.

The aircraft mechanician (O) requires for his trade a more advanced skill in fitting and some experience of turning and he receives 320 hours training in these crafts with correspondingly less in sheet metal work (fitting 25 per cent: turning 16 per cent: sheet metal work 59 per cent—total 780 hours).

The technical phase of the (AE) course (FIG. 9) is identical to that given to A.A.3s but because of the aircraft mechanicians' background, can be covered at a faster pace. On passing the NAMEB final technical examination ratings are advanced to Aircraft Mechanician 3rd Class (AE) or (O). The aircraft mechanician (AE) is, from then on, fully interchangeable with aircraft artificers (AE) of equivalent rate. As far as the aircraft mechanician (O) is concerned he is the only skilled rating now being trained for the Air Ordnance Branch.

Failure Rates on Career Courses

It will be noted from FIG. 6 that the failure rates of career courses vary from $\frac{1}{2}$ per cent to 7 per cent, and, as perhaps one might expect, the higher figures generally apply to the more advanced courses. This is not so for aircraft mechanicians who have a low failure rate. This is largely governed by their selection which, carried out at R.N.A.S. Arbroath, is determined by their general performance and results gained on the Leading Rates' or Petty Officers' courses, as applicable. It would be reasonable to conclude that the number of aircraft mechanicians could be readily increased without lowering the qualifying standards, if manning requirements demanded, although there would be

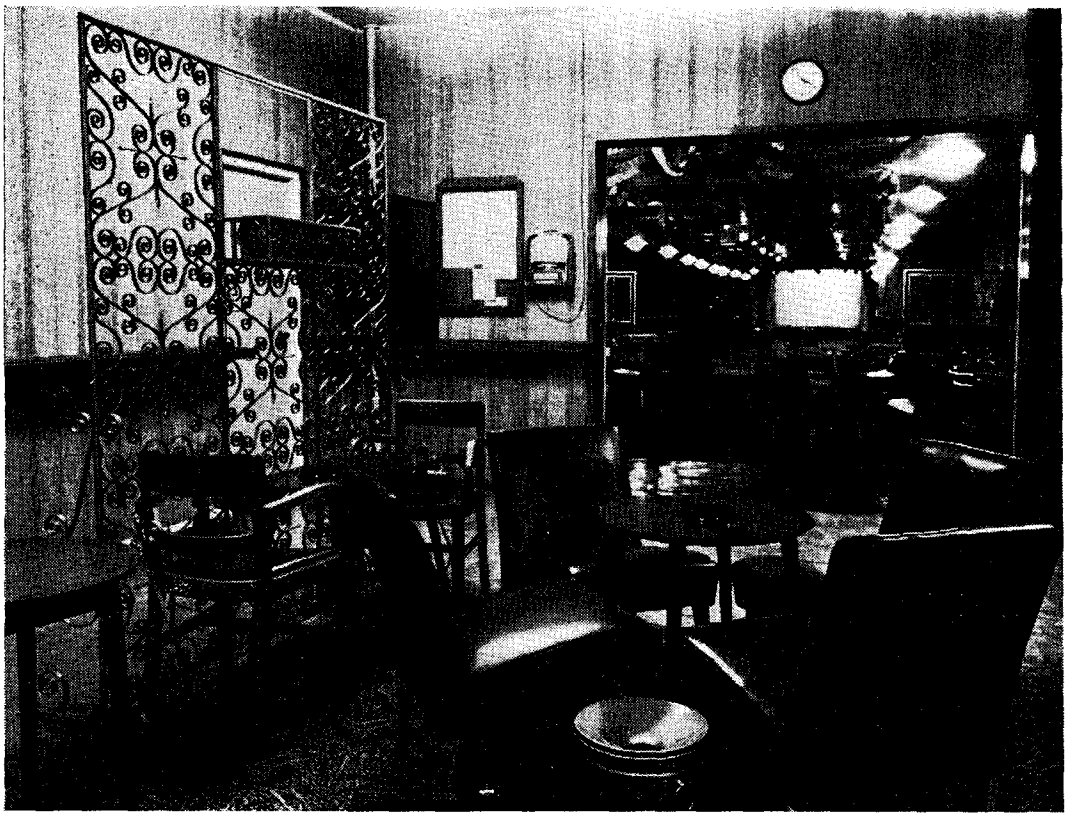

FIG. 10—THE 'CONDOR' CLUB

inevitably a small rise in failure rate.

