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Fifty years of training in the Meteorological Office

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Fifty years of training in the Meteorological Office

This year is the 50th anniversary of the introduction of formal training courses in the Meteorological Office; and this issue is devoted to a modest celebration of this milestone.

It should not be imagined that there had been no meteorological training courses anywhere else in the country before 1936. One of the earliest pieces of instructional memorabilia which has recently been found has a civil aviation context. It is an exam paper in meteorology sat by candidates for the grade of First Class Navigator on 13 April 1926. Judging by this test of their skill in one subject, First Class Navigators of 60 years ago must have been very competent people. They were faced with questions on line squalls, the climatology of India and the theory of a Dines pressure-tube anemometer which even a student of meteorology might find quite taxing, and the following tailpiece to a question on upper winds would involve most of us in some lateral thinking today:

Mention briefly four methods, other than pilot balloons, of measuring wind in the upper air including at least one method for obtaining the wind above clouds when the sky is overcast.

No prizes are offered for a solution to this, and anyone who finds it hard to conceive of the possibility of meteorological activity before the invention of radiosondes may be interested to refer to one of L.F. Richardson's (1924)* less well-known papers.

The final question in this exam paper takes us into an area which was to become the preserve of the professional weather forecaster:

Give an account of the steps you would take at Cranwell to prepare a forecast at 8 p.m. in November of the local visibility between midnight and 4 a.m.

Those of us who have spent a whole professional career using forecasting techniques developed about 30 years ago, may wonder what was taught to trainees in earlier times to enable them to answer such a question. Though we have the textbooks that they used, there is now almost no knowledge of the practical craft that went along with the general synoptic principles and this is an unfortunate gap.

Where we are much more fortunate is in the continued presence with us of some of the principal architects of meteorological training in the modern era, and their memories are recorded in this issue. Although their contributions were submitted quite independently, they complement each other in a remarkably satisfying way both in their style and their content. R.J. Ogden unravels the details of the

* Richardson, L.F.; How to observe the wind by shooting spheres upward, *Prof Note, Meteorol Off.* 3, 1924. No. 34.

assistant training programme during a period when as many as a thousand recruits were trained in one year. C.J. Boyden writes about the training of forecasters, with which he was so intimately connected, while P.J. Meade recalls the first training course for scientists and demonstrates the link between training and research which persists to this day in the Meteorological Office structure where 'Training' still comes within the Research Directorate.

The last article describes developments in training since 1972 when the Training School moved from Stanmore to Shinfield Park, near Reading, and in the process was given the new title of Meteorological Office College. A television script-writer could hardly have contrived a more suspenseful point at which to terminate the latest episode of this particular serial. Without doubt we are about to enter a period of great technological change which will have a substantial impact on our knowledge of the atmosphere as well as on the working practices of applied meteorologists. How will the training of our staff alter to keep pace with these changes? Perhaps in ten years' time, another episode in the unfolding story will be chronicled in these pages.

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Meteorological Office training scheme: the first ten years

By C.J. Boyden

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Summary

Systematic training for forecasting began only three years before the outbreak of World War II, first with existing staff and in modest numbers. After the fall of France there was a great increase in recruitment, and the Training School — at Gloucester and later in London — was working at full capacity for much of the war.

It must be difficult for the meteorologist of today to believe that until 50 years ago there was no organized training at any level within the Meteorological Office. My own career began with two years at Edinburgh and a year at Lerwick, and, as there was no official post for me at either place, I had some time to read the few books on meteorology that were available. My introduction to forecasting came with a posting to M.O.6 in 1933, and there H.L. Wright and I spent some light-hearted hours learning the squiggles used in plotting a synoptic chart. Our training consisted of watching forecasters at work without getting in their way.

I was next posted to Calshot, where for a few months I masqueraded as an independent forecaster, fortunately without disaster, and then came a year or so on the forecasting bench at Headquarters, at what used to be Adastral House. I was fortunate in that this period included the six months when Professor Bjerknes worked there to further his ideas on frontal analysis and development. These were

well known from his classic papers of 12 and 15 years earlier, but British forecasters varied greatly in their enthusiasm for applying them.

One evening in 1936 I found a note waiting for me as I came on night duty. It was from Mr R.G.K. Lempfert, deputy to the Director, asking me to see him in the morning. This I did, and I was astonished to be told I was to open a training school. I murmured something about the planning of the course and was told that Mr S.P. Peters had been giving some instruction in forecasting and would pass on a syllabus. As to when I should begin, Mr Lempfert thought Monday week would be suitable as he had already arranged for a room at Croydon Airport. The students were to be eight Assistants Grade II who, if successful on the course, would be promoted to Grade I.

The next few days were hectic. I realized that the best I could hope for was to prepare lectures for a week or two and trust I could keep ahead of the class for the six months the course was to last. Armed with a two-page syllabus from Peters I set about my task, basing my initial notes largely on the four volumes of Shaw's *Manual of meteorology* and the newly published *Physical and dynamical meteorology* by Brunt. These were supplemented later by *Some problems of modern meteorology*, consisting of important papers from the *Quarterly Journal* of the Royal Meteorological Society. Of the few other appropriate publications, I remember a short book on weather forecasting by J. Van Mieghem, published in 1936, which I found very stimulating and helpful in preparing lectures.

In relation to this initial class it is important to realize that in those days Meteorological Office staff were divided between Professional Assistants, who were recruited from the universities, and the ordinary assistants, most of whom joined straight from school. Officially, the graduates were the forecasters and the rest were not. Regardless of what actually happened at outstations, the distinction ranked in the minds of many non-graduates, who, with their years of experience, knew how important they were in the functioning of outstations.

In due course I confronted my class of eight veterans, all of them strangers to me (one had actually joined the Office before I was born). I began by referring to the 'gentlemen and players' atmosphere in the Office, of which we were all conscious, and I stressed that the success of the course depended on an open and friendly relationship between all of us. Their response from that day to the end of the course was magnificent. Naturally they were aware that their careers depended on their success on the course, but I remain convinced that an important feature of this course — and of many similar ones over the years — was that it largely destroyed the feeling of segregation.

Our stay at Croydon lasted only a few weeks. Someone had overlooked the fact that aircraft engines underwent tests for an hour or more almost every day in a nearby hangar, so lecturing and study were impossible.

Our next home consisted of two or three rooms above a Lyons tea-shop facing South Kensington station, and as far as I can recall we were there for something like two years. A.F. Crossley joined me in the spring of 1938, and thereafter we each had a class of graduate or non-graduate students.

One of the attractions of training forecasters was the complete independence it gave us. No one questioned a syllabus (or even asked to see one), and indeed Crossley and I organized our courses independently of each other.

How a course was organized was undoubtedly influenced by the threat of war, and the Munich crisis of 1938 (when we all dispersed to outstations for a week or two) brought an added sense of urgency to our work. We aimed to produce fairly competent forecasters in a reasonably short time, and to keep to a minimum any theoretical meteorology that was not essential. And, particularly with the non-graduate classes, the emphasis was on broad physical explanations rather than mathematically precise ones (if such existed!). Moreover, I was always at pains to distinguish between meteorological phenomena for which there were fairly satisfactory explanations and phenomena which were not understood. It does much for a forecaster's confidence if he knows that he is not alone in his ignorance.

I think it is true to say that almost every trainee forecaster enjoyed meteorology. This was partly because at an early stage on the course he could make use of what he had learnt. In the main I kept lectures to the morning period, with chart plotting and forecasting partly in the morning but mainly in the afternoon. Observing and pilot balloon work were fitted in between lectures, to give everyone a little fresh air as much as anything.

I have always considered it important that forecaster training — after the earliest stages of the course — should be on current weather, and this I have always achieved. (Normally, when the first lecture of the day ended at 9.15 a.m., a duplicated foolscap sheet of 0700 GMT observations would be available to each trainee.) In working a set series of past charts the trainee is aware that his instructor knows what happened next. With current charts they are on an equal footing, and it is good for the instructor to be wrong from time to time.

Success in the teaching of forecasting can be assessed by whether the student becomes excited and stimulated by his own efforts. For some years I had hanging on the wall a couplet from Shaw's Vol. IV, which ran something like this: 'The forecaster's heart knoweth its own bitterness, and the stranger intermeddleth not with its joy'. If a student really understood what Shaw meant he was well on the way to becoming a forecaster.

In 1939 there was a considerable expansion of training, for it was clear that war was imminent. A larger organization was set up in Central London, with Professor Brunt in charge, and I returned to operational forecasting.

With the fall of France the following year there was some difficulty in making good use of returning meteorologists. Nevertheless, it was decided that the Office should prepare for substantial expansion, and I was recalled to set up a training school at Gloucester in the autumn of 1940, and I was especially fortunate in being able to choose Mr J.P. Kay as my right-hand man.

Within a short time we were training large numbers of forecasters and assistants, most of them in uniform, including WAAF officers and airwomen. To the best of my recollection the forecaster courses lasted 12 weeks and the assistant courses 6, followed in each case by outstation training.

Gloucester was an ideal location for a training school and we had few reminders of the war apart from the arrival for training of various young men from the Continent who, often at great risk, had escaped to join their forces in England. I remember in particular two Norwegian youngsters who had managed to cross the North Sea in a rowing boat.

It was perhaps two or three years later that the School was transferred from Gloucester to London, to an empty convent in Kilburn. This was equally satisfactory for our purposes apart from the arrival of flying bombs. These did not interfere with training to any great extent but they were a novelty to many trainees and so were a strong counter-attraction during lectures.

The Kilburn convent was a long building which housed another Government department at the far end. One night an incendiary bomb set light to the end of the building remote from the night-watchman and, by the time he became aware of it, a large part of the building was destroyed.

I think it was after this fire that we moved to rooms over a furniture shop in Oxford Street. The accommodation was spacious in comparison with the upper floor above the tea-shop of ten years before, but could not be compared with the Training College of today. However, the intake of trainees declined as the war neared its end. As for myself, an overseas posting early in 1947 ended the ten most satisfactory years of my career.

Note on quotation from Napier Shaw

The words quoted are from Volume IV, page 285, and are adapted from Proverbs 14.10: 'The heart knoweth his own bitterness; and a stranger doth not intermeddle with his joy' (Authorized Version). More recent translations are easier to understand, e.g. 'The heart knows its own bitterness and a stranger has no part in its joy' (New English Bible).

Transatlantic civil aviation — the initial phase: the first training course for scientists in the Meteorological Office

By P.J. Meade

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Summary

In 1935 the Meteorological Office was notified of a requirement for a forecasting organization to take part in an experimental programme for the development of commercial air routes over the North Atlantic Ocean. Early in 1936 a number of graduates were recruited to train as forecasters and to assist in investigations of weather conditions over possible transatlantic air routes. The graduates received a formal course in synoptic and dynamical meteorology — the first such course ever given by the Office to its own staff — and received practical training in the provision of forecasting services for civil aviation.

1. Introduction

The first training course for scientists in the Meteorological Office was arranged for a specific purpose, namely, the provision of a forecasting service for the development of commercial air routes over the North Atlantic. The course opened officially in February 1936 but did not get properly under way until a month or so later when an adequate complement of graduates, who were recruited steadily rather than simultaneously, had reported for duty. Before 1936, although the Office had been in existence for many years, formal training courses for new graduates would not have been a practical proposition because the rate of recruitment was slow and at times there was an interval of several years between one graduate and the next one entering the Office. Training had to be 'on the job' and, in my experience in working with senior colleagues, was thorough and effective.

When our own Government and that of the USA decided, through their official or semi-official airlines — Imperial Airways and Pan American Airways — that civil aviation had reached a stage that would justify an experimental programme to investigate the feasibility of scheduled commercial flights between North America and Britain, there was considerable scepticism, not least among a number of pilots, and widespread anxiety about the outcome of the projected trials. Pioneering flights like those of Alcock and Brown (1919) and Charles Lindbergh (1927) had stirred the imagination of the general public but there had also been many tragic failures. Each year in the 1920s and early 1930s there had been various attempts, usually sponsored by aircraft manufacturers and by oil companies, to fly the North Atlantic, eastbound or westbound, and in nearly all cases the aircraft and its crew had disappeared without trace. The weather took the blame for all these failures. In those days aircraft operated in the lowest few thousand feet of the atmosphere and in consequence had to cope with the worst conditions — in terms of strong winds and turbulence, rain and snow, squalls and ice formation — to be found on the route being flown. It appeared to be very well known that on most days one or more intense depressions with strong wind circulations usually moving in an easterly direction would be present over the North Atlantic. There was therefore a fairly widespread feeling that, with the aircraft available at the time, transatlantic aviation would be at best a hazardous undertaking.

As was only to be expected, the responsible authorities decided that civil aviation must advance and that lessons rather than extreme pessimism were to be drawn from past failures. It was therefore planned that a series of experimental crossings would start in the spring of 1937. Imperial Airways would use the new 'C Class' flying boats which had been designed primarily for the establishment of the Empire airmail routes from Britain to India and Australia, and from Britain to South Africa. These flying boats,

described in the Press as 'giants', held up to 24 passengers on the relatively short steps on the so-called Empire routes but the two to be used for the early transatlantic flights, *Caledonia* and *Cambria*, were cleared of all passenger fittings so that additional fuel could be carried. For their part, Pan American Airways planned to use flying boats, with names like *Yankee Clipper*, already in service on air routes over the Pacific Ocean and possessing ample endurance for a crossing of the North Atlantic.

On the eastern side of the Atlantic the main flying boat base was to be at Hythe on Southampton Water, a base already in the course of development for the Empire airmail services; but the departure point for *Caledonia* and *Cambria*, as well as for the Pan American Airways clippers for westbound flights, was to be at Foynes near the mouth of the River Shannon on the west coast of Ireland. The responsibility for providing forecasting services at Hythe and Foynes was assigned to the Meteorological Office; in the case of Foynes mainly because the Irish Meteorological Service had only just begun to set up a forecasting service for civil aviation.

