

OCCASIONAL PAPERS ON METEOROLOGICAL HISTORY No.2

**EXTRACTS FROM:  
THE METEOROLOGICAL  
OFFICE DUNSTABLE AND  
THE IDA UNIT IN WORLD  
WAR II**

**by Brian Audric**



**THE ROYAL METEOROLOGICAL SOCIETY  
Specialist Group for the History of  
Meteorology and Physical Oceanography**

**SEPTEMBER 2000**

**ISBN – 0 948090 16 2**

**104 OXFORD ROAD – READING – RG1 7LL – UNITED KINGDOM**

**Telephone: +44 (0)118 956 8500 Fax: +44 (0)118 956 8571**

**Email: *execdir@royalmetsoc.org***

**Web: *http://www.royalmetsoc.org***

**Registered charity number 208222**

# CONTENTS

---

Introduction .....	1
The Central Forecast Office .....	1
Life in Dunstable .....	4
Staff .....	5
The IDA Unit .....	8
The Russian Code .....	10
The German Code .....	11
The Vichy French Code .....	12
The Italian Codes .....	12
The Hungarian, Romanian and Bulgarian Codes.....	12
German Air Force Weather Reconnaissance.....	13
One-Time Pads.....	13
Other reports received by the IDA Unit .....	14
Issue of MANX .....	14
General .....	15
Appendix 1 (International Meteorological Code) .....	16
Appendix 2 (References) .....	16

## ILLUSTRATIONS

Fig.1	Dunstable under police guard .....	1
Fig.2	WT aerials at Dunstable.....	2
Fig.3	Central Forecast Office at work – as if no camera was there!.....	3
Fig.4	C K M Douglas – the master forecaster .....	6
Fig.5	Robert Ratcliffe – a pioneer of the wartime upper-air bench .....	7
Fig.6	The Mansion at Bletchley Park .....	9
	The Special Long-range Forecast Unit in 1944.....	17

# INTRODUCTION

I joined the Met Office in October 1939 as a Technical Assistant III (TA III) and served briefly in the Marine Division and at Heston Airport before being posted to the Central Forecast Office, Dunstable. At Dunstable, I was one of the five starter members of the IDA Unit, in which I remained until late 1943. I left Dunstable and the Met Office in the autumn of 1947 and spent the next thirty-three years in the laboratories of the National Chemical Laboratory and the National Physical Laboratory at Teddington, Middlesex.

The following account is based on my memory of times over fifty years ago and must therefore have some gaps and inaccuracies. For these, I can only apologize.

The eight years that I spent in the Met Office have left a stronger impression upon me than the much longer time spent in the laboratories, not because I did not enjoy the later work, but because the Met Office was my first job and working on the IDA Unit in wartime was something very special. It was a great pleasure to look at a synoptic chart of Europe in the middle of the war and see the work of the IDA Unit plotted all over the enemy-held territory.

## THE CENTRAL FORECAST OFFICE

In anticipation of immediate heavy air raids on London at the start of World War II, the evacuation of strategic government departments was planned before the outbreak of hostilities. One such move concerned the Central Forecast Office (CFO) of the Met Office from Kingsway, London, to a site in Dunstable, Bedfordshire. As the new office accommodation had not been completed by September 1939, the CFO was evacuated to Birmingham. The move to Dunstable was made in early 1940. At Dunstable, the Met Office was code-named ETA, although it was usually known simply as 'Dunstable'. The choice of this small town was an excellent one, only 35 miles from London. It received enemy bombs only once, and these caused no damage. The CFO was about five miles from the major RAF Communications Centre at Leighton Buzzard and twelve miles from Bletchley Park which housed Station X, the now-famous centre for decoding enemy communications.

The Met Office site was on the western edge of the town, close to the foot of the Downs, and comprised one complete field and part of another. The first contained all the buildings, the second the concrete approach road connecting the office to the town. Both areas were surrounded by a high chain-link fence topped by barbed wire, with a single gate to the Office area.