The standard of and, therefore, the failure rate of naval air mechanics in training is set largely by entry standards. A number of those who are taken off the technical course elect to transfer to other branches and their training is not, therefore, entirely wasted and they are not lost to the Service.

Aircraft Artificers and Aircraft Mechanicians

Much has been said in the past of the standard of aircraft artificers *vis-à-vis* aircraft mechanicians. The latter are the cream of the Naval Air Mechanic Branch and the majority are men of a high standard both as skilled men and as Petty Officers or Chief Petty Officers. Aircraft artificers still provide the majority of the best skilled men in the AE trade but, undoubtedly, some artificers appear in an unfavourable light by comparison with aircraft mechanicians. One of the factors giving rise to this is the comparative immaturity and consequent lack of motivation of some apprentices while under training. It is believed that the integration of technical training of apprentices/AA3s with aircraft mechanicians, and the recently increased training time spent in the field and more leadership experience for the apprentices/AA3s may help to overcome this.

GENERAL SERVICE TRAINING

The Admiralty Board's directive that a man's substantive rating and his technical qualification are complementary to each other and of equal importance is recognized at R.N.A.S. Arbroath by regarding general service training as being in every way as important as the technical and academic training.

The aim of the general service training is to produce disciplined, responsible and self-reliant men, possessing confidence, courage, endurance and self-respect. Much of this training is of course a continuous process going on more or less unnoticed in the day to day life of the establishment. It is hoped that insistence on good appearance, bearing, punctuality, the meticulous performance of any duties imposed, a high standard of cleanliness in the messdecks, and the opportunity to take charge on and off the parade ground contribute to the achievement of this aim. There are also sixteen clubs or outside activities, as listed below, which offer further opportunities, each in its own way, of broadening and developing the personal qualities desired, especially as each club is run, practically entirely, by its members.

Angling	Motor Club	Band	Photography
Archery	Rifle	Model Car	Wrestling
Canoeing	Sailing	Mountaineering	Gliding
Dramatic	Skiing	Golf	Sub Aqua.

Most of the clubs are enthusiastically supported. Angling, canoeing, mountaineering, skiing and golf owe much of their popularity to the unrivalled opportunities offered by the local countryside. Once a person takes the step of joining one of these clubs he seldom loses interest and usually develops into a rabid enthusiast.

Under a different heading but also serving the same purpose is the *Condor* Club. This replaced the NAAFI canteen in 1959 to the extent that it is run as a club with a president appointed by the Captain and a committee of representatives of all parts of ship. Furnishings and refreshments are still provided by the NAAFI. The entertainment programme is worked out by the Committee at their monthly meetings and with the very wide variety of events that are provided the club is always a most popular centre (FIG. 10).

The most important feature is that the discipline and behaviour in the club is made the responsibility of the members and their own committee. The loss of club privileges for bad behaviour is regarded as such a penalty that this very rarely needs to be imposed by the Committee. We are very proud indeed of how well our young men, and girls, respond to this self-discipline.

The more formalized general service training divides itself naturally into four headings:

(*i*) Parade Training

(*ii*) PT and Recreational Training

(*iii*) Religious Training

(*iv*) Venture and Expedition Training.

The amount of parade training varies from the four hours per week given to the Petty Officer Air Fitters (O) in their first term to the one hour a fortnight which is all that can be spared for the leading air mechanics. A.A.3s, apprentices and naval air mechanics under training, all receive one hour per week. Morning Divisions are held on Mondays, Tuesdays, Thursdays and Fridays for all men under training and both apprentices' and naval air mechanics' guards are paraded. Station Divisions are held once a fortnight. On all of these occasions, both in classes and at Divisions, opportunities are given of taking charge.

All the younger men have one hour of P.T. per week, the Petty Officer air

FIG. 11—VENTURE TRAINING AT THE GLEN ESK BASE

fitters and aircraft mechanicians being excluded. There is a well equipped gymnasium, but as yet no swimming bath, the lack of which is keenly felt. Backward swimmers are brought on in special sessions at the Arbroath Public Baths, but the travelling time involved and the rather drab surroundings of the baths make it an unpopular pursuit. Investigations are going on as to how a proper swimming bath might be obtained, but the less costly open air variety, which some establishments have achieved in the South, would not be worth building at Arbroath because its use would be very limited by the weather.