On the western side of the Atlantic, a new flying boat base at Botwood in Newfoundland was used. Clearly the designation of Foynes and Botwood was in order to keep the length of the route to a minimum and well within the range of the American and British flying boats. Responsibility for the forecasting service to be provided at Botwood was undertaken by the Canadian Meteorological Service. The person appointed to take charge of the forecasting centre at Botwood attended the first training course for scientists organized by the Meteorological Office. In common with the British trainees on the course, it was his first encounter with meteorology as a profession.

2. Training and investigations

When the requirement for providing a forecasting service for the experimental trials over the North Atlantic was notified to the Meteorological Office, the Director, Sir George Simpson, decided that the staff were already fully committed on current tasks and therefore there could be no question of redeploying forecasters to meet what was recognized as an exciting and very demanding new responsibility. He also appreciated that, in the time available before the inaugural flights were to take place, a considerable amount of research and investigation had to be carried out into the weather conditions for aviation over the North Atlantic. The Director therefore obtained approval for the recruitment of a number of graduates who would be trained in forecasting for transatlantic flights and would, under experienced supervision, investigate the frequency, intensity and direction of movement of Atlantic depressions and study other associated problems. The organizational and administrative base for these new arrangements took the form of an Atlantic Investigation and Training Section established with effect from 1 February 1936 in M.O.5, the Office's Overseas Branch. Mr S.P. Peters, a forecaster of wide experience and high reputation, was appointed to take charge of the section and he was assisted by two trained forecasters in the grade of Technical Assistant 1 (TA1), Messrs D.F. Bowering and E.S. Tunstall. Office accommodation was an enormous L-shaped room with 15 or more tables equipped with plotting slopes in the operational block at Croydon Airport which was then known as the airport of London, the forerunner of Heathrow. In the same building, but some distance away, was the important forecasting office serving civil air flights to the Continent and to destinations in the United Kingdom. The Observer grades in this office were to play a valuable part in the training of Mr Peters's class of graduates.

As recruiting proceeded we arrived on the course in ones and twos knowing little of meteorology and even less about the activities of a forecasting office. We each spent the first few days quietly with sheets of paper and a pamphlet giving instructions on the plotting of synoptic observations on weather charts, practised with station models until we were told our plotting was neat, clear and compact and then tried our hands at plotting weather maps and drawing isobars. Most of us at first tried to treat every pressure

observation as absolutely accurate and, as a result, our isobars possessed innumerable squiggles which probably suggested to our mentors that we had been taught drawing by Picasso. All these exercises were necessary because as part of the training and investigation programmes we were to plot, analyse and draw charts for a whole year covering North America, the North Atlantic and Europe.

In these various tasks associated with weather maps Mr Peters watched over each individual's progress but the main practical assistance was provided by Bowering and Tunstall who gave every encouragement and also explained the observing procedures. However, in this latter area of the work we derived most benefit from the Observers in the forecasting office. We accompanied them on routine observing duties, carried out pilot balloon ascents and used balloons to estimate cloud height in marginal conditions. The Observers were particularly helpful and interesting in their description and discussion of clouds. One of their main duties was to watch the development and movement of cloud systems in all weather conditions and the picture that was presented to us was a dynamic one, in contrast to the static displays in the *International Cloud Atlas* — although these were also regarded as very valuable and interesting.

This preliminary training in the ancillary duties of a forecasting office lasted only a week or so although we continued with various aspects of the observational routine, notably pilot ballooning and cloud study. We were then each allotted a section of the period selected for the detailed plotting and study of Atlantic weather. We were presented with boxes filled with synoptic bulletins obtained partly from the US Weather Bureau and partly from the Forecasting Branch, M.O.2's archives. We also examined ships' logs, loaned to us by the Marine Branch, M.O.1, and were able to find valuable observations which were made on Atlantic voyages but not reported in time for inclusion in broadcasts of synoptic data.

Charts for a relatively short period were prepared primarily for a study of weather conditions since it was considered that these, rather than winds and other parameters, might present the greatest threat to the flying boats which would have an operational height of a few thousand feet. In short, it was assessed that very strong winds could be predicted and the flights postponed but that a great deal needed to be learned about the severity of weather conditions in the more intense depressions. There was also a secondary purpose which formed an important section of the whole investigation. The charts we prepared, supplemented by ten years of working charts (which did not go so far west as ours) borrowed from M.O.2, were used to estimate times of flight from Foynes to Botwood in great circle and rhumb-line routes. On certain occasions we considered alternative, better-weather routes, and measured route lengths and estimated flight times. Our main sources of information were, of course, the surface charts, and wind estimates were based on the sea-level isobars using the geostrophic scale. The report which Mr Peters prepared for submission to the Headquarters Branch, M.O.5, and for consideration by civil aviation authorities contained an assessment of Atlantic weather conditions month by month and also a statistical analysis and discussion of the flight times Foynes–Botwood over a period of about seven years.

A special feature of the investigation was carried out by one of the trainees, D.A. (now Sir Arthur) Davies, who made several Atlantic crossings in a cargo vessel, the *Manchester Port*, to study weather conditions at first hand and to make pilot balloon wind soundings whenever practicable. His results were incorporated in the report prepared by Mr Peters and referred to above.

At Croydon we were visited several times by the head of the Overseas Branch, Mr F. Entwistle, who was already a well known figure in international civil aviation and who was the architect of many of the meteorological procedures for the support of air navigation that are still in existence today. After the Second World War he became Head of the Navigation Directorate of the International Civil Aviation Organization, a directorate which included the Meteorological (MET) Division as well as several others. Mr Entwistle was always ready to talk to us individually or collectively. He clearly had great faith in the

future of transatlantic civil aviation and emphasized that our responsibilities were to contribute to the safety of such flights and to try to avoid any death or glory exploits which had characterized so many earlier attempts to fly the Atlantic. We readily absorbed his enthusiasm and it may be said that, like the crew of stout Cortez, we looked at each other with a wild surmise. The analogy may be somewhat imaginative but Entwistle, who possessed that comfortable shape which in women who are not duchesses is described as stoutness, could be compared at least in one particular with stout Cortez.

It might be remarked that some of the foregoing paragraphs have tended to concentrate on the investigation leaving the important training aspect in the background. It will be understood, however, that the work of analysing and drawing synoptic charts formed an essential element in the training of forecasters. Moreover, the area of study, stretching from North America across the Atlantic into Europe, is probably the most testing as well as the most interesting for a forecaster at the outset of his career. The other main components of training — lectures supplemented by wider reading and forecasting from current charts — were conducted by Mr Peters when he judged that our practical work on Atlantic charts had given us an adequate background on the behaviour of pressure systems and the weather associated with them.

It should be mentioned that, when the course took place in 1936, and indeed for some years afterwards, meteorological data for forecasting consisted of three-hourly surface observations with special intermediate reports from any station experiencing a sudden, adverse change, some pilot balloon wind observations from areas where the weather was fine or fair, and upper-air temperature and humidity observations up to about 25 000 feet made by RAF aircraft making vertical ascents from Duxford near Cambridge and Aldergrove in Northern Ireland.

The series of lectures, in so far as theory was concerned, were limited to presentation and discussion of forecasting techniques and procedures, including the application of empirical rules. Thus we learned about geostrophic winds and isallobaric analysis, about the tephigram and its use in forecasting maximum day temperatures (Gold squares), showers and thunderstorms, and about night minimum temperatures, frost and fog. In a more descriptive and practical, i.e. less theoretical, manner we studied and applied the Bjerknes hypotheses regarding the development of depressions on the polar front.

We were also encouraged to read not only the papers referred to in the lectures but also more advanced texts and to explore widely among the many mansions of meteorology. There was an excellent library with ample copies of such publications as Brunt's *Physical and dynamical meteorology*, Normand's papers on the tephigram, Bjerknes' description of the polar front and so on. Of particular interest was the major paper by V. Bjerknes which derived and discussed the equations of motion in three dimensions on a rotating earth and, incidentally, nearly did for dynamical meteorology what Horace Lamb in his massive treatise had done for hydrodynamics. We also derived much interest from reading some of the papers on turbulence referred to in Brunt's book. This wide theoretical reading provided a necessary corrective to some early discussions among ourselves when we wondered why, having graduated in mathematics and/or physics (there were some double firsts on the course), we should be employed in plotting charts and drawing isobars. Both the reading and the practical work provided reassurance that meteorology, whether in forecasting the weather or in some other branch of the science, contained a host of problems that could challenge the best brains and still escape complete solutions.

As regards current weather we took it in turn to plot and analyse the 07 GMT chart (at that time the main synoptic hours were 01, 07, 13 and 18 GMT) and by about midday the rest of the class were given a briefing on existing conditions and expected developments. In addition, a forecast for the Croydon area for the following 24 hours was issued. This daily exercise lacked the continuity that is provided by a complete series of charts but the effort was very satisfactory. Mr Peters played an advisory and helpful role and, when the forecast went badly astray, always claimed a share of the responsibility.

3. The purpose of the course is widened

The specific purpose of the course was to train new-entrant graduates to carry out investigations into North Atlantic weather conditions in preparation for scheduled flights by civil airlines and to provide the forecasting services for such flights. Almost immediately this purpose was slightly modified. The Colonial Office, then a Department of State but now absorbed into the Foreign and Commonwealth Office, had recruited two graduates, J. (now Sir John) Carmichael and W. Richards, for meteorological duties in the Sudan and in Singapore respectively. The Office was asked to train them in forecasting and our course under Mr Peters was the only one available. They both participated fully but were given ample time to read books and memoranda on weather in the tropics and subtropics. A month or so later a member of the Meteorological Service of Iraq, Mr Towfiq Fattah, joined the course for training and was absorbed into the various activities for the next five months.

Within a few months, by mid-1936, the purpose of the course was widened much further. The expansion of the armed forces against the possibility of war gathered momentum and the Office recruited a steady stream of graduates, mainly for service at new RAF stations although some were also required for duties with the Royal Artillery in connection with gunnery and sound ranging. At first these recruits came to our course for training as forecasters, with time allowed for any special studies that were required, and completed their training with us before leaving for duty with the Army or RAF. However, this arrangement could not continue since our course was destined to evolve into an Atlantic investigation and forecasting section discarding all responsibility for training. In the latter half of 1936, therefore, the Office set up an organization under Mr C.J. Boyden responsible for training staff at all levels and from that time on no more new entrants joined our course. This training organization has continued in existence, with many changes in location and in scientific and technical scope, throughout the intervening years up to the present day and is a permanent feature of the Office establishment.

The trainees who left our course for RAF stations had a particularly testing time. They had never issued a forecast for an actual flight; they had never served in an office of any description and presumably had no knowledge of the innumerable organizational and administrative details that are indispensable for efficient functioning. In many cases the RAF stations were new and still under construction so everything had to start from scratch. Fortunately, the RAF placed the highest value upon their forecasting service and goodwill was at hand in overcoming the various difficulties. Even so, such experiences exert considerable strain and all these trainees emerged with great credit and an unimpaired sense of humour.

From time to time we were joined on the course for short periods, 2–3 weeks, by members of the Office with some years' service. They needed either to refresh their knowledge of forecasting or to acquire some background as to the activities in a forecasting office. In this latter category was Dr F.J. Scrase who, after a long period of research into atmospheric turbulence followed by a few years at Kew Observatory, had received a posting to take charge of our office in Gibraltar.

4. Personalities and other items

The names of those who attended the course for a substantial period, i.e. omitting the 2–3 week attachments, reads as follows in alphabetical order: C.J.M. Aanensen, J.H. Brazell, J. Carmichael, D.A. Davies F.E. Dixon, Towfiq Fattah, R. Frith, J.L. Galloway, J. Harding, T.N.S. Harrower, G.W. Hurst, L. Jacobs, H.H. Lamb, F.E. Lumb, P. MacTaggart-Cowan, P.J. Meade, S. Proud, W. Richards and G. Thornton-Smith.

The majority of those named have had many years' service in the Office. Regarding some of the others, again taken in alphabetical order, the remarks which follow may be of interest: Davies became Director of the East African Meteorological Service soon after the 1939–45 World War and then held the position

of Secretary-General of the World Meteorological Organization (WMO) for 24 years from 1956 to 1979. On his retirement he was appointed Secretary-General Emeritus by WMO and HM The Queen conferred a knighthood on him. Dixon transferred to the Irish Meteorological Service and Galloway to the Canadian Service. MacTaggart-Cowan in due course became Controller of the Canadian Service. Proud was lost at sea in 1941 while serving on a weather ship which was sunk by enemy action.

Visitors to the course included J. Bjerknes who was on a six-month attachment to M.O.2, from the Norwegian Service. He spoke to us about his work on polar front depressions and had an informal chat with each member of the course. Two senior members of the Office, Dr J.M. Stagg and Mr R.P. Batty, paid short visits and spoke about the responsibilities and work of the Office.

Members of the course enjoyed a fair amount of extramural activity. Some joined local orchestras and others represented clubs at rugby, tennis, squash and badminton. At the Air Ministry sports in June, the course fielded a tug-of-war team which reached the final, only to lose after a protracted struggle. The team was coached with dedication and fiery eloquence by one of the observers in the forecasting office.

5. Final days at Croydon

By the early days of 1937, numbers on the course had dwindled since for some time trained staff had been leaving for their outstations and new entrants to the Office had been joining the courses run by Mr Boyden. The size of the Atlantic unit remained in doubt. The Head of Branch, Mr Entwistle, envisaged that a forecasting section consisting of Mr Peters (in charge) and four forecasters would go to Foynes, whilst a small group of about six forecasters would remain at Croydon to carry out investigations into problems identified by the section at Foynes during their operational work and to provide a pool of trained forecasters for posting to any new transatlantic bases that might be opened. In the end this plan could not be realized because the demand for forecasters arising from the expansion of the RAF was too great.