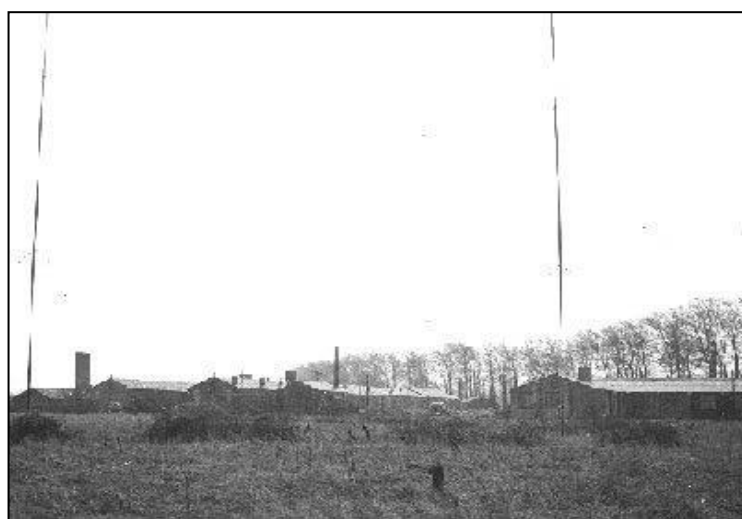


*Fig.1 Dunstable under police guard*

The entrance to the outer bailey from the town also had a gate but it was rarely, if ever, closed. The inner gate was controlled by civilian Air Ministry police with a guardroom near to the gate (Fig.1).

At first, the Air Ministry police wore their own clothes with an official armband and were armed with pickaxe handles. Later, they were provided with proper uniforms and service revolvers. They patrolled the grounds and the buildings by day and night. Next to the police office was a row of lock-up garages for the cars of duty staff and behind the garages a cycle shed. Later, the garages were taken over by a detachment of the RAF Regiment brought in to guard us from enemy invasion, and the cycle sheds became the HQ for our own Home Guard. The Met Office comprised two very well constructed wooden buildings joined by an entrance hall forming a large H. A detached boiler house supplied the central heating, while some distance away was a building containing a standby diesel generator capable of supplying enough power to run the whole station in an emergency. We all had instruction in starting the plant if it should be required.

One of the sections of the main building was devoted entirely to operations and the other was largely administrative. Besides a large teleprinter room which received all the weather reports from the outstations and from which the collected reports were issued to all stations, the operations building contained a repair workshop (staffed by Post Office engineers) and the internal telephone exchange. Next door was the Communications Room where the editing was performed and where the draughtswomen who prepared the Daily Weather Report worked. The final section of the operations area was divided into the Wireless Telegraphy (WT) Room, which received most of the meteorological radio transmissions from abroad (staffed by RAF



**Fig.2 WT aerials at Dunstable**

and civilian operators), and the Forecast Room, where the Aviation and Senior Forecasters worked. The administration building contained offices for senior staff, a general office, a meteorological library, a Registry, etc. The receiving aerials for the WT Room were located in a field some distance away from the main site (Fig.2).

This was ETA when I arrived in April 1940. Other buildings were added later: a lithographic printing works

for chart production, an enlarged WT cabin of inferior construction placed between the two arms of the H building, and finally the NAAFI (Navy, Army, Air Force Institute). Later in 1940, the site was camouflaged by installing steel uprights which carried cables that started at ground level at the site perimeter and passed over the buildings. Wire netting containing lead turnings overlaid the cables and this was sprayed with a dull camouflage paint. It did not look very camouflaged from the ground and a pilot friend of a staff member told her that he had flown over her office. "It's the camouflaged hill near the Downs", he said. "We know it well"! To everyone's relief at the end of the War, the camouflage was removed, along with the blast walls surrounding the H-Block.

I think it was in 1942 that an experimental long-range forecasting unit was established at ETA, housed in part of the chart printing works which had just been built. The staff were mostly female assistants, civilians and Women's Auxiliary Air Force (WAAF), who used simple mechanical adding machines to work out the mathematics involved. One of the supervisors was Miss Jarman, seconded from the IDA Unit.