Everyone except the leading air mechanics has one recreation afternoon per week when all the conventional sports are played. There are three rugger, six soccer and three hockey pitches and four cricket squares. Other facilities for sport include a ·22 range, two squash courts, and four tennis courts, to be increased to six shortly. The conventional sports undoubtedly suffer from the numbers who prefer the various 'Exped' activities and, although this must have an effect on the standard of Station teams, there is the consoling thought that the training aim is being achieved as well, if not better, because of it.

There are three churches on board, one for each of the major denominations, but only one Chaplain who is Church of England. Officiating Ministers from Arbroath conduct the services in the Scottish and Roman Catholic Churches. A short service, with prayers and a hymn is conducted at Daily Divisions. Once a week this is taken by the Officiating Minister of the Church of Scotland and from time to time by the Roman Catholic priest from R.N.A.S. Lossiemouth. Roman Catholics no longer 'fall out' from morning prayers. Religious Instruction is included in the syllabus for A.A.3s, apprentices and naval air mechanics but not for those on other career courses.

Compulsory Venture Training schemes have been designed to suit the needs and potentialities of the various trainees. Time allowed for these is as follows:-

A.A.3s and apprentices—5 weeks' training spread over the whole course

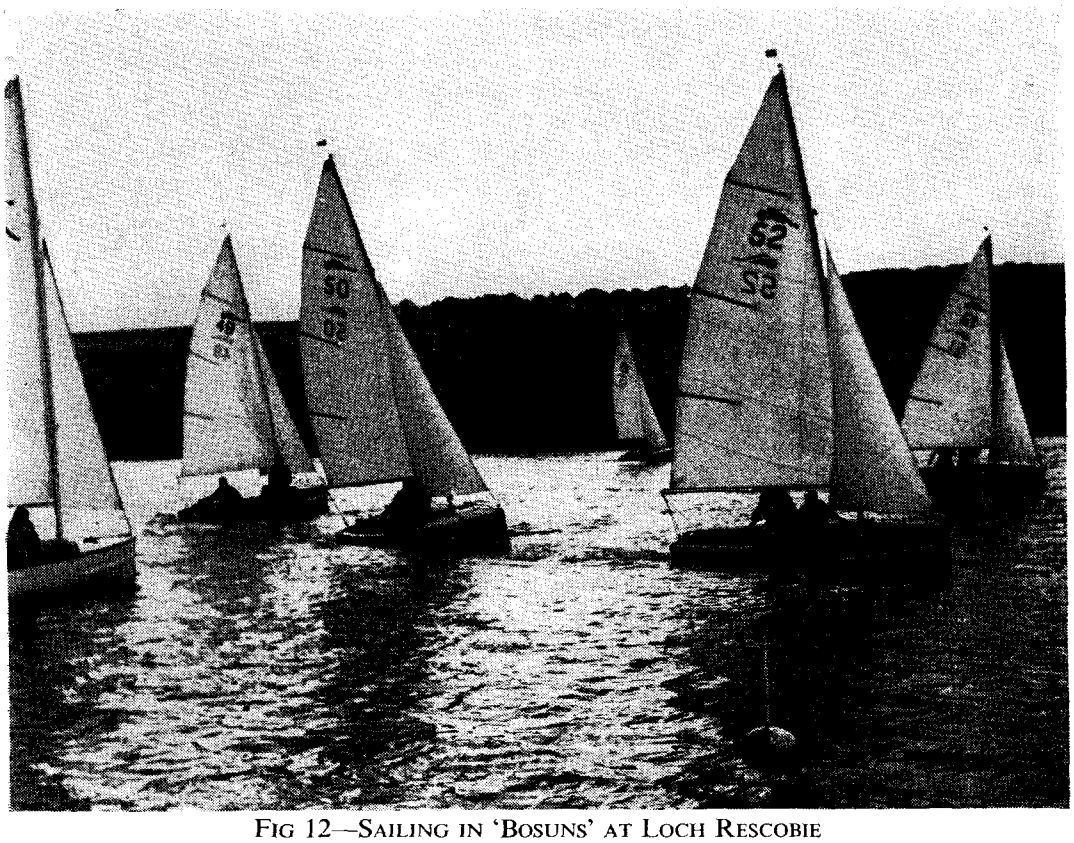

FIG 12—SAILING IN 'BOSUNS' AT LOCH RESCOBIE

(4th, 6th, 8th, 13th and 14th terms)

Aircraft mechanicians—2 weeks

Naval air mechanics (and Wren air mechanics)—3 days

Instructors' course—3 days advanced V.T.