At the end of January 1937, therefore, the residue of the course was reduced to the Foynes contingent, namely Peters, Davies, Harding, Meade and Proud. We were to disperse in the first week of February and reassemble a few days later at Foynes. Then a last-minute change was made. A telephone call from Headquarters told Mr Peters that Imperial Airways intended to begin operations at Hythe, Southampton immediately and that one of the forecasters in the Foynes section was to go to Hythe instead. Peters was told to decide. Obvious choices for Foynes were Davies, who did the *Manchester Port* crossings, and Harding who had already shown an extraordinary flair for forecasting. So Peters had to decide between Proud and me, knowing that we were both keen to go and, as he assured us, wanting both of us in the team. He did the sensible thing. He explained the position to us and suggested we might like to sort it out between us. If we could, well and good, if not he would decide. Proud and I agreed that this was a question of sufficient importance to be settled in the bar of the Airport Hotel and we went there straight away. When the beer had been bought a coin of the realm was extracted from the change and sent spinning into the air. Proud called correctly and went to Foynes and I went to Hythe. We returned to the office to report to Peters and a slight mishap occurred. Stanley Proud had a sparkling wit expressed in throwaway remarks delivered with a dead pan face. As we entered the office he uttered one such aside and when we reached Peters's desk I was wearing a broad smile and Proud remained dead pan. Peters jumped up and said, 'I can see how you have settled it. Never mind, Proud, the work at Hythe will be extremely important and you will find it most interesting.' When we explained the true position, Peters seemed convinced that we had played a practical joke on him and we thought it best to keep out of his way for the rest of the day.

After the experiences of my former colleagues who left the course in order to open forecasting offices on new RAF stations, I went to Hythe in a frame of mind that might be described as somewhat lacking in

confidence. All was well, however. Until office accommodation became available at the flying boat base, I used the facilities of the forecasting office at the RAF station at Calshot at the mouth of Southampton Water about eight miles from Hythe. The officer-in-charge was Mr R.A. Watson, a man of wide culture and gentle humour with many years' forecasting experience both at home and abroad. He readily expanded the plotting and analysis routine so that the working charts would cover the Mediterranean and part of the Middle East as well as Europe and the eastern Atlantic. Mr Watson took a great interest in my work and helped in all possible ways. On operational days I would plot and analyse my own charts and, with his advice, compile the forecast and then go to Hythe to brief the pilots. My first forecasts were a link with the forthcoming Atlantic trials since the proving flights of *Caledonia* and *Cambria*, testing range, communications and other factors, took the form of non-stop flights from Hythe to Alexandria on the Egyptian coast.

6. Conclusion

The investigation and training section of the Office's Overseas Branch was established officially on 1 February 1936 and was in existence at Croydon for one year and a few days. The training element of the section was discontinued but the investigation and forecasting component proved remarkably fertile. The work carried out at Croydon led to the development, in collaboration with the Canadian Meteorological Service, of meteorological procedures for long-distance civil aviation routes which were implemented for the experimental flights between Foynes and Botwood. These procedures, which included the provision for exchanges of data, analyses, and advisory route and terminal forecasts, were largely adopted world-wide for operations by civil airlines.

Meteorological Office training of assistant staff: 1939–51

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Summary

The purpose of this note is to place on record an account of the early, peripatetic years of formal assistant training in the Meteorological Office. The pattern of recruitment controls the logistics of the training organization and the academic background of the intake influences the manner of teaching. These two matters are thus highly relevant to any account of training and some remarks on them are given in an introductory section; this also includes comment on the available sources of information. The training story itself then unfolds in the main body of the note.

Introduction

Civilian assistant grades and qualifications

In 1939, assistant duties at outstations were shared by two quite distinct grades of staff, namely Observers and Assistants Grade III (AIII).

The Observer grade was devised during the early 1930s partly to provide an opportunity of civilian employment for selected airmen who had satisfactorily completed a long term of regular service in the RAF. Recruitment ceased in 1938 when about 70 Observers had been appointed; the grade then became obsolescent and the staff were later absorbed into the AIII grade. Observers had no specific academic qualifications and were given no formal training; despite this, by 1939, when most of them were aged 30 to 40, many had become very highly skilled at observing, coding, decoding and chart plotting.

The AIIIs were recruited from 1936 to 1939 at age 17 to 20, and were required to have Inter BSc or Higher School Certificate (roughly equivalent to GCE A-level) in three principal mathematical or scientific subjects; the annual salary at age 19 was £130 (which approximates to £2250 at present-day prices) but £10 was deducted for each year below age 19. By contrast with the Observers, therefore, AIIIs were not only much younger but much better qualified academically; indeed, although the work they did was that done in later years by Scientific Assistants (SAs), from the qualification point of view they were more than on a par with post-war Assistant Experimental Officers (AXOs).

From October 1939, assistant recruits were appointed to a new temporary grade of Meteorological Assistant (MA) on a fixed salary of £110 p.a. The entry age was set at 17, and the minimum academic qualification was lowered to Matriculation including passes in elementary mathematics and physics; but over-age candidates were also considered and indeed some university graduates who were not at that time accepted as direct-entrant forecasters first joined instead as MAs.

Civilian assistants were recruited into the MA grade until the end of 1946, but from 1947 onwards appointments were made into the new post-war grade of SA, initially on a temporary basis. The entry qualifications remained broadly the same as those for MAs but the age of entry was considerably widened to include those in their twenties and salaries were on an incremental scale.

The initial wartime expansion: September 1939–spring 1940

Putting the Office on a war footing involved a big increase in 24-hour working and consequently a large influx of assistant staff. Recruitment is all too often a very protracted affair, but the approach of war showed that if the need is really urgent, procedures can be speeded up considerably. When I answered my doorbell one day in late August 1939, the telegraph boy handed me not the familiar pale

orange envelope in which telegrams were normally delivered but a vivid red one on which the word **PRIORITY** was outlined in dark blue down the left-hand side. In response to my application for appointment as an AIII, the text summoned me for interview the very next day in Adastral House, then on the corner of Kingsway and Aldwych. A provisional offer of appointment was made two days later and, after undergoing a full Civil Service medical examination and checks having been made with the character referees I had named, I was given just three days notice to report for training at Berkeley Square House on Friday 15 September 1939.

Small groups of AIIs had been recruited in May, July and late August, bringing the total AII complement on 1 September 1939 to 136. There was a large intake of AIIs in September and early October and continuous recruitment for the new MA grade followed without pause. During the spring of 1940, when 260 AIIs and MAs had joined since the outbreak of war, recruitment was suspended (Air Ministry (Air Historical Branch) 1954).

The recruitment of airmen for the newly formed Meteorological Branch of the Royal Air Force Volunteer Reserve (RAFVR) was first sanctioned during the early summer of 1939; airmen who had by then enrolled were mobilized at the outbreak of war and were absorbed into the assistant cadre of the Office. Small numbers of airmen continued to join through the autumn and winter, bringing the total intake by the spring of 1940 (when, as for MAs, recruitment was suspended) to 240 (Air Ministry (Air Historical Branch) 1954).

Taking into account the 70 or so Observers, the total assistant complement on 1 September 1939 was a little over 200; in less than nine months it had risen to over 700.

The next burst of recruitment: December 1940–April 1942

Recruitment of MAs resumed in December 1940, initially with intakes of 15–20 at fortnightly intervals. Early in 1941, with continuing expansion of the RAF both in the United Kingdom and overseas (assistants were sent even to West Africa and to the RAF flying training schools in Canada), a much more vigorous campaign was mounted. The traditional small notices in tiny print in newspapers were supplemented by more eye-catching material and trails for MA jobs were given on radio (for security reasons, weather forecasts were not broadcast during the war, and the 12.55 p.m. time-slot on the BBC Home Service was used instead for Government announcements). A recruitment board toured the country, visiting places such as Darlington, so that applicants did not have to travel long distances to London for interview. All this activity resulted in a marked increase in MA recruitment during the spring and summer of 1941 and, significantly from the training point of view, produced some sharp peaks in the intake; these caused logistic problems of a type that recurred in later years.

The influx of MAs eased off during the winter, and in the spring of 1942 virtually ceased for about 18 months, being replaced by the very large Women's Auxiliary Air Force (WAAF) intake. During the period of roughly 18 months from December 1940 to April 1942, over 500 MAs had joined the Office together with well over 100 airmen.

The major WAAF inflow: September 1941–June 1943

Early in 1941 it had been agreed that a new trade of Meteorologist would be introduced in the WAAF. Recruitment began during the late summer, initially at the rate of 15 per fortnight. It no doubt soon became evident that the WAAF could provide very competent outstation assistants; by February 1942 the intake had been stepped up to around 30 per week and it remained more or less at that level for nearly 18 months until June 1943. By this time, over 1800 Met Waafs had been enrolled and they had taken over almost the entire complement of outstation assistant posts in the United Kingdom.

Throughout the period of massive WAAF recruitment airmen had continued to join in small numbers, just over 50 coming in during the year from June 1942 to May 1943. There appears to have been no MA recruitment during this time except for a few people engaged specifically for work at Headquarters.

The surge in recruitment of airmen: June 1943–August 1945

By June 1943, the need for airmen overseas in support of RAF and Army units in North Africa, the Mediterranean and the Middle East was increasing and recruitment was stepped up; around 500 Met airmen joined the service in the 12 months to May 1944, together with about 30 MAs. Met airmen went into Europe shortly after D-Day and more were required in India in preparation for the Far East campaign; so the rate of intake again accelerated and over 1100 were enrolled between June 1944 and June 1945, and there was a further steady trickle of about 110 MAs during the same period.

A handful of Waafs enrolled during the late summer and early autumn of 1943, but the trade of Meteorologist was then closed; those still wanting to join were unable to do so and had to sign on, at least for a time, for other trades. However, by late 1944 it had become evident that with yet more RAF stations being opened in the United Kingdom there was once again a marked shortage of assistants. The trade of Meteorologist was therefore reopened and between November 1944 and June 1945 a further 180 Met Waafs were recruited. From the training point of view this caused major problems because the new intake of Waafs came at a time when airman recruitment was at peak level.

The academic requirements for both Waaf and airman recruits were similar to those for MAs, but to an increasing extent much greater emphasis was placed on strong motivation and some ability in mathematics together with a good general education to School Certificate level rather than on the possession of specific certificates. This practice (which no doubt stemmed from the large numbers required) certainly had implications for the training programme as it could not be assumed that all students were familiar with the concepts of elementary physics; but an absence of scientific knowledge could be, and was, overcome by teaching. Overall, the wartime intake of service personnel fitted in very well and maintained high standards of professional competence.

During the final year of the war, certain trades in both the RAF and the WAAF became over-full (e.g. Wireless Operator and Student Pilot but never Meteorologist); personnel in such trades were then declared redundant and were forced to remuster. For some, the opportunity this gave to join the Met service was very welcome, but others came much less willingly. As those remustered carried their rank with them, assistant training courses in late 1944 and in 1945 often included Corporals, Sergeants and even the occasional Warrant Officer; some of these were not at all pleased at finding themselves 'back at school' alongside new-entrant airmen and Waafs, and considerable tact was needed on the part of the instructors.

The last intake of Waafs appears to have been in June 1945, and that of airmen in August 1945 when the war in the Far East finally came to an end.

Post-war recruitment: 1946–51

It might be supposed that with the cessation of hostilities and the consequent contraction in the meteorological support needed by the armed forces, there would be little need for civilian recruitment during the immediate post-war years. Indeed, during the ten-month period from September 1945 to June 1946 inclusive, the total MA intake appears to have been two. But a time bomb was ticking away in the background because during the two years of 1946 and 1947 perhaps as many as 4000 Met airmen and Waafs were demobilized.

Recruitment of MAs restarted on a modest scale in July 1946, but clearly the Office became very worried about the assistant staff situation. During the autumn Waafs, and no doubt airmen, were asked to defer their release dates by six months and letters were also sent to those on demobilization leave inviting them to apply for temporary civilian posts in the Office. These measures had a limited success, but recruitment on a very large scale became essential in order to maintain the meteorological service.

During the autumn of 1946, assistant recruitment was at the rate of 10–20 every three weeks. This intake increased sharply the following spring and reached an astonishing peak of 50–60 in every week of September 1947; not surprisingly the training organization had many problems in dealing with a concentrated influx of this magnitude. By the end of the year, when the flood tide had receded, more than 1000 MAs had been added to the complement. In the subsequent years from 1948 to 1951 the annual intakes varied between 200 and just over 300.

Sources of information

Brief references to the Meteorological Office Training School in Berkeley Square from 1939 to 1940 are made both in the official account (Air Ministry (Air Historical Branch) 1954) of the Meteorological Office during the war and in an article about training by Meade (1952); articles concerning training published subsequently by Gordon (1959) and Johnson (1972) refer to the early years only by quotation from Meade's article. An account of training during the years from 1936 to 1946 has also recently been prepared by Boyden (1986); this primarily concerns forecaster training.

The earliest documentary evidence known to exist relates to courses at the Meteorological Office Training School at Gloucester between late 1940 and mid-1942. A file preserved at the Meteorological Office College, Shinfield Park, lists names of students who attended each course, together with the ending but not the starting dates of the courses; for some curious reason these were not identified by serial numbers in the usual way. The College also holds records of the courses at the WAAF School in London from 1941 to 1943 and at the combined Schools at Kilburn and Oxford Street from 1943 to 1946; these give lists of students on each serially numbered course, but unfortunately neither starting nor ending dates of the courses were recorded. From the beginning of 1947, full details of students and courses have been entered in an Assistant Student Register which is still in use at the College.

In order to unravel the tangled story of assistant training, it was necessary to reconstruct as precisely as possible the dates of over 500 courses. Meteorological Office seniority lists prepared for internal use during the early 1950s proved to be a fruitful source of information; for all established staff then serving, these lists tabulate dates of joining the Office and whether as AIII, MA, SA, airman or Waaf. In the large majority of cases, though by no means invariably, the date of joining during the period of this review was the starting date of an assistant course; this established a skeleton framework of dates and the rest of the timetable had to be inferred by interpolation and from other considerations.

The other major input to this note, especially concerning the war years, has been my own personal recollections together with those of over 25 friends and colleagues whom I have consulted. After 40 years and more, memories are inevitably patchy, less than precise and sometimes undeniably in error; but by cross-checking with each other and with the surviving fragments of record, a coherent pattern has emerged. Most importantly, the recollections have made it possible to turn what would otherwise have been a very bare record into a story of real people in real places.