When the unit had settled into its routine it commenced issuing long-range forecasts which were pinned up on the Senior Forecaster's bench. I believe that these forecasts were made three or four weeks ahead, but they did not prove to be successful. The mathematical theory upon which the forecasts were based may well have been correct but until very powerful computers became available there was no possibility of incorporating all the data required. The unit was eventually closed down and the staff dispersed to other duties in 1943.

When I joined the CFO (Fig.3), I was surprised that no hourly observations of the weather were being made. We may have had a barometer and a barograph but there were no instruments outside, and once the blast walls were erected it was not possible to see what the weather was doing from indoors. I think the only forecaster to show any interest in the local weather was CKM Douglas, who did keep it under pretty close observation.



***Fig.3 Central Forecast Office at work - as if no camera was there!***

It was quite late on in the War before regular observations commenced. An enclosure with Stevenson screen, rain gauge, etc. was set up and various females became the observers. We had a Dines Pressure Tube Anemometer with its own little hut at a suitable distance from the buildings and a slave recording drum in the Forecast Room.

There were quite a few casualties among the maximum and minimum thermometers. One young lady managed to write off several of them by hitting them against the screen when shaking down the index.

Following the fall of France in 1940, the CFO Home Guard was formed and most of the male civilians joined it. We obtained uniforms in time and, better still, we obtained rifles. The latter, supplied as part of the American Lease-Lend, were Eddystone, .300 calibre, with a five-round magazine. They had been manufactured during or just after World War I.

The Home Guard had the use of the Dunstable Rifle Club range underneath a disused retort house at the local gasworks. Here, we used the club's .22 calibre single-shot target rifles. Later, we did maneuvers with other local units and fired our Eddystones on real army-type ranges, and some of us had the chance to throw Mills Grenades. I

somehow avoided the bomb throwing. Our local rifle range was a disused chalk pit. I enjoyed shooting practice, which was especially pleasant on a summer evening.

Our officers were Dight, the senior forecaster, and Roberts, an academic mathematician temporarily at CFO on research work. Our sergeant was a communications supervisor named Rudlin. All three had served in the army in World War I.

We patrolled around the office at night until the threat of invasion had passed and returned to this duty in 1944 after the D-Day landings (in case the enemy retaliated by dropping parachutists). It was perhaps fortunate that we did not have to defend ourselves against an invader, as the only local exercise involving ourselves and the town's Home Guard was a disaster. Members of the 51<sup>st</sup> Highland Division were to infiltrate our positions, but we mistook the advancing town Home Guard for the enemy and engaged them with brisk rifle fire (blanks of course). The townies responded with Thunder Flashes. The Highlanders slipped past behind us and were away.

During the war, there was always a possibility that ETA could be destroyed or badly damaged by enemy action. An alternative station was constructed with all the necessary equipment at Monks Risborough, Buckinghamshire. I never saw this place, but I was told it was built partly underground and had tennis courts on its flat roof as camouflage. Fortunately, it was never required for use.

## **LIFE IN DUNSTABLE**

During wartime, Dunstable was quite a pleasant place to be. It proved to be a 'safe haven' and emerged unscathed in 1945. During the Battle of Britain, daytime raids were made on nearby Luton, and I remember the first one very well. We were having tea in the garden of the Priory Cafe, where we lodged, and became aware of aircraft noises and distant explosions. Looking to the east, we saw German bombers attacking the Vauxhall Motor Works in Luton and being attacked by our fighters. When we looked round, most of the other patrons had left (without paying) and, belatedly, the air-raid siren sounded. We decided to go to the Office to see what was happening there. The town air-raid wardens were out in full force directing everyone to shelters, but we said 'Air Ministry' and they waved us on as if we were going to stop the raid. At the Office, we found that some of the staff were taking cover in one of the underground shelters, but most were either working or outside looking towards Luton. By now, the aerial battle had passed right out of sight. This was the only time during the war that any of the shelters were used, although we had very many warnings, often as many as six in a night.