The schemes are carried out from three main bases:-

The Glen Quiech Base—This is a small crofter's cottage, or bothy, at the head of a glen in a gently rolling hillside. It is used for elementary instruction in hill walking.

The Glen Esk Base (FIG. 11)—This also is a small bothy, but is surrounded by steeper hills which give scope for more advanced and ambitious hill walking.

The Glen Nevis Base—This base is shared with R.N.A.S. Lossiemouth and from it three activities are readily available: mountain walking on the Nevis range, canoeing expeditions, and coastal cruising in the *Sea Swallow* from Loch Linnhe.

The schemes available extend progressively from the simple scheme for naval air mechanics at Glen Quiech, which consists of hill walking, sleeping under canvas and instruction in map reading and compass work, to the most advanced seven-day expedition, which includes a walk over hills from Fort William to Glen Clova, a distance of more than 100 miles. The members of the class provide the leaders and produce the plans for the advanced scheme.

As well as the compulsory Venture Training and the club activities mentioned above there is a voluntary mountain rescue team, which has been made

a sub-unit of the official Mountain Rescue Unit of the R.A.F. Station, Leuchars, and thus operates under the direction of the Northern Area Mountain Rescue Organization. The Mountain Rescue Team has already saved several lives, the most recent being in March of this year when it rescued a climber suffering from extreme exposure after being lost in the snow for 24 hours on Stob Binnein (3,821 ft).

The sailing club is lucky to have the use of Loch Rescobie—a small private loch in pleasant surroundings about 10 miles on the road to Forfar (FIG. 12). The 6 Bosuns, 5 Olympics and 6 Enterprises are in constant demand. There is a small club house built by enthusiastic past members on the inspiration of a previous Training Commander, which adds greatly to the amenities.

Leadership Training for Leading Rates

A pilot Leading Rates' Leadership Course for sixteen leading air mechanics (AE) was held in July of this year. The fourteen-day course is identical to those already run at *Excellent*, *Raleigh*, *Terror*, and *Safeguard* (DCI 964/64) and is considered necessary because these four schools cannot compete with the large numbers of candidates in the Fleet. An essential feature of such courses is that ratings of all branches should be included, and it is planned for future courses to include some general service candidates from *Safeguard* on an exchange basis. The course is monitored by H.M.S. *Royal Arthur* and should fill a well recognized gap in the training of our leading ratings.

THE FUTURE

The Establishment

The establishment has ample scope for expansion. At present the task is limited mainly by accommodation. Projects in the development plan which have been approved are a new laboratory block, and conversion of the steam heating system from coal to automatically controlled oil firing. That familiar black smoke cloud over the training area which has appeared at regular intervals in the heating season for the past 25 years will never be seen again. At a later stage all the many independent and dispersed L.P. and H.P. boilers for heating and galleys, etc., will be replaced by a central boiler house with automatic oil fired boilers serving a high temperature hot water system.

A modernization programme on the accommodation buildings, which have been greatly improved as a result, has been carried out over the last three years and is now almost complete. This, however, will give only a very limited extension to the life of these buildings and currently, in the long term plan, R.N.A.S. Arbroath is scheduled to be rebuilt completely in the 1970's. Detailed work on developing the design and layout of the replacement buildings will, it is hoped, start by 1968.