The story of assistant training

Pre-war arrangements

Before May 1939, the normal training procedure for AIIs was the time-honoured practice of 'sitting by Nellie' or rather her male counterpart. Except for those few people needed at Headquarters, recruits

were posted on appointment to an outstation where they were expected to pick up what they needed to know by reading and from staff on duty. Not surprisingly, the effectiveness of this practice was distinctly uneven. It depended not only on initiative and the ability of an individual to educate himself, but also very much on the competence and enthusiasm of the local staff who had perforce to act as tutors in addition to carrying out their normal duties.

The first assistant course ever run by the Meteorological Office started on 1 May 1939, when 12 new-entrant AIIs assembled at the Meteorological Office in Edinburgh, then in Drumsheugh Gardens. The instructors were O.B. O'Sullivan (AII) and T.R. Soden (Observer). The course lasted for eight weeks and included lectures on elementary meteorological theory; for some of the outdoor practical work, the students had to travel over two miles to the Observatory at Blackford Hill on the south side of the city.

A week after the end of this initial venture, a second course of 12 AIIs run by the same instructors started at Manston on 3 July 1939. A third course also assembled there on 29 August 1939, but the outbreak of war barely a week later put an end to the proceedings; this course was abandoned early in September and the students were posted to outstations for further training.

The Training School in Berkeley Square: 1939–40

When the Meteorological Branch of the RAFVR was formed, it was envisaged that officers and airmen would be given appropriate instruction at evening classes. A panel of volunteers from the Meteorological Office was formed to provide the instruction, and syllabuses were devised. But by the end of August 1939 nothing further had been done because suitable accommodation in which to hold the classes could not be found in London (Air Ministry (Air Historical Branch) 1954). Thus when the airmen reservists were mobilized at the outbreak of war, they had to be dispersed to outstations for on-the-job training as had been the norm for AIII staff before May 1939.

Matters then moved at great speed. The idea of evening classes was abandoned; within a few days rooms for a new Meteorological Office Training School were found in Berkeley Square House and Professor David Brunt of Imperial College was appointed to take charge, his most immediate task being to train the RAFVR officers as forecasters (Air Ministry (Air Historical Branch) 1954). But the accommodation available was more than sufficient for forecaster training and it was decided to make use of the surplus to provide short courses for civilian assistants. Furniture, instruments, equipment, books and other training material were rapidly assembled and instructors were appointed to deal with a first intake of new-entrant AIIs on Friday 15 September 1939.

The new assistant courses were of two weeks' duration. Elementary theory lectures on temperature, pressure and its relation to wind, cloud formation, fog, pressure systems and fronts were given by A.F. Crossley, a Technical Officer who had been an instructor at the pre-war Training School in South Kensington (Boyden 1986). But the all-important instruction in practical work was in the hands of instructors new to the job (C.H. Wood and S.C. Batchelor, both AIIs) and was clearly being developed as the course progressed. I still have a vivid recollection of the way in which we were introduced to the synoptic code. An instructor wrote on the blackboard:

IIIC_LC_M wwVhN_h DDFWN PPPTT UC_Happ.

He didn't tell us what these letters stood for nor what purpose they served, but merely said, 'Learn that' and walked out of the room. Admittedly we had been provided with copies of *Wireless weather messages* and the instructional booklets on chart plotting and pilot balloons also, for theoretical background, with Pick's *Short course in elementary meteorology* and *The weather map*. Using these we were

evidently expected to devil out a great deal for ourselves and no fewer than 16 of the 60 instructional periods during the fortnight were allocated to private study. For ex-sixth form students, this was not unreasonable, but the different educational background of the subsequent MA courses no doubt dictated a different approach.

We had, and needed, 16 periods for practical work on coding, decoding and chart plotting. Although we did not realize it at the time, the surface observation code of those days was far from satisfactory. The ranges of visibility and cloud height implied by the single code figures were far too coarse for aviation purposes, so we had to learn the extra groups that were then added to the synoptic message, prefixed by the letters FFF, JJJ, HHH and so on; interestingly, as the need for these stemmed from the demands of international civil aviation, fog visibilities and cloud heights were given in metres, a fact not appreciated by the RAF.

Only eight periods were devoted to the making and recording of surface observations; no doubt it was felt that this vital subject could be covered more effectively during our subsequent on-the-job training at outstations. But we did spend ten periods on pilot balloon work and this was a popular activity as it took us into the fresh air on the roof. We were given dire warnings as to what would happen to anyone who let go of an overfilled balloon with the balance weight still attached. Some of the brighter members of the class soon tumbled to the fact that underfilled balloons had negative buoyancy; several of these were released to descend slowly into Berkeley Square where they bounced up and down amidst the traffic.

Although when we left the course we certainly needed a long spell of further training at outstations, a great deal had been packed into two weeks. Perhaps most importantly, we enjoyed the course, and the friendly, relaxed and chatty approach of the instructors made us feel that the Meteorological Office would prove to be a pleasant organization for which to work.

The steady programme of assistant courses every fortnight in Berkeley Square appears to have been completed by the end of February 1940, although at least one further course was held during the spring. Having also completed the major commitment for forecaster training for the time being, the School was closed during the early summer (Air Ministry (Air Historical Branch) 1954).

The Training School at Gloucester: 1940–42

During the Berkeley Square interlude, the Meteorological Office Training School had been under university aegis, but when the School was re-established during the autumn of 1940 at Eastern Avenue, Barnwood, on the outskirts of Gloucester, direction reverted to the Meteorological Office where it has remained ever since. Mr C.J. Boyden, a Senior Technical Officer who had run the pre-war forecaster training in South Kensington (Boyden 1986), was appointed to take charge, with J.P. Kay as his deputy. The classrooms were in the temporary hut-type buildings associated with an RAF station, but it was a pleasant, semi-rural location with the Cotswold scarp as a backdrop. The civilian students were billeted with landladies in the city and surrounding villages.

The assistant courses at Gloucester were initially of four weeks' duration. The first one started on 17 December 1940, and from then on one and sometimes two classes began every fortnight until early June 1941, so that there were normally two to four classes in the School at the same time. Lectures in elementary theory appear to have been given by one or other of the instructors responsible primarily for the forecaster classes, but the all-important practical work was handled by Messrs Coutts, McLeod, Waite and later Davies who were all AIIIs. During a short early-summer hesitation in the inflow the course was reorganized to cover a five-week period; the need for this extension no doubt stemmed from the introduction of new codes and procedures and the need to give even greater emphasis to pilot balloons and ballistic wind computations.



Members of the staff of the Training School, 1941. Back row from left to right: F. Gorner, A.E. Parker, C.N. Mcleod, J.M. Coutts, J.P. Kay,? Front row: Ruth Hitchen, C.J. Boyden, Flying Officer M.W. Brown.

When asked for their dominant memories of assistant training, those who attended courses at Gloucester (and for that matter subsequent courses at Oxford Street and Kilburn) almost without exception spoke of many hours on pilot balloons and the associated computational work. This may strike present-day readers as surprising, but there were two good reasons why it was so. Upper-air forecasting was then in its infancy and a regular input of wind information was essential; indeed at many stations in the United Kingdom, pilot balloons had to be made regularly whenever cloud conditions permitted. At one Fighter Command Station where I was based in 1941 and 1942, weather permitting, we were required to make three ascents every night, using candle lanterns suspended on lengths of elastic beneath the balloons to make them visible. In the depths of winter this could be a finger-numbing experience, but in summer we had the compensation of hearing the nightingales that were plentiful in that area. But over and above the needs of aviation forecasting, pilot balloons also provided a key input for calculation of the ballistic winds needed by both field and anti-aircraft artillery. Preparation of the two types of coded METEOR messages involved quite lengthy manual computation, and thorough training was needed for this. In some Commands overseas, small groups of Met airmen were formed into independent Mobile Pilot Balloon Units that worked directly in support of the Army as well as contributing to the synoptic network.

The first of the new five-week courses started in July 1941 and, with regular double or triple class entries, the number of simultaneous classes in the School soon rose to three or four and even briefly in September to five. During the winter the intake eased off, and the virtual suspension of MA recruitment brought the need for assistant courses at Gloucester to an end in early June 1942 (the School remained there until August 1943 to deal with forecaster courses). During the 18 months of assistant training at Gloucester there had been 37 courses attended by a total of over 600 students; most of these were MAs (472 male and 27 female), but there were also 125 British airmen, a few airmen from both France and Norway and three small contingents of Canadian Army personnel who had participated primarily for instruction in pilot balloon work and ballistic wind computation.

The 1941 overflow operations in London and Edinburgh

The vigorous MA recruitment early in 1941 produced a surge of new entrants who could not all be accepted in the Gloucester School, presumably due to a shortage of classrooms. Additional training facilities had to be found elsewhere and it was evidently decided that London and Edinburgh were the places in which temporary single-class operations could most readily be mounted.

At interview boards in London around this time, candidates who did not live in the London area were asked if they had friends or relatives there with whom they could stay whilst undergoing training if their applications were successful. The Office then arranged for a series of three four-week assistant courses to be held in Princes House, Kingsway, with A.J. Scriven and I.G. Hughes as instructors. The first class started on 25 February, a second on 25 March and the third probably on 6 May 1941. Some of the observational work, in particular pilot balloons, had to be done on the roof of Victory House, the London Headquarters of the Meteorological Office, which was on the other side of Kingsway further up the road; the Senior Directorate whose offices were just beneath this roof were not too pleased at the inevitable noise this caused, with parties of teenagers walking up and down, hydrogen cylinders being rolled on the roof, etc.

No records of these courses have survived, but two small memories have. The first was the consternation of the instructors on receiving a very justified complaint from a policeman about being hit by a filled inkwell dropped on to him from the classroom window. The other concerned a class sent on to the roof to do an observation who reported visibility '6I' because they could see the appropriate visibility mark, namely a tower of the Crystal Palace which had survived the 1936 fire. After checking subsequently, the instructor told them that they were quite wrong and that the visibility was no more than '6H' as the tower was invisible; but he had to apologize next day when it was discovered that, between the roof visits of the class and himself, the tower had been demolished as an unnecessary landmark that might have helped enemy aircraft to pinpoint targets.

The London operation catered for the overflow from the southern half of the country. For candidates from Scotland and the north of England, two courses were run at the Meteorological Office in Drumsheugh Gardens, Edinburgh, where the very first assistant course had been held in May 1939. No records exist, but it is known that the instructor in charge was C. Doherty and that a four-week course with 12 students started on 25 March and another with rather more students on 22 April 1941. During the fortnight commencing 25 March there were thus six classes simultaneously under training — four at Gloucester, one in London and one in Edinburgh; this marked the peak of the MA recruitment during the spring of 1941.

The WAAF Training School in London: 1941–43

The introduction of the trade of Meteorologist in the WAAF clearly promised a new and potentially large source of recruits for the Office, and it was decided to set up a separate Training School for them in London. Accommodation in which to make a start was found in an annex to the London School of Economics (LSE), in Houghton Street, just off the Aldwych. In line with the courses for MAs and airmen at Gloucester during the summer of 1941, the initial training was to last for five weeks.

The new WAAF School opened in considerable haste and on a shoe-string. D.H. Clarke (then AII but shortly afterwards promoted to AI) was appointed to take charge and arrived to take up post on Tuesday 9 September 1941 to prepare, single-handed, for his first class of 11 students who booked in just three days later. I.G. Hughes (who had worked with the Princes House courses) arrived on Monday 15 September and a second class of 15 students came on the following day. New courses then started at roughly fortnightly intervals and by the end of the year there were five classes simultaneously in the School; by this time T.A. Quinn, G.A. Cowling, W.S. Stubley and J.R. Ramage had joined the staff.

It seems likely that, with an expanding programme, a move was inevitable in order to obtain more classroom accommodation and on New Year's Day 1942, less than four months after its foundation, the School made the first of what turned out to be a series of moves. Its second home was in the Land Registry, only a short distance away at the south-eastern corner of Lincoln's Inn Fields. By all accounts the accommodation there was by no means satisfactory. The building had been bomb damaged; many of the windows were boarded up making artificial light essential throughout the day and it was also very draughty. To add to the problems, the heating system broke down completely during the cold weather in January and the School had to be closed for several days; three classes in the School at the time had their courses extended by a week to compensate for this. By mid-February 1942 two classes were arriving every week, so that with five-week courses it was only a matter of time before there were ten classes in the School simultaneously. T.R. Soden, G.R. McKeon, F.G. Dolbear and R. Wrench joined the staff during this period, but there appears still to have been a total absence of administrative support staff; D.H. Clarke was reduced to making his course reports in manuscript.

In the middle of May 1942 the School moved again, this time about half a mile away to Russell Square House at the north-east corner of Russell Square in Bloomsbury. The accommodation there consisted of the top two floors of the building which also housed Ministry of Information staff and, at street level, a bank; it seems to have been a distinct improvement on the depressing environment in the Land Registry. But once again, after only four months, the School had to pack its bags, almost certainly to obtain more classroom space. The new premises were on the upper floors above Drages' furniture shop, 73-77 Oxford Street, backing on to Soho Square, and here, no doubt to the relief of the staff, the School remained for 11 months until the move to Kilburn in late August 1943. It was characteristic of the disturbed conditions during wartime that the various moves of the School had to be made at very short notice; indeed, some of the staff first heard of an impending upheaval from the office cleaners who were usually well informed on such matters.

With effect from the move to Oxford Street in mid-September 1942, the course was re-planned to cover a six-week period. New codes were still being introduced, but the primary gain of the extension was that the final week of the course could be entirely devoted to practical work in a fairly realistic simulation of the daily commitment at an outstation. This is a feature that has remained part of assistant courses ever since, except during the emergency situation that developed early in 1945.

Although the School in London had been established to provide training for members of the WAAF, the termination of assistant training at Gloucester in early June 1942 meant that other arrangements had to be made for the airmen who were continuing to sign on in small numbers. From this time, therefore, occasional airmen appeared in classes in both Russell Square and Oxford Street and, by the summer of 1943, the airmen intake dominated the School. This necessitated a change of emphasis in the curriculum; most of the airmen were destined to serve overseas and, as at Gloucester, pilot balloon work and ballistic wind computations became a major feature of the course rather than merely one aspect of it.