Dunstable had a good selection of shops and pubs, plus a cinema and a public library. Luton, only 5 miles away, had a greater range of shops and several cinemas. There was a frequent bus service to Luton and a less frequent service from our two railway stations, the LNER, which went to Luton, and the LMS, which connected with the main line at Leighton Buzzard. The town provided other amusements such as horse riding on the Downs, an open-air swimming pool and very pleasant country towards Tring and Aylesbury where I enjoyed many cycle rides. The pattern of shift working enabled us to make full use of all the facilities. The approach to the Office from the town was through a council housing estate via Worthington Road and into our outer field. In the summer of 1940, the yellow-flowered charlock grew wherever the ground had been disturbed, showing very clearly where the drains, water and other services had been laid. After the first year the weeds did not reappear. This outer land was used by some of the staff as allotments, and a grass tennis court was laid out, but the irregular surface defied most players. Tennis courts were available in the town. Before the war, the farmland around Dunstable was used mostly for grazing, as the soil was fairly

shallow over chalk. During the War, much of the farmland went over to grain production.

Soon after the Office was opened, it was slightly damaged by fire. The waste paper, never in short supply, was collected in large wicker baskets on casters and left in the entrance hall. Early one morning, a careless match set fire to a basket of paper which in turn started to set light to the ceiling. Mr Dodds, the duty Senior Forecaster, discovered the fire and raised the alarm. Unhappily, most of the fire extinguishers were kept in the hall. Dodds managed to get an extinguisher and prevented the fire from increasing, but he suffered burns and had some damaged clothing. The local fire brigade attended, but only after some argument. They held that the Office was actually in the Luton Rural District Council area, not the Dunstable Town Council area. This was before the National Fire Service (NFS) was established. When I first arrived at ETA, workmen were finishing the repairs after the fire. An unfortunate original design feature was the use of celluloid strip to seal the joints of the plaster board used for the interior walls. This had caught fire and sent a flame chasing away down the Admin corridor. Fortunately, it burnt so fast that it failed to ignite the walls. It was replaced with gummed paper. Another slight fire occurred one night when an assistant went to sleep in a leatherette-covered armchair whilst smoking. The cigarette burnt through the chair cover and fell inside. Soon, smoke poured out and we doused the chair outside. In the autumn of 1940, we were infested with earwigs, most active at night. The later years were pretty free from any insect invasion.