Training

Before looking at the future it must first be established that the training now is meeting the requirements for 1965 and this can be done by feed back of information from the field. All too rarely does this occur but this is understandable with the heavy training and operational loads carried by the air stations, carriers and squadrons. The initiative must come from the training establishments and training liaison teams are now being sent round the air stations at four to six-monthly intervals to discuss training problems and to obtain feed back material for the course syllabuses. This has been a successful

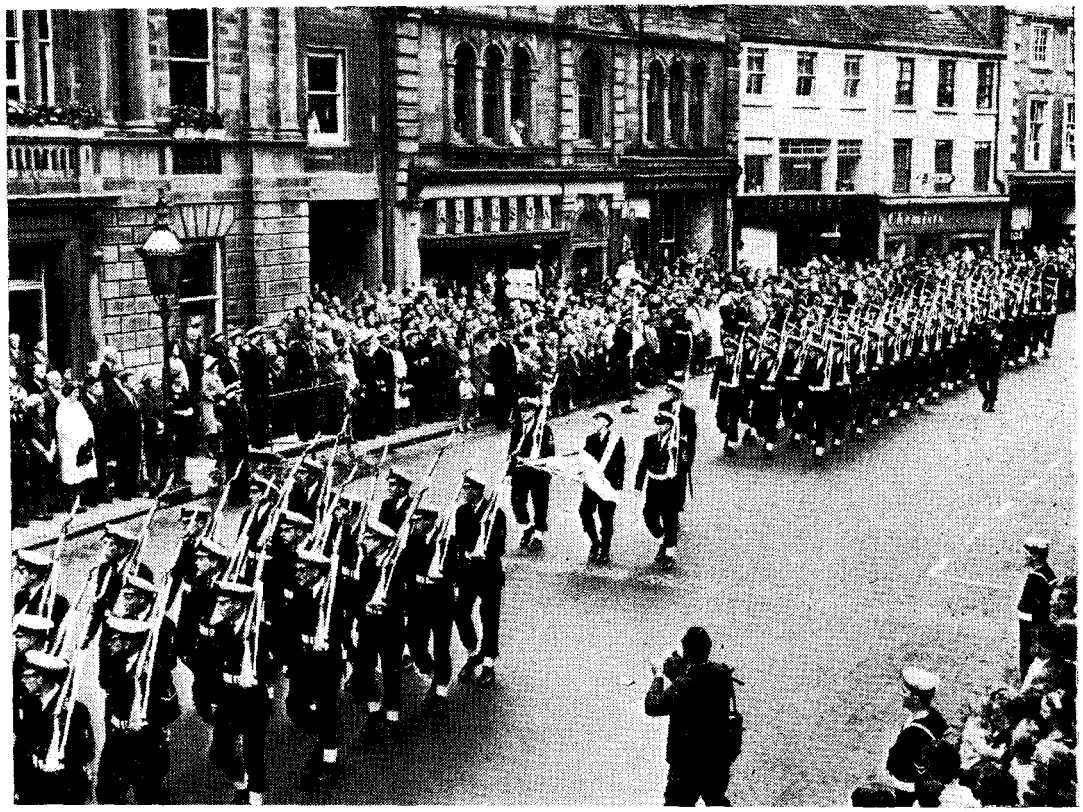

FIG. 13—MARCHING THROUGH THE ROYAL BURGH OF ARBROATH ON 21ST JULY 1965

operation and has resulted in the implementation of a number of sensible changes in syllabuses and training details both at Arbroath and at the other air stations.

The second question to be asked is 'Will the training of today meet the requirements of aircraft maintenance of the 1970's?' Whether our present maintenance trade structure will match the maintenance task of the Phantom aircraft has yet to be proved but with the increasing part played in aircraft systems by electro-mechanical devices of varying degrees of sophistication it is believed that some changes will ultimately be necessary to meet the need of the succeeding generation of naval aircraft. The problems arising from the overlap of interest of various trades will need investigation to ensure the right training with the minimum cost and maximum efficiency.

CONCLUSION

As a training establishment, R.N.A.S. Arbroath has many natural advantages: a pleasant area, reasonably remote from the very bright lights but easily accessible by rail and air, blessed with facilities for every type of activity, and with readily accessible 'country' for venture training. At the present time the married quarter situation is such that there is virtually no waiting list.

Reference must also be made to the wonderful co-operation over the years of local landowners and townspeople. The close ties with them culminated in the granting of the Freedom of the Royal Burgh of Arbroath to H.M.S. *Condor* in 1961. The customary right, which goes with the Freedom, of marching through the Royal Burgh with bayonets fixed, drums playing and banner flying was exercised on 21st July, 1965, as a part of R.N.A.S. Arbroath's 25th anniversary celebrations (FIG. 13).

In this 25th year the establishment is as closely knit as it has ever been and,

it is hoped, will be allowed to develop and play its part in Fleet Air Arm affairs for many years to come.