For the Waafs, who with very few exceptions served only in the United Kingdom, efficient operation of the meteorological telecommunications was a matter of considerable importance. During the early part of the war switchboards at collecting centres were very simple to operate, and the quarter-hour breaks in the teleprinter broadcast allowed plenty of time for collection of observations sent slowly by outstation staff. But by 1942, as I found to my embarrassment during an emergency detachment to HQ 11 Group, Uxbridge, switchboards had become more complicated and the increasing number of new stations had lengthened the collectives to the point where one-finger exercises at outstations could no longer be tolerated. Waafs who attended courses in 1941 and 1942 had been given no special training in teleprinter work and many of them were subsequently sent for specialist instruction, for example to the Post Office in Birmingham. In early 1943, therefore, it was decided that teleprinter training would have to be included in the assistant course and as a stop-gap measure from February 1943 onwards the

WAAF courses were extended to seven weeks; the girls were then able to spend a series of afternoons either at a large Post Office exchange near Euston (where the Weatherline messages now originate) or at the Police College near Hendon. This arrangement appears to have lasted for about five months, i.e. until the purely WAAF classes virtually ceased.

With a weekly double class entry and six-week courses, 12 classrooms were needed, and these were available at Oxford Street. But a minor surge in WAAF recruitment in January 1943, together with the extension of the course for teleprinter training, meant that during February and March 1943 there were up to 15 classes simultaneously in the School. This must have caused some administrative headaches, but the problem was evidently overcome, presumably by obtaining temporary extra classrooms in the building. When a similar crisis occurred nearly two years later at Kilburn, more drastic measures had to be taken.

Whilst attending the meteorological courses in Central London, the Waafs were billeted in what had been a well-appointed block of flats called Fountain Court in Buckingham Palace Road, near the coach station. A canteen on the premises provided breakfasts and evening meals, but the girls had to fend for themselves at lunch-time; they were given luncheon vouchers for 1s. (5p), although in 1943 this covered the cost of no more than a light snack in a Lyons tea-shop. However, the instructors would have been grateful for even that modest subsidy, because the London allowance to cover the extra costs of 'digs', travel and food was then just 8s.6d. (42½p) per week and this rarely permitted the indulgence of a snack at Lyons.

The numbers of students who completed training at the WAAF School during its independent existence before the move to Kilburn are shown in the Table below:

Location	Period	No. of courses	No. of Waafs	No. of airmen
LSE Annex	Sept. 1941–Dec. 1941	6	95	0
Land Registry	Jan. 1942–May 1942	24	329	0
Russell Square	May 1942–Sept. 1942	32	454	16
Oxford Street	Sept. 1942–Aug. 1943	78	943	119

The School at Kilburn: 1943–46

During the war Gloucester was a billeting area and domestic accommodation was in very short supply. By mid-1943, the shortage had become so acute that billets could no longer be found for the forecaster students and a move became inevitable. Alternative accommodation was allocated in the then vacant Orphanage of Mercy in Randolph Gardens, London NW6, and the move took place in August 1943. The space available there was much more than was needed for the forecasting courses, so it was decided to move the WAAF School also to Kilburn later the same month (Air Ministry (Air Historical Branch) 1954). All meteorological training was then once again under the same roof with Mr C.J. Boyden in overall charge of the combined Schools, but D.H. Clarke remained responsible him for assistant training.

The orphanage was a large building standing in its own grounds just off Maida Vale, the section of the A5 trunk road linking the Edgware Road to Kilburn High Road. This is a heavily built-up, unattractive part of London and, despite the mosaic flooring of the corridors, the building provided a gloomy and rather depressing environment for meteorological training, especially during 1944 when the V1 flying bombs droned across the sky. Another Air Ministry civilian department shared the accommodation so that the total number of people at the site was large enough to justify a lunch-time canteen which made use of the kitchens.

One slightly bizarre aspect of the Kilburn School was that students on observing practice outside worked against a background of grunts and the sort of odours more usually found in rural locations. During the war, backyard pigs could be kept under strict controls to augment the meat ration, and the local council had authorized the erection of pigsties in Paddington Recreation Ground just across the road. The orphanage was a rambling building and airmen exploring the unused first-floor dormitories were startled to discover a notice on the wall reading, 'If you need a mistress, press this bell', but soon found that the facility had been discontinued.

Just one WAAF course was held at Kilburn in October 1943 before the trade was closed so that, with no need for teleprinter training, the courses for airmen (and MAs) followed the normal six-week pattern. Until the spring of 1944 only one class started each week and for about nine months the School was running at half capacity; but the intake then doubled and by midsummer 1944 there was again a full complement of 12 classes at a time. The reopening of the WAAF trade led to weekly intakes of three classes; admittedly, the complication of teleprinter training did not recur because by then arrangements had been made for the girls to go on a fortnight's course given by RAF Signals personnel at Cranwell immediately following their meteorological training, but it was clearly only a matter of time before the School population built up to 18 simultaneous classes.

To postpone the inevitable crisis, the course was first redesigned to be completed in five instead of six weeks; classes in the School over Christmas 1944 were not given the traditional extra week to compensate for the holiday break and subsequent classes had five-week courses. But this still left a need for 15 classrooms and something had to be done to prevent the School from bursting at the seams. Fortunately, extra space was found, albeit some distance away, in Cornwall House on the South Bank, near Waterloo Station. D.H. Clarke took charge of this 'outstation' and from early February to mid-June 1945, two or three classes were accommodated there. The arrangement made was for certain classes to book in and spend an initial week at Kilburn during which they were given all their introductory and elementary theory lectures; no doubt reeling from this onslaught they then moved across London for the remaining four weeks of practical work in Cornwall House. The outstation also provided an emergency home for classes that had to be evacuated from Kilburn as a result of bomb damage not long before the end of the war; fortunately, this occurred during the night when neither staff nor students were there.

Whilst attending courses at Kilburn (and Cornwall House), the Waafs were billeted in various blocks of flats (Bentinck Close and Albany Mansions among them) on the north and west sides of Regent's Park. Some of the airmen lived in a hostel in Hallam Street, just off Portland Place, others were in Viceroy Court near Bentinck Close, but some had the prestigious address of the St Regis Hotel in Cork Street, Mayfair.

The intake eased off fairly steadily from late spring 1945 and from June onwards there was no need for the Cornwall House outstation; the course probably reverted to its normal six-week length during August. By then the inflow had almost ceased and, apart from a few late-entrant airmen, the only new students were 40 who from their names appear to have been Dutch airmen and airwomen; these added yet further to the ethnic diversity of students that had passed through Kilburn which had already included over 50 Canadian Army personnel, some Canadian airmen and airwomen, a contingent from the West Indies (who were highly amused at finding pigs in Central London) and some Belgians. The backbone of the UK students in 170 classes at Kilburn comprised 1574 airmen, 196 Waafs, and 86 male and 58 female MAs. One well-remembered component of the UK Met Service during the later stages of the war that did not pass through Kilburn was provided by Polish airmen and airwomen; the reason for this is that the Polish Air Force set up their own Met Training School at Hucknall.

After the autumn of 1945 there was just one, unnumbered, course consisting of two female MAs but no others. Thus in March 1946 there were only forecaster students in the School when a serious fire

occurred one Friday night in the convent kitchen. The building had to be evacuated, and the School moved once more to the Oxford Street accommodation in which it had been from September 1942 to August 1943.

The second period in Oxford Street: 1946–47

The first post-war assistant course in Oxford Street did not start until July 1946, so there was plenty of time to revise the syllabus for peacetime work. Although pilot balloons were still taught, there was no longer the need to give marked emphasis to them and ballistic wind computations were hardly mentioned. There was still a welter of codes of all kinds, but it was possible to include a more comprehensive background of elementary meteorological theory.

When I arrived in September 1946 as an instructor, there were four classes in the School, but this number dropped to two right through the winter. However, there was a particularly successful recruitment campaign in Northern Ireland during the autumn and it was decided that it would be simpler and cheaper for courses to be run there than to bring 45 new entrants to London for training. So D.H. Clarke, W.S. Stubley and J.H. Albion went over to Sydenham Airfield, Belfast, taking with them or sending all the necessary training equipment. From mid-November to Christmas they ran three simultaneous courses and this cleared the intake.

The classrooms in Oxford Street were on the fifth and sixth floors of Drages' building and those at the back overlooked Soho Square; when taking a class one day I recall stopping in mid-sentence with astonishment at seeing a kestrel hovering about 20 feet away, level with the windows. As in so many London buildings at that time, the window frames had been badly warped by the effects of bombing and let in plenty of draughts. Life became particularly unpleasant during the prolonged cold spell that lasted from mid-January to mid-March 1947. To make matters worse there was a very serious fuel shortage and the Government appealed for volunteers to work at weekends in railway goods yards, trying with pickaxes to free coal that had been frozen solid in the trucks by snow and ice. The lifts were not used and there was no heat in the radiators; we all wore overcoats in class and I found out how difficult it is to hold a piece of chalk when wearing cycling gauntlets. Plotting practice could only be in short bursts, interspersed with breaks during which numbed fingers could be warmed. The gas ring produced no more than tiny beads of flame; the first member of staff to arrive in the morning put on a kettle and each time it boiled (three or four times during the day) tea was made for staff and students alike. In addition to the cold, we had long periods of monotonously dull weather; members of one class saw only stratocumulus and a few glimpses of altostratus during the entire six weeks of their course.

Early in 1947, Mr C.J. Boyden who had been in charge of the School continuously since 1940 was posted overseas and was replaced by Mr R.E. Farms. In late April 1947, after a little over a year in Oxford Street on this occasion, the School moved yet again, to Alexandra House in Kingsway. On the morning of the move, the students all reported to Drages to collect charts, sheets of synoptics and their filled red and black inkwells. They were given coppers for the bus journey along New Oxford Street and Holborn and set off with their books and all this clutter; on arrival at Alexandra House they were able to get straight to work, leaving the instructors to look after the move and installation of all the instruments and equipment.

The School in Kingsway: 1947–51

Within a period of seven months during 1947, the School experienced what proved to be the most dramatic surge of activity in its 50-year history. At the time of the move from Oxford Street there were four assistant courses in progress. A steady build-up started in mid-May and at the end of September

there were over 300 students in the School, divided into no less than 20 separate classes. By the beginning of December the tide had receded and once again only four classes were in residence.

Not surprisingly this explosion in the student population caused not a little chaos. The Air Ministry accommodation officers must have been at their wits' ends. Since the time of the move the School had occupied rooms not only in Alexandra House but also in Princes House next door, to which there was internal access on some but not all floors (this was the building where the 1941 courses had been held). More rooms were allocated in these buildings but, as the number of classes continued to grow, by July there was no more space available and three outposts had to be established in other buildings — Adastral House on the other side of Kingsway, Bush House in the Aldwych (best known perhaps as the headquarters of the BBC Overseas Service) and Pen Corner where some rooms above Waterman's Pen Shop on the corner of Kemble Street further up Kingsway were taken over. New instructors arrived thick and fast to cope with the influx of students and had little or no time for preparation before finding themselves responsible at least for the practical work with a class. Stocks of basic equipment like humidity and pilot balloon slide-rules were nowhere near enough for each class to have its own supply, and the instructors had to waste a lot of time touring the neighbourhood trying to locate what was needed for work with a class. The students in the outposts also had to walk up and down Kingsway, for example to visit the School cinema to see instructional films, for which very carefully prepared timetables were needed.

Another totally unexpected consequence of the recruitment surge was that so many students completed their courses within a short period that outstations simply could not absorb them all for the essential spell of on-the-job training. There was no possibility of keeping them in an already grossly overcrowded School, so the solution adopted was to set up two dummy outstations. Rooms were found at Blackbushe and Manston airfields; W.S. Stubley and G.F. Clapp were detached to the former and two other instructors to the latter. At each place, full 24-hour working was maintained so that the students had their first taste of roster duties including nights; they were given full work programmes including the answering of telephone enquiries, some of these originated by the local meteorological offices at the airfields who could easily monitor and, when necessary, correct the information provided. It is believed that two classes both spent two or three weeks at each station; with a declining output of students, the operation was then brought to a close before winter started.

One of the key features of assistant training over the years was the continual development of hand-out leaflets of all kinds, from step-by-step instructions for using humidity and pilot balloon slide-rules or filling in the Observation Register, to notes about cloud types and succinct summaries of essential basic physics. These speeded up the instruction and saved the need for a great deal of note taking. New ideas in the light of experience led to many revisions and amendments, and there was a constant need for preparation of material for coding, decoding and plotting practice. The amount of typing and duplicating involved was very considerable indeed and one of the key members of staff was Miss Ruth Hitchen who had started with Mr Boyden in the very early days at Gloucester; she had come with him to Kilburn and Oxford Street and went on to Stanmore where she finally retired in 1967. Her expertise with wax stencils and rotary duplicators was legendary. Now that photocopiers are so widely available, it requires an effort of memory to recall life without them; yet most outstations during the war had to manage using hectographic ink or carbon paper and the ubiquitous trays of jelly, and even at large establishments like the Training School there was nothing better than the extremely messy rotary duplicators like the Gestetner. When a duplication task was complete, most typists would drop the inky stencil with distaste into the waste bin; but Ruth kept everything not purely ephemeral swathed in sheets of blotting paper and serially numbered, so that one could ask for another 100 copies of something and get them in a very short time. Moreover, she was prepared to put carefully masked used stencils back into her typewriter and make amendments to them, and even to splice pieces of new stencil into old ones.

These activities not only obviated the need for a great deal of retyping but saved a tremendous amount of time and provided the instructors with a really first-class service.