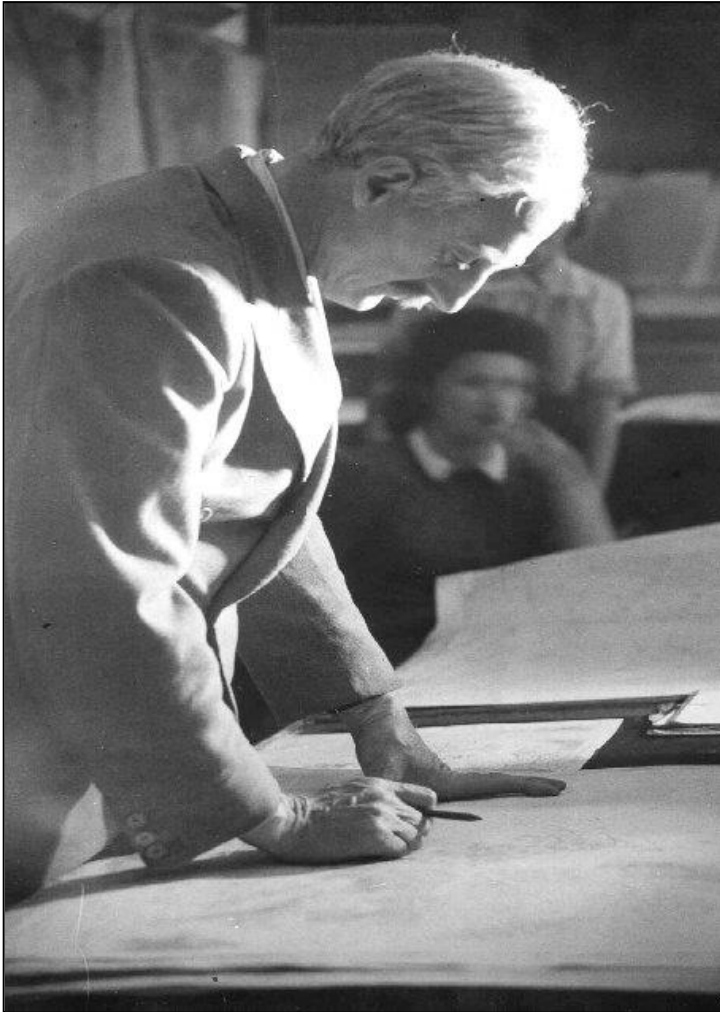
## STAFF

Before World War II, meteorology in the UK was a male preserve, and this was still the case in 1940, but a change was on the way. The Air Ministry had recruited a considerable number of male university graduates as MET II's (salary £300 pa). Dunstable had several working as assistants alongside temporary and established TA III's. As time passed, the majority of the MET II's and the senior TA III's departed to be trained as forecasters to serve RAF airfields in the UK and abroad. The male assistants were replaced by civilian females and later by both civilians and WAAF's.

Along with all the other staff of my grade, I was commissioned as an RAF Pilot Officer in 1943, but I remained under civilian conditions until I left the Met Office in 1947. I have never been notified of my demobilization and have considered applying for an RAF pension.

Male staff continued to provide all the forecasters, the communication supervisors and some specialized jobs. There were some young men who came as assistants, but women filled most of the chairs. During my time in Dunstable, up to the autumn of 1947, there were no women forecasters. After fifty years, I have forgotten many of the names of my former colleagues, although I remember most of the faces. The Head of Branch was EG Bilham, a climatologist who was not seen very often outside his office. A quiet man in general, he could be very firm with those at Headquarters who tried to interfere. I experienced this as he once supported me in a most decided manner. He lived in a nearby village and was known in consequence as the 'Squire of Eaton Bray'.

The most senior forecaster, CKM Douglas (Fig.4), was totally dedicated to the study of weather and had an extensive memory of past weather situations.



His austere and somewhat distant manner was probably due partly to shyness and partly to injuries sustained whilst flying in the 1914-18 war. He was, however, a very pleasant man and when off duty could tell stories about himself and his misadventures. I remember Messrs. Dodds, Dight, Forsdyke and Harding, all Senior Forecasters, very well. The Senior Forecaster on night duty was on call but slept in the Senior Forecaster's bedroom between midnight and about 0500, when he was woken up by the Aviation Forecaster with a cup of tea.

**Fig.4 C K M Douglas – the master forecaster**

We had several foreign staff. Berson was a Pole educated in Sweden who said in 1940 that if the Germans invaded Britain he would stay in the office because if he went outside he might be considered a Fifth Columnist, as during the German invasion of Poland he had had difficulties because he spoke Polish with a Swedish accent. We had several Norwegians. Hans Munkabye had been in charge of communications in the Norwegian Met Office and had also worked for the Resistance after the German invasion of Norway. When his cover was blown, he had escaped to England via Sweden. Professor Sverre Petterssen, another Norwegian, resident in the USA, came to England and recruited Norwegians from Norway to join him. One of these was Captain Christiansen, who was helped by the Resistance to get to England via Sweden. There were others, too, including Per Sundt of Bergen, who escaped from Norway by boat to Shetland and joined the Norwegian Air Force. He was trained in meteorology and came to Dunstable. Sundt and Christiansen, together with Robert Ratcliffe (Fig.5), formed part of the Upper Air Unit under Petterssen.