During the autumn and early winter of 1948, the School undertook a very onerous additional task. The World Meteorological Organization had decided to introduce a completely new set of synoptic codes on 1 January 1949, and these had to be taught well before the operative date. Complete sets of data had to be prepared by translating then current data into the new codes, and completely new training leaflets on coding and plotting matters had to be prepared. Operational staff at outstations were faced with similar problems so, to help with the familiarization process throughout the Office, the leaflets and sheets of practice data were circulated to all outstations. There is no doubt that all this careful preparation paid handsome dividends and helped to minimize the trauma of the change,

Throughout 1948, 1949, 1950 and 1951 the School population varied between two and five classes at a time with no surges in the intake. Mr P.J. Meade, who by then was Head of the School, instituted a review of assistant training. It had long been thought that too much was being crammed into the six weeks of the assistant course and early in 1949 an extension to eight weeks was agreed. Under the new arrangements the instruction was completed in the first six weeks allowing the final two weeks to be entirely devoted to outstation simulation work; this no doubt reduced the period of on-the-job training needed subsequently at outstations. It had taken almost ten years to get back to the eight-week course that had had to be abandoned because of wartime pressures. In early 1950 another improvement was introduced whereby older assistants were brought back to the School for three-week refresher courses. Seven of these were run during 1950 and one in early 1951; in particular these courses aimed at brushing up the background of elementary theory needed for success at Civil Service Establishment Boards, as well as broadening the practical experience of those who had become specialized in their work.

On 22 August 1951, the School moved to Stanmore where it was to stay for about 20 years, ending the 12-year period of upheaval and movement described in this note during which more than 500 assistant courses had been run at no less than 17 different locations to provide for over 7000 students.

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Training in the Meteorological Office: some notes on the period from March 1948 to February 1952

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Summary

After World War II a reconstruction of the Meteorological Office took place. The new establishment came into effect on 1 March 1948 and, compared with the pre-war size of the Office, showed a considerable expansion. Since most of the wartime entrants had left to follow their chosen careers, there were serious shortages in various grades and so the recruitment and training of staff were to be of major importance for some years ahead. The most urgent need was to fill the forecaster vacancies and special measures were taken to try to overcome the problem. This article covers the first four years' activities of the Training Branch, M.O. 14.

1. Introduction

Previously I wrote an article for this magazine (Meade 1952)* describing the organization for training, the various courses that were provided for home and overseas students and the arrangements for external training. This article is readily accessible in the libraries of Meteorological Services and in what follows I propose to avoid excessive repetition and confine myself to some of the highlights of the four-year period when I had responsibility for training.

Since formal training in the Office began in 1936 the number of staff carrying the title Head of Training, or its equivalent, must be quite substantial. I would hazard a guess that few had sought the job but that all had very quickly found it to be one of the most satisfying and inspiring assignments in the Office's many mansions. I was shocked and somewhat disappointed when the Director, Sir Nelson Johnson, told me that I was to be responsible for training. However, by the time he had finished explaining what he wanted done and discussing ways and means with me, my only doubt was whether I would be equal to a task of such wide scope and potential importance.

The principal reason for my appointment, which came into effect on 1 March 1948, was probably that I had spent the preceding 14 months, from 1 January 1947 to 29 February 1948, as personal staff officer to the Director, assisting him in planning the post-war organization of the Office, described at the time as the reconstruction, and in his Presidency of the International Meteorological Organization (IMO).

During World War II the IMO had lain dormant. Founded in 1873, it was an association of directors of Meteorological Services and had done valuable and essential work in promoting international co-operation but it had no official status. However, wartime requirements for meteorological information had demonstrated the importance to each country of its meteorological organization. It had become clear that the existing arrangement of IMO was too informal and that it should be transformed into an official inter-governmental body. This was achieved in 1951 with the creation of the World Meteorological Organization (WMO) which gained further official recognition as a specialized agency of the United Nations.

Sir Nelson Johnson was thus the transition President with the dual function of reviving the activities of IMO and preparing the way for the creation of WMO with its official standing and enhanced responsibilities. In those days the secretariat of IMO was very small compared to the large, more or less autonomous organization that functions in Geneva today. Almost everything that came to the

* Meade, P.J.; Training in the Meteorological Office, *Meteorol Mag*, 81, 1952, 129-137.

secretariat, whether from Meteorological Services or from the presidents of the reactivated technical commissions and regional associations, was referred to Sir Nelson for instructions. It fell to me to investigate the background, in consultation with appropriate colleagues, and draft letters for the President's approval and onward despatch.

The reconstruction of the Office for its post-war responsibilities was a lengthy business involving many government departments and protracted and often frustrating arguments. In the final stages there was an intervention, which proved decisive, by the staff association, the Institute of Professional Civil Servants. One day the full story should be told. The evolution of the Office may be readily understood by examining the changes in its upper structure. Before the outbreak of war in 1939 the Director was supported by three Assistant Directors and there were seven Branches. By the end of the war the Director had the help of a Deputy Director, five Assistant Directors and 14 Branches. The post-war establishment introduced on 1 March 1948 gave the Director a Principal Deputy Director, three Deputy Directors (for Forecasting, Services and Research), nine Assistant Directors and 22 Branches. In one Branch, M.O.2 the Central Forecasting Office, three Senior Principal Scientific Officers (SPSOs) were established so that, with nine SPSO Assistant Directors, there were 12 SPSO posts altogether. Clearly the reconstruction provided much-improved career prospects and this progress has continued over the years in various reorganizations, notably that which resulted from the report of the Brabazon Committee and gave the Office in 1957 its first Director-General. It should be mentioned that any comparisons between the establishments of 1948 and of the present time need considerable care because apart from the expansions that have occurred there have also been changes in nomenclature. For example, the Branches of 1948 headed by Principal Scientific Officers (PSOs) are now, if they still exist, parts of much larger Branches headed by SPSOs.

In the restructured Office a separate Branch, M.O.14, was formed for training. In briefing me about my appointment as Head of Training, Sir Nelson Johnson said that my experience of working with him had given me full information about the Office's plans and objectives and also about developments in the international field. Such knowledge would provide a valuable background and he asked me to set high scientific and technical standards and to take personal responsibility not only for training but also for the recruitment of Scientific Officer (SO) and Experimental Officer (XO) staff through the Civil Service commissions. This latter task I carried out with the help of my deputy, Mr K.H. Smith, who was a tower of strength in all ways and succeeded me as Head of Training in March 1952.

2. Problems of staff shortages

Recruitment of staff was one of the most intractable problems facing the Office in the post-war period. During the war there had been an enormous expansion with members from other professions, mostly teachers, and school-leavers crowding into the Office on mobilization into the Royal Air Force Volunteer Reserve. These people did excellent work for the armed services at home and in overseas theatres of war and it was hoped that a substantial number would remain with the Office after the war, making meteorology their chosen profession. A fair proportion did stay but the majority decided to return to their former employment or, in the case of those who joined us on leaving school, to seek other jobs or continue with their education. For the Office to revert to its pre-war strength would have led to very serious difficulties because current commitments in 1948 were much greater and more widespread and, in addition, gave many indications of further expansion. Recruitment was therefore given high priority and this was obviously of particular concern to the Training Branch which was preparing instruction courses for new staff at SO, XO and assistant grades.

It was a difficult time for recruitment because reconstruction was going on everywhere and in the labour market as a whole there were more vacancies than qualified applicants. Science graduates were

able to pick and choose and move around almost at will. The position was similar with regard to those leaving school with A-levels or equivalent qualifications and there was also the added attraction of expanding university places. In the case of assistants entering with O-levels or equivalent, recruitment was relatively easy but there was a large turnover since those who were acceptable to the Office were in great demand, often at higher salaries, in other sectors of employment.

We realized therefore that SO courses would probably be small as far as our own intake was concerned but there was the possibility of a few extra students from the various colonial Meteorological Services and from foreign services. For the first three years the annual SO courses contained four or five trainees; in the fourth year, 1951/52, we had ten trainees on the course.

With regard to assistants the only practical attitude was to accept that large numbers would be taken on and that a fair degree of wastage would occur, mainly within a year or two of an assistant leaving the Training School. In each of my four years in charge of training we ran courses for about 250–300 assistants. Naturally we made efforts to persuade these young people to look upon the Office as their chosen career. We described the variety of work that was available and encouraged the more promising to take advantage of facilities for further study in mathematics and physics with the object of becoming qualified for class-to-class promotion.

The worst problem of all was the shortage of staff in the XO class. At that time the Office was predominantly a forecasting organization and many outstations had to carry out their work in spite of acute shortages at Assistant Experimental Officer (AXO) and XO levels. One remedy that was resorted to provided the Training School with a most interesting challenge and proved quite successful.

3. Strengthening the XO class

The advantage of having recruitment interviews centralized in one person, the Head of Training, was that it was possible to set and maintain standards at each level of entry. The Director would not have permitted any lowering of standards which might have assisted in obtaining a short-term solution at a cost of unwelcome problems over the more distant future. The serious shortage of forecasters in the XO class was considered to be of limited duration, up to about ten years perhaps. For one thing assistants taking advantage of concessions for external studies might provide a steady and most welcome source of supply to the forecasting grades.

After wide consultation and discussion it was decided to carry out a trawl among assistants of some years' experience to find out if there were any who could be considered fairly close to AXO standard and who might with a little help cross the line dividing the assistant from the XO class. Officers-in-charge were invited to nominate likely candidates. At the same time we in the Training Branch examined the personal cards of all assistants in order to pick out those who had obtained credits or, preferably, distinctions in mathematics and physics in the School Certificates (equivalent to O-levels). In effect we were looking for assistants who, but for the war, would probably have continued their education in science and possibly proceeded to a university.

The result of the trawl was very encouraging and the next step was to test the quality of the potential candidates at an internal board chaired by the Assistant Director for Personnel (AD Met O(P)) Mr M.T. Spence, the Head of the Establishment Branch and myself. The majority were accepted as promising AXO material and were brought to the Training School for further development. The first few weeks were spent on an intensive course in mathematics, mainly calculus, and physics with heat and thermodynamics as the main topics. The objectives were to make sure that the trainees would be capable of understanding the tephigram, geostrophic and thermal winds and the construction of upper-air charts. Very few had to be returned to their stations and the remainder were told to enter the AXO Civil Service competition and, at some risk, embarked on the initial forecasting course. Most of these

specially selected assistants satisfied the Civil Service Commission at the first attempt, the others a year later.

The experiment, because that is what it was, was considered to be well worthwhile and steps were maintained to monitor the progress of assistants who were showing promise as well as a keenness to make their way in the Office. In my first two years 97 AXOs were trained in forecasting of whom only 27 were direct entrants, the other 70 being promoted from the assistant grade. The experiment and its results became well known throughout the Office and helped to serve as a spur to assistants to undertake external studies, for which generous concessions were available, and thus improve their prospects of class-to-class promotion. Thereafter our initial forecasting courses invariably contained a substantial proportion of assistants who had been raised to AXO. Many of the assistants selected in the trawl had successful careers in the Office. An outstanding example was W.R. Brady who for many years was a valued member at senior forecaster level of the Central Forecasting Office.

4. Employment of German meteorologists

Around 1948/49 staff shortages among our units serving the Army and RAF in the British zone of Germany were particularly worrying because of the intensive flying and associated operations taking place. The Chief Meteorological Officer, Mr R. Cranna, noted that the German Meteorological Service was at a low ebb and in consequence a number of experienced German meteorologists were unemployed. He therefore suggested to the Air Staff that deficiencies might be overcome by recruiting German forecasters and assistants to work under British supervision at RAF airfields in the British zone. The proposal was approved subject to satisfactory assurances on such questions as security on the one hand and competence in English language, forecasting and briefing on the other.

It was then decided that the assistants would go directly to stations where only a minimum of training and familiarization would be required. For the forecasters I was called upon to provide a detachment from the Training School for duty in Germany for about six months. The arrangements were quickly made and offices and a classroom were provided in the Deutsche Seewart building in Hamburg. We soon found that the English language presented few problems to the German forecasters and that all they required was a short refresher course in forecasting together with instruction in briefing RAF aircrews. The forecasters had already acquired, under the leadership of Schregardus, much experience with up-to-date techniques of upper-air analysis and altogether the courses we provided were very rewarding as well as going far to solve urgent staffing problems. It was a pleasure to see the enthusiasm of the German forecasters.

5. Refresher courses

An annual training conference, chaired by AD Met O(P) and attended by Heads of Branches, provided useful information and discussion regarding any shortcomings in the standards of training and gaps in the various courses. Visits to outstations were also very productive. In the case of AXOs it was possible to gauge their progress directly because a few years after their initial course they would return to the Training School for an advanced forecasting course. This course was an essential step on the way to promotion to XO.

Promotion boards were another source of information about training requirements. In the organization as it existed up to about 1950, staff would not be expected to return to the Training School after their advanced forecasting course. That is, XOs and above would have no further contact with training. However, promotion boards from XO to Senior Experimental Officer (SXO) and from SXO to Chief Experimental Officer (CXO) revealed tendencies for staff in busy forecasting centres to become

somewhat rusty in their technical background and to experience difficulty in keeping abreast of new scientific methods in forecasting. The need for refresher courses was therefore quite clear and, in deciding to arrange them, it was also felt that, ignoring the aspect of rustiness, staff would benefit from a quiet few weeks, away from personal contacts and telephones, spent in reading and practical work and also in discussions with instructing staff.

6. Some non-routine items

(a) *The 1949 synoptic codes – trade unions lend a hand*

The appointed date for the introduction world-wide of new synoptic codes covering surface observations from land stations and ships, and also upper-air observations of wind, humidity and temperature was 1 January 1949. Compared with the existing codes, the changes were comprehensive and detailed. The whole reporting system had fallen into some disarray because during the war various countries or groups of countries, to suit their own purposes, had made amendments and additions to the international codes which had come into operation in 1935 and were totally inadequate for post-war requirements.

In the second half of 1948 the Training School was giving instruction in both the current codes and those to be introduced in the new year. Of course, trainees who would still be attending the School at the year's end were taught only the new codes.