The head of the Teleprinter Room was Charlie Muggeridge, seconded from the Post Office Telegraph Engineers before the war to re-organize the Met Office teleprinter service. He could do anything that was necessary, from repairs to machines to typing faster and more accurately than anyone else, I have seen him typing a long forecast



into a Creed punch and as soon as he had a yard of tape he fed it into the broadcast machine and resumed punching faster than the broadcast machine so that the loop between the two machines drooped further and further. In 1944, when Paris had been liberated, ONM Paris and ourselves were reconnected by land line and cable. When a fault occurred somewhere in northern France, Muggeridge went out and located it - he knew exactly where the lines ran. After the War, he was able to return to Post Office Telegraphs and gained very well-deserved promotion before he retired.



***Fig.5 Robert Ratcliffe - a pioneer of the wartime upper-air bench***

Service motor cycle dispatch riders provided a daily service, once or twice a day, to the London HQ and three or four times a day to Station X for the IDA Unit. They provided an excellent service in all weathers and all seasons.

One winter night, a rider left Dunstable for Bletchley at 2200 but had not returned by 2300. A freezing rain had started by 2230 and everywhere was coated with ice. We feared that the rider had met with an accident. We rang up Bletchley and all the local police stations but there was no news of him or of an accident. At midnight, he arrived back, coated in ice from head to foot. He had arrived at Bletchley before the rain had started and had come back almost the whole distance in bottom gear at walking pace with both feet on the road to keep himself upright. He soon revived with plenty of hot coffee.

Another rider suffered a broken leg when doing the London run. He was knocked off his bike by a car but returned to us as soon as he was fit again. The riders were armed with service revolvers which they handed in to the communication supervisors to be locked up safely when they went off duty. One supervisor took a revolver from its holster before locking it up and pulled the trigger and blew a hole in the Communications Room floor. The guns were carried with one chamber empty in case the trigger was accidentally pulled. Tragically, one rider was showing off to some females in the WT Room. He put his gun to his head and pulled the trigger. He died later in hospital.

Sergeant Stroud was one of the most useful and knowledgeable members of the WT staff. He had been in the RAF as a radio operator and had joined the Air Ministry radio

staff in Kingsway at the end of his service pre-war. He was recalled to the RAF in 1939. He was an excellent operator and found all sorts of German local transmissions which were most valuable to the IDA Unit.

The RAF personnel were under the command of Squadron Leader Goodfellow. All the RAF personnel had specialist trades; there was very little parade-ground stuff. Pay parades and FFI's (Free From Infection) were all that I remember. The Met RAF staff came under the same controls as the civilian staff and there was no difference at work. Some WAAFs stayed on in the Met Office as civilians when demobbed.

I have a vivid recollection from the latter days of the war, concerning an American Army Air force base at Long Marston, a few miles from Dunstable. Several times I saw the Flying Fortress bombers returning from their daylight raids on Germany, many of them limping home. I wondered how they could possibly fly with such damage to wings and tailplanes, failed engines and dead and wounded crewmen on board. They flew low over us as they neared base and one could only hope that they landed safely.

I found ETA to be a happy place to work, with a very friendly and lively atmosphere. I spent over seven years there and the time never dragged, I am sure that most of us who served there enjoyed it as much.

## THE IDA UNIT

I arrived at the Central Forecast Office, Dunstable, on 1 April 1940 and met Mr Hayes, who was in charge of the Admin Office. He sent me off to secure lodgings at the Priory Cafe in the town and I was told to report back at the Office at 0900 the next day. The Priory Cafe already provided accommodation to five or six other Met staff. We paid £1.50 per week for full board and lodging - my salary was £120 per annum, rising to £130 at nineteen.