During October 1948 I received a telephone call from the Principal Deputy Director, Meteorological Office, Dr J.M. Stagg. He started as follows: 'I want to tell you about a serious and urgent problem that has arisen. I am not asking you to do anything about it — indeed I have no authority to ask you to take any action in this case.' He then went on to explain that booklets had been printed giving instructions about the new codes and had been despatched by the Stationery Office to our Branch at Harrow. The booklets, numbering several thousand in about a dozen packages, were overdue and had been traced to the parcels depot at Euston station where they were held up because of a strike. Dr Stagg mentioned that the instructions had to be distributed to our own stations at home and overseas and also to colonial Meteorological Services, the Voluntary Observing Fleet and many other people and organizations. The strike had been on for some time, had had a lot of press coverage and there was no indication as to when it would be settled. He ended by saying that the problem was desperately urgent and telling me to be very careful.

It was obvious what had to be done so I collected five trainee assistants from one of the courses and explained the problem. I told them I was going to ask the trade unions involved to allow me to search for the parcels and remove them. The assistants' sole task would be to help in the search if approval was given and, if not, we would just have to return to the School. (News quickly went round the School as to what was afoot and it seemed that everyone, instructors and trainees, wanted to be involved.) The six of us took a bus from the School in Kingsway to Euston station and, telling my companions to stay in the background, I approached the pickets and said I had an urgent need for some of the parcels that were held up and added that I would like to see their leaders. The pickets were in a good humour and several of them accompanied me to the union leaders. I explained the problem and stressed that the country would look pretty foolish and inefficient all over the world if we failed to introduce the new procedures at the end of the year.

Without any further discussion the main union leader said (expletives removed): 'Go ahead, help yourself and the best of luck. If you find what you're looking for, it'll be a miracle.' I called the assistants over and we deployed among the stack of parcels which was about 100 metres by 6 metres and about 3 metres high. We were looking for parcels with official labels on and addressed to the Meteorological Office, Harrow and within about ten minutes we had found the lot. They were well separated but were

prominent and waiting to be found. A van was summoned from the Air Ministry and very soon the parcels were on their way to Harrow for distribution to be set in motion. I reported to Dr Stagg that I had found as much good nature among union leaders and pickets as I was accustomed to find in many other activities.

(b) *Recruitment by the Crown Agents*

When British colonial Meteorological Services required new graduate staff they would ask the Crown Agents to recruit them. This was done with our help in interviewing the applicants and the successful candidates came to us for training before proceeding overseas. The first such graduate who reported to the Training School was destined for one of the colonial services in West Africa and was clearly going to be an excellent acquisition.

After a while we learned that his conditions of service laid down that he was on half basic pay while training in this country and would not be on full pay until he went abroad to take up his duties. Our trainee was finding his financial position becoming increasingly desperate as it was bound to do, since at the time living in London on full pay would have been hard enough. I made repeated attempts by letter and telephone to improve the position but it seemed the regulations were there and had to be observed. The problem was solved when another member of the course suggested we should refer not to the Crown Agents but to the half-Crown Agents. I relayed this suggestion to the Crown Agents and soon the graduate in question was on full pay back-dated to the day he reported to the Training School.

(c) *Publicity*

The Training School received a lot of publicity, too much in many ways, but at a time of staff shortages publicity was regarded as a valuable aid to recruitment. The source of publicity was the Air Ministry information circulars which were regularly issued to the Press and the British Broadcasting Corporation. The Air Ministry was the Office's parent department and the Public Relations Branch kept in touch for news about any special activities. In the training field, interest was always aroused when overseas meteorologists were attending our courses and this aspect accounted for one notable occasion.

In 1951, after the School had moved to Stanmore, we happened to have under training as forecasters meteorologists from West Africa, Ceylon (now Sri Lanka), Iraq and Burma, all at the same time. The Air Ministry informed the Press, there was an immediate response and arrangements were made for journalists and photographers to visit the School one afternoon. The overseas trainees were informed and seemed pleased. At the appointed time some 30 people with equipment appeared and I wondered how we would cope. I gave them a brief talk and led them along the corridor towards the forecast classrooms. However, as we were passing one assistant classroom the door opened and one or more of the journalists noted that the class was a mixed one and enquired, 'Do you train women as meteorologists?' On being told that we did, the Press lost all interest in the overseas trainees and wanted to visit the classes that had women students. It would be more realistic to describe them as girls or young ladies since they were all recent school-leavers. The sequel was an enormous amount of publicity in the national and provincial Press, and also in women's magazines showing the girls sending up balloons to measure the upper winds, peering into the screen to read the thermometers or plotting charts. Our overseas trainees were very disappointed but a few weeks later, through the good offices of the Public Relations Branch, a smaller and more manageable press party arrived, the doors with the mixed classes were kept shut and our overseas members were able to send home cuttings and photographs from the newspapers.

7. Conclusion

The Training School described in my 1952 article and recalled in this one may be quite different in various ways from the training organization that functions in the Office at the present time. In those days the efforts of the Director to build up a substantial research effort had still to bear fruit and so training was mainly concerned with synoptic and dynamic meteorology with a fairly small element of climatology. Within this relatively limited spectrum training was great fun. The instructors were dedicated and possessed a good sense of humour. The trainees, almost without exception, were conscientious and enthusiastic and, as is customary with young people, had a cheerful and confident outlook.

551.5(09):06:37

The Meteorological Office College, 1972–86

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Summary

The development of training at the Meteorological Office College at Shinfield Park, near Reading, is described. Traditional courses for scientific staff, in atmospheric sciences, weather forecasting and observing are now complemented by courses in computer programming for which special accommodation has been provided. Technical training, both electronic and non-electronic, is another area which has undergone significant development recently.

Introduction

This article concentrates on the 15 years since the Meteorological Office's main training facility was moved from Stanmore to Shinfield Park (lying on the southern outskirts of Reading) and its title changed from the Meteorological Office Training School to the Meteorological Office College; a move described in some detail by Johnson (1972). In that time the College has matured and expanded so that it now meets the bulk of the Meteorological Office's training requirements as well as providing a service to many national Meteorological Services abroad. This process of evolution has accelerated recently, reflecting the advent of new technology, so the moment is opportune to take stock and review the changes which have taken place since 1972. Other articles (Boyden 1986, Meade 1986a, 1986b, Ogden 1986) cover various aspects of the pre-Shinfield era and the reader is also referred to articles by Meade (1952) and Gordon (1959) as well as the one by Johnson (1972) for further details of this period.

Although this article concentrates on the post-Stanmore era it is useful to start by listing the Heads of Meteorological Office Training as this helps to set the current position into context:

Training courses		Meteorological Office Training School		Meteorological Office College	
1935	S.P. Peters	1939	Prof. (Sir David) Brunt	1971	D.H. Johnson
1936	C.J. Boyden	1940	C.J. Boyden	1974	D.E. Jones
		1947	R.E. Farms	1976	S.G. Cornford
		1948	P.J. Meade	1984	C.J. Readings
		1952	K.H. Smith		
		1954	A.H. Gordon		
		1962	W.R. Galloway		
		1965	R.J. Ogden		
		1969	D.H. Johnson		

All these helped to lay the foundations for what is now a very effective training establishment and it should be recognized at the outset that without their endeavours, and those of their colleagues, the current levels of excellence would never have been achieved.

Effective training is fundamental to the well-being of the Meteorological Office and so it is not surprising that it is overseen by a Board (i.e. the Training Board) which includes (among others) the Director-General, the Director of Services and the Director of Research. The Principal of the College acts as its Secretary. This high level of representation ensures that training is reviewed at the highest possible level. Day-to-day control of training has recently been strengthened through the Principal of the College being given overall responsibility for monitoring all training funded by the Meteorological Office, internal and external. The various facets of the training programmes will now be considered in turn.

Recent developments in the training of scientific staff

(a) Assistants

This year the training of new-entrant Assistant Scientific Officers (ASOs) posted to outstations will undergo a fundamental change with the existing Initial Assistants (IA) and Advanced Assistants (AA) courses, each of four weeks, being abolished and being replaced by a new Outstations Assistant (OA) course which will last seven weeks. All new-entrant outstation ASOs will attend this course within a few weeks of joining the Meteorological Office so instead of learning skills on one course (the IA) and theory on another (the AA) a few years later, they will receive all their fundamental training on entry. This reflects recent changes both in the Meteorological Office's requirements and the career structure of scientists. Accompanying this will be slight changes to the syllabus as the advent of new technology means there is a need for ASOs to be familiar with the operation of computers (shortly to be introduced at outstations) and with electronic instrumentation. There will be less need for plotting but a clear grasp of the fundamentals of meteorology will, if anything, be more important.

In parallel with this, the training of new-entrant ASOs posted to Bracknell will be extended by one week to include instruction in the use of the computer facility at Bracknell (i.e. COSMOS) as most Headquarter Branches want ASOs to have some level of competence in this area. This course will be known as the Bracknell Assistants (BA) course. There are clearly defined segments within these and other courses which are intended to facilitate the transfer of ASOs from Bracknell to outstations and vice versa.

The Extension Assistants (EA) course for the experienced members of the grade will increasingly occupy an even more important position than it does at present with the advent of new technology and the ensuing need to train all assistants in the operation of this new equipment while at the same time

ensuring that they retain a clear appreciation of the fundamentals of meteorology. In common with all other refresher courses, the interval between any individual's attendance at successive courses has been set at five years by the Training Board.

(b) *Station supervisors*

Five years ago a two-course scheme was introduced to cater for the needs of station supervisors, namely the Initial Supervisors (IS) course attended on promotion, and the Further Supervisors (FS) course to be attended every five years subsequently. The IS course concentrates specifically on the duties associated with the grade. There are many visiting speakers to this course who cover subjects as diverse as welfare and administration. The first FS courses have recently been held and they have a strong meteorological content as well as cultivating team project work. In the near future the content of both these courses will be affected by the advent of new technology which will inevitably alter working practices.

(c) *Forecasters*

The basic pattern for training forecasters is well established. Depending on their background, new entrants to the field take either the Applied Meteorology Course (AMC)* or the Initial Forecasting Course (IFC), followed by the Advanced Forecasting Course (AFC) once they have attained a certain level of competence and experience. After that they attend the Extension Course (EC) followed by Further Extension Courses (FECs) every five years which revise and update their skills.

The changes over the past decade have been more of content than of form though they have been quite radical, reflecting the increased dependence on numerical products. Local forecasting techniques are still important as is the prediction of mesoscale weather systems, but as broad-scale developments are quite effectively predicted by numerical models there is now much less emphasis on Sutcliffe's techniques (and other allied approaches) than was once the case. Forecasters still receive some instruction in these areas but the aim is restricted to providing them with the background needed to assess numerical products.

The traditional emphasis on aviation forecasting has been modified to cater for the increased effort in public service forecasting. Briefings using the current weather are still an important feature of forecaster training but nowadays television and radio presentations are also covered. Closed-circuit television is used not only to instruct on television presentation but also to improve briefing techniques generally — a visual record of performance being far more effective than verbal criticism alone.

Other changes have followed upon the drastic decrease in overseas forecasting commitments to the RAF. This has led to the demise of the Tropical and Mediterranean Meteorology courses though a general introduction to these areas is still included in all initial courses. A new development is the South Atlantic Meteorology (SAM) course reflecting the increased commitment in that area.

(d) *Support scientists*

Support scientists, who have essentially the same academic qualifications as forecasters, work mainly at Bracknell in Headquarters Branches supporting a wide variety of research and other activities of a non-forecasting nature. To cater for the increasing numbers of these staff the AMC was introduced in 1973. It was developed from the IFC by separating out the practical forecasting techniques and leaving a ten-week meteorology theory module common to all applied meteorologists. After a one-week project period, support scientists proceed to their Branches at Bracknell. Subsequently they attend the same

* With a forecasting techniques segment (i.e. AMC (F/C)).

refresher courses as the forecasters. Furthermore, as most of them have to use the COSMOS computer system, they also attend computer/programming courses at an early stage of their careers.

(e) *Research scientists*

The corner-stone of the training given to research scientists is the Scientific Officers (SO) course, the first part of which they attend shortly after joining the Office. This lasts some five months and includes instruction in forecasting techniques (including detachment to an outstation) as well as meteorological theory. Recent changes have led to a slight shortening of the course with the dropping of the traditional research project but with an increased emphasis on a review project, in which the trainee scientist surveys the present state of knowledge in a chosen area of meteorology. The second part of the course, consisting of Advanced Lectures, now takes place in the autumn some eight months after the end of the initial SO course. In these lectures the topics are covered at a level which is at the forefront of present knowledge. They span the whole range of the Office's research interests and run on a three-year cycle.

Training in computer skills

When the Office first started using computers, programmers were trained by computer manufacturers but, as numbers increased, *ad hoc* training courses were run at Bracknell by experienced Office staff. Then in 1970 the IBM 360 arrived and for four years programmers were trained under contract by IBM. When the 'free' training ran out recourse was made to self-teaching methods but these did not prove very satisfactory and in 1976 the first programmer training course was held at Shinfield (13 miles from the computer!). Regular courses followed, with the 'Initial Programming Course (IPC) then on-the-job training then Second Programming Course (SPC)' pattern being developed. The College's first computer (a Digital PDP 11/34) arrived in the summer of 1980, solving some problems but creating others due to the mismatch between the PDP and the IBM. In summer 1985 the PDP 11/34 was replaced by a number of IBM Personal Computers (PCs) which in addition to being totally compatible with COSMOS can also be operated independently as small computers in their own right. This equipment is now housed in purpose-built accommodation (Fig. 1) and has proved very effective.



Figure 1. A class operating the IBM Personal Computers at the College.

The training of programmers continues to follow the pattern as originally conceived but with the COSMOS Programmers Course (CPC) replacing the SPC, so that the current pattern is 'IPC then on-the-job training then CPC' supplemented by a series of specialized seminars. In addition there is now a COSMOS Users Course (CUC) intended to provide non-programmers with a basic introduction to the use of COSMOS. This course will shortly form an integral module of the new BA course. In fact, the need for computer literacy is increasing so fast that most members of the Office will shortly need some level of competence in this area. In response to this trend members of many courses are already being taught how to extract synoptic data from the main data banks on COSMOS, how to use the terminals to manipulate statistical data, how to extract forecast model data, etc. This general requirement will grow, though the main use of the College computer facility will remain the training of programmers.

Although not strictly relevant to this section it is convenient to mention here the use of the computing facilities to support a limited number of 'self-teach' packages. Currently such activities are mainly confined to the Meteorological Statistics Course and parts of the mainstream computing courses. However, this is an expanding field and the use of the equipment in the computer section for this purpose will undoubtedly grow over the next few years.

Technical training

Almost all of the Office's technical staff are recruited from the ASO grade. This has been the case for many years though the form their training has taken has changed from time to time. Currently it is carried out in partnership with the Reading College of Technology which provides the basic training, leaving the Meteorological Office School of Technical Training (MOSTT) to cover the areas particular to the Office. This includes instruction in the maintenance of meteorological equipment and training in good industrial practices. The training is likely to be shortened in the near future but at the moment it lasts 15 months. On successfully completing the course a technician gains a Technical Education Council certificate as well as being regraded to Radio (Met) Technician (R(M)T). In addition to the course for R(M)Ts, MOSTT also runs short courses on specific pieces of equipment. These courses typically run for a week and are open to all technical staff, not just R(M)Ts. Specialized courses are also organized for overseas technicians, namely the Basic Electronics Course (run in collaboration with Reading College of Technology) and the Instrument Maintenance Course (with Farnborough College of Technology). In both cases MOSTT covers the training in areas which are specific to meteorology.

The training courses run by MOSTT are held either at Beaufort Park (near Bracknell, where the Operational Instrumentation Branch is located) or else at Shinfield Park. Most in-house training is in fact carried out at Shinfield Park and in recognition of this the facilities at the College have recently been refurbished. Part of Stanmore House (see Fig. 2) is now entirely devoted to technical training and includes facilities such as electronic and mechanical workshops and a demonstration room (Fig. 3). This is of benefit not only to technical training but also to other courses which can now easily be shown equipment. This is important given the pace at which new equipment is being introduced at outstations.

New buildings and facilities

In order to cater for the many changes described above and the advent of new equipment, such as word processors and radar and satellite display systems, several parts of the College have had to be refurbished. Notable among the changes are new forecasting bays and two television/radio studios. The former were formed by subdividing a large classroom into a series of booths the configuration of which can be changed according to need (see Fig. 4). All are linked by electrical trunking so that there are few restrictions on the siting of equipment. As new outstation display systems appear they can easily be incorporated into the forecasting bays making it possible to simulate most types of outstation.

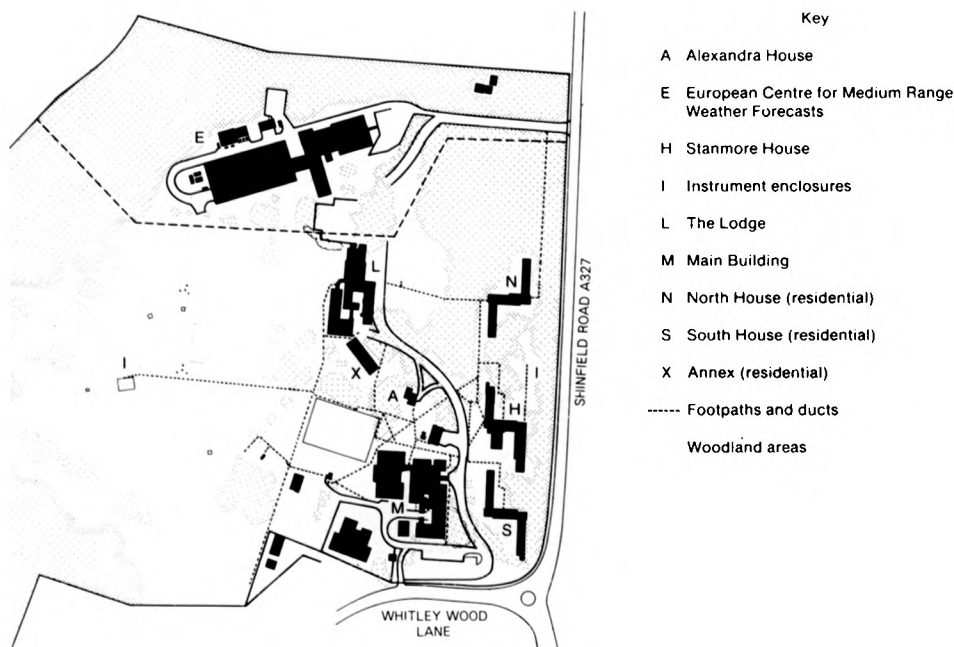


Figure 2. Site plan of the Meteorological Office College, Shinfield Park.

Many changes have taken place in the last two years and reflect the evolving nature of the Office's training requirement. Staff now not only have to acquire traditional knowledge and skills but also have to learn how to exploit new equipment. In some instances, in fact, it has proved necessary to run courses at the outstations themselves. Recent examples of these include training given at Glasgow and Manchester Weather Centres to instruct staff in the use of the word processors, coinciding with the introduction of this equipment at these stations. However, this is the exception rather than the rule and the bulk of training is still carried out at Shinfield Park, hence the need to improve the facilities at the College.

Other facilities increasingly exploited are the television/radio studios. These are mainly used for training in briefing techniques but include facilities for individuals to view video films or listen to cassettes. Extensive use is made of the video equipment at the College and it now has a growing stock of useful commercial videos as well as some short home-made examples on meteorological subjects made by staff and students as course projects at the College. Plans to acquire video projection systems are well advanced. Such systems are easier to use than cine projectors, and video is rapidly replacing cine film as a training medium.

The new computer rooms are currently fully equipped with IBM PCs and include slave terminals which enable students to follow the teaching of an instructor working from a master terminal. Cable trunking now links most of the College teaching areas so there are few restrictions on the siting of this equipment. The College is also linked to Bracknell by a 64 000-bit-per-second line which permits the rapid reception of large volumes of data.

Other accommodation has also been improved in recent years. There is now a conference room and several seminar rooms. The old Industrial Civil Servants' rest room, now renamed Alexandra House, has been equipped so that new-entrant assistants can experience the rigours of observing in quite

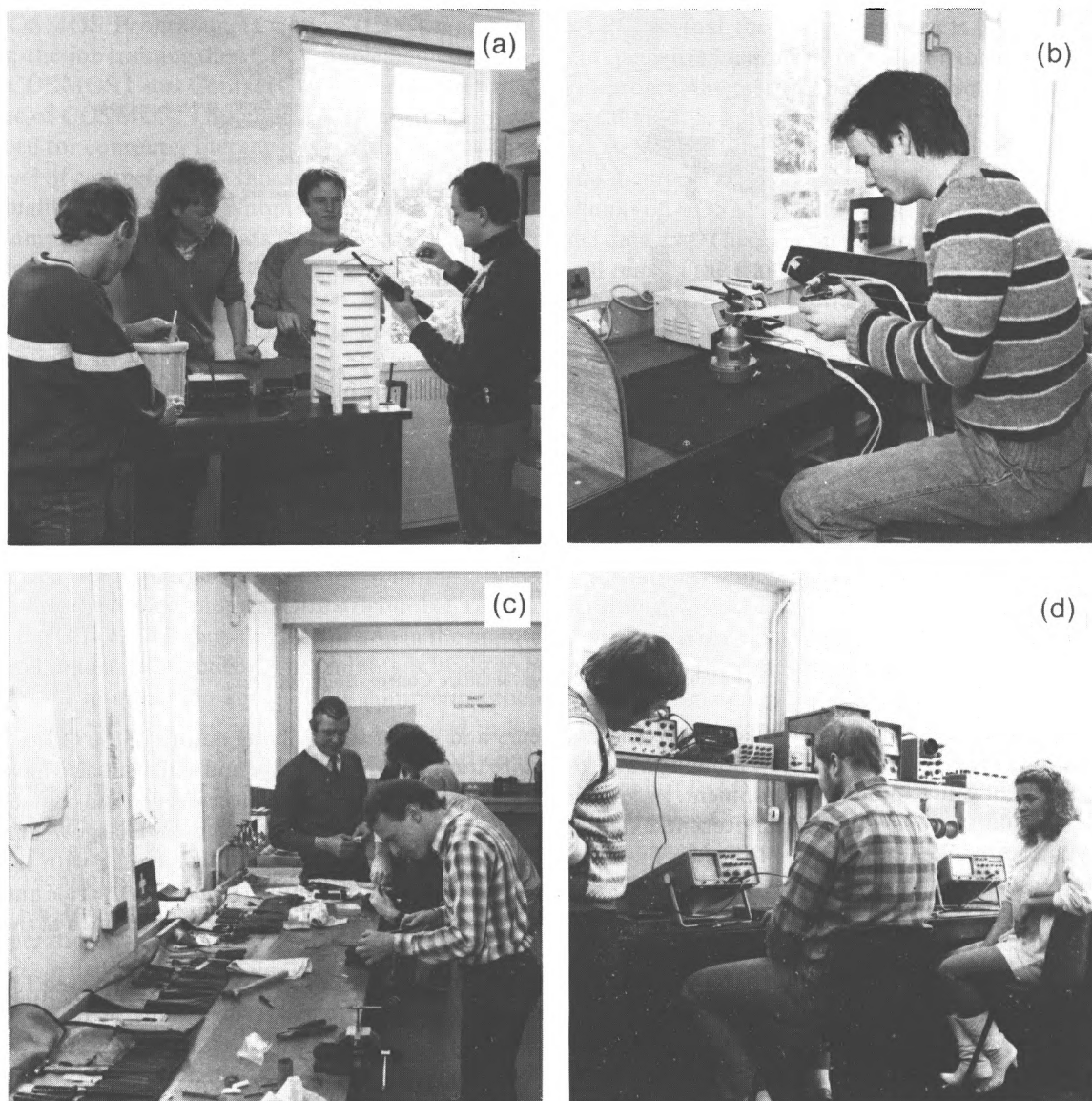


Figure 3. Technical training: (a) installing and calibrating a digital temperature indicator, (b) using de-soldering equipment, (c) making engineering tools, (d) an introduction to electronic test equipment.

realistic surroundings, isolated from other buildings and relying on telephone links. On the social side there have been improvements in many areas, the most notable of which have been the installation of an all-weather cricket pitch and the refurbishment of the squash court.



Figure 4. New equipment in a simulated forecast office. On the right, two forecasters receiving instruction in the use of word processors. On the left, a Jasmin display showing areas of rainfall observed by the national radar network. In the centre, an instructor studying a satellite image being received via an aerial system located on the roof of the building.

Other users and uses

The facilities of the College are not solely devoted to the mainstream courses outlined above. They are increasingly being used by Branches such as Observational Requirements and Practices, Advisory Services, and Personnel Management for seminars and conferences. The Meteorological Committee and its Research subcommittee both meet regularly at Shinfield and several World Meteorological Organization Working Group meetings have been held there. The Outstation Colloquia and the Chief and Principal Meteorological Officers' Conferences are regular features of the College calendar. Last year a Summer School was held for the first time. The subject of this School was 'Mesoscale meteorology' and it was attended by over 70 people including academics as well as scientists and forecasters from the Office. It was judged to be a very successful innovation and it is probable that Summer Schools will be repeated at two-yearly intervals.

Many of the courses run at the College are open to non-members of the Meteorological Office, a point that is often not generally realized but which plays a significant part in helping to broaden the perspective of the training provided at the College. All the forecasting and observing courses are open to non-Meteorological Office personnel and over the years hundreds of overseas students from over 80 different countries have attended courses at Shinfield Park. These courses are supplemented by others, such as the Basic Electronics Course and the Instrument Maintenance Course mentioned above, which are specifically designed to meet the needs of developing countries.

Another activity of continuing importance is the training of non-Meteorological Office observers. Three courses are specifically run for this purpose, namely the Co-operating Observers (CO) course, the Auxiliary Observers (AO) course and the Air Traffic Control Observers (AT) course. The latter is unique in that those who successfully complete both it and a subsequent week of on-the-job training

under the supervision of an experienced observer, receive a Certificate of Competence. The College has also run special courses for specific groups of weather users such as masters of marine vessels and members of Water Authorities who make extensive use of the information provided by the weather radar network.

Concluding remarks

This article has attempted to give a broad outline of the College as it is now, highlighting many of the changes that have taken place in recent years. With the advent of new technology further marked changes will certainly occur both in the content of courses and in the manner in which they are run.

In his article, Johnson (1972) noted that, unlike the situation at Stanmore, the College at Shinfield Park would be fully residential and that great benefits were to be expected from this. These benefits have been fully realized. The facilities which a residential College provides, either for undisturbed study in the evenings or for after-dinner talks and discussions, are invaluable. So too are the opportunities for informally renewing old friendships and striking up new ones. In the past 15 years the College has become an important focus for maintaining the internal corporate spirit of the Meteorological Office, just as it also serves quite significantly to generate external links with international meteorology.

As well as being widely regarded as a training establishment of the highest quality, the College is a place where people live. Its permanent staff devote considerable amounts of their own time towards providing facilities and a social environment which makes it a pleasant place at which to stay. This is the context in which the opportunities and challenges of the next few years will be met.

Acknowledgements

An article of this form would not be complete without acknowledging the support and help of all the instructors at the College, colleagues throughout the Meteorological Office and co-operating educational establishments, all of whom play a part in running the courses. Special mention should be made of the Reading College of Technology and the Farnborough College of Technology. The authors would also like to acknowledge the help provided by their neighbours at the European Centre for Medium Range Weather Forecasts and at the Department of Meteorology at the University of Reading. All, in their various ways, help the College meet the needs of the Meteorological Office in particular and meteorology in general.

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Correction

Meteorological Magazine, June 1986, p. 187. We regret that the following sentence was omitted after the first paragraph of the Obituary of Dr A.E. Gill: 'The following is the address given at the funeral service by Dr J.T. Houghton, Director-General, Meteorological Office'.

Meteorological Magazine

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Spelling should conform to the preferred spelling in the *Concise Oxford Dictionary*.

References should be made using the Harvard system (author, date) and full details should be given at the end of the text. If a document referred to is unpublished, details must be given of the library where it may be seen. Documents which are not available to enquirers must not be referred to.

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