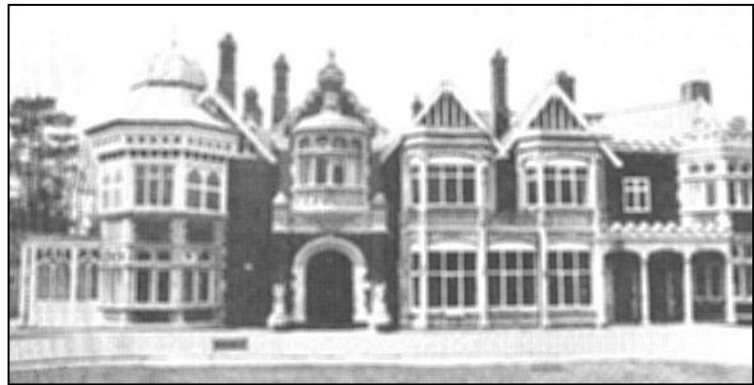
At 0900 on 2 April, I was introduced to Philip Howse from Bletchley Park and four other assistants already working at Dunstable. Apart from Tom Hart, I do not remember their names. Howse explained that we were to be members of a new unit called IDA and we were to decode Russian weather reports which would be intercepted by the WT section. We would work at one end of the Forecast Room, secrecy was paramount, and no mention of our work was to be told to anyone anywhere. We were told that we had been positively vetted for this work. Although we did not know it at the time, we would before long be decoding weather reports from all over Europe in order to relieve the cryptographic staff at Bletchley Park.

Before World War II, an International Conference had designed a code for the exchange of weather reports between all countries. The information was contained in groups of five figures and could be sent by radio or telegraph (see Appendix). In peacetime, weather information was available to every country, but upon the outbreak of World War II the belligerents immediately enciphered their WT reports. Whilst several neutral countries continued to send *en clair*, others such as Sweden and Switzerland did not. Those countries that could send their reports internally by telex, such as the United Kingdom, did so without enciphering them, but Russia, covering such a vast area, had to use WT, and as it was at war with Finland and had a non-aggression pact with Germany it encoded all its observations.

In April 1940, the British forecaster's European weather chart had blank areas over Germany, Austria, Finland, Russia and the eastern Baltic. As shipping in the Western Approaches now kept radio silence, the only reports available were from the Azores, Iceland and Greenland. Although many weather systems move from west to east over the British Isles, not enough accurate information was available over Germany to prepare good forecasts for Bomber Command operations. By mid-summer 1940, after

most of Europe had been overrun by Germany and Italy, the European chart contained only Portugal and Spain.

**Fig.6 The Mansion at Bletchley Park**



From the outbreak of War, Station X at Bletchley Park (Fig.6) had been at work breaking the German and Russian weather codes and had achieved considerable success. Their decoded material was sent to Dunstable by telex and re-issued to a restricted clientele (such as RAF Commands and selected RAF stations) under the heading MANX. Instructions were given to all meteorological stations that any MANX information arriving accidentally at unauthorised stations must be immediately destroyed by burning.

Having been shown by Howse how to decode the Russian transmissions, we practised the art for the next three days. On Friday 5 April, we went on to a 24-hour roster of three shifts, 0800-1500, 1500-2200 and 2200-0800. It required four bodies to cover the shifts and rest days; the fifth one did a normal day 0900-1700 or covered for those on leave or sick.

The reports from the European area of Russia were the most useful to our forecasters. However, there was another section of the broadcasts which we could not decode and this was sent immediately to Station X by telex. Headed KWADRAT, this portion was in a more sophisticated cipher which changed every six hours and contained a selection of Russian station reports intended for Germany. An hour or so later, the Germans sent a similar message to Russia in the same code which contained a selection of German station reports. Thus, our Russian decodes were used to break KWADRAT and provided us with a useful selection of German stations to be sent out on MANX.

When the IDA Unit had settled into a working routine, Philip Howse returned to Station X and his place was taken by E Knighting, a mathematics lecturer. Knighting spent some time during the summer of 1940 at Station X, learning the mysteries, and RW Gloyne, an aviation forecaster, took charge. When Knighting returned, Gloyne resumed forecasting and later left Dunstable. Knighting remained in charge until sometime in 1943, when he went onto other duties and was replaced by a WAAF officer. Both Knighting and Gloyne remained in the Met Office for the rest of their careers.

The IDA Unit took over all the routine decoding, whilst the staff at Station X, under Dr McVittie, continued to provide the keys to decoding and keep them up to date. As the work increased, so did the staff. Three original members went to Station X and very gradually most of the male staff were replaced by civilian females and WAAFs. Three women university graduates, Maud Collard, Molly Jarman and Hilary Ratcliffe, joined Tom Hart to be the Unit's supervisors. Each supervisor had one experienced assistant, who took over to cover the absence of the supervisor on leave or sick. I was the assistant to Molly Jarman until 1942, when she was transferred to an experimental long-range forecast unit at Dunstable. I was then promoted to supervisor in her place and my assistant was Irene Gerry.

As the IDA Unit increased in size, our situation in the Forecast Room became too cramped for both us and the forecasters, so we were temporarily housed in the Library. This room was very cold in winter, especially at night, as it had only two

radiators. The night shift (usually three) huddled round a Valor oil stove. When the new enlarged WT Room was occupied, we took over the old one, which put us next to the Forecast Room with which we communicated via a hatch. This was the home of the IDA Unit for the rest of its existence. The space vacated by us in the Forecast Room was later taken up by the Upper-Air Unit, an Anglo-Norwegian group led by Professor Sverre Pettersen, which did very valuable forecasting work, especially before the D-Day landings.

When the day-to-day decoding was transferred from Station X to the IDA Unit, a new and much more interesting phase of our work commenced and we became responsible for supplying weather information for most of Europe to our forecasters and the MANX recipients. The main source was the German collective transmission broadcast on the call sign DDX, which included a comprehensive collection of German weather stations followed by a good selection of reports from the conquered countries and the Eastern European states that had allied with Germany. The interchange of information between Russia and Germany via KWADRAT (see above) continued until the German invasion of Russia. I was on night shift when the invasion started and the Russian KWADRAT arrived. This was decoded as usual by Station X, but when the German KWADRAT was decoded it was found to be rubbish.

## THE RUSSIAN CODE

The Russian code was quite simple. One figure in each group of five was replaced by another, and a second figure dependent on the first one was subtracted from the remaining four figures in the group. This sounds complicated, but, as the example will show, it was an easy system to learn and we could decode almost as quickly as reading the numbers. Here is an example: -

The Key.

(a)	(b)	(c)
0	3	7
1	2	4
2	0	9
3	1	5
4	7	3
5	8	6
6	4	8
7	9	2
8	6	0
9	5	1

The coded message as received: 99369 21553 09895 39875 56167. Replace each underlined figure as shown in column (a) by the corresponding figure in column (b), thus: 99365 01553 39895 19875 86167. Now take the figure in column (c) corresponding to the original figure in column (a) and subtract it from each of the remaining four figures in each group: The decode is 88255 02664 32128 14320 80501.

## THE GERMAN CODE

Station X supplied us with printed code sheets on thin cards. The cards had ten vertical columns, each of 100 groups. The first read downwards 000, 001, 002 etc. to 098, 099, while the second column read 100,101,102 etc. to 199 and so on until the last which read 900; 901, 902 etc. to 999. Against each of these numbers was written a random three figure group. This was sheet A, and sheet B was the reverse of A. Thus, if 921 printed on sheet A read 436, then 436 printed on sheet B read 921. The sheets that we received were by no means complete, but Station X sent us additions to the sheets daily and the amount of information steadily increased.

An example of a DDX decode: 92120 43326 95449 70762 39042. Message as received, coded on sheet A: 921/20 4/332/6 95/449/ 707/62 3/904/2. Divided into 3- figure groups. Exchange each 3-figure group above by its replacement from sheet B. The single figure at the end of the fifth group was exchanged for another taken from a single figure replacement code (similar to the (a) and (b) columns in the Russian Code shown above). A single-figure exchange code was included in each DDX sheet. This single figure exchange was not needed when the rainfall groups were sent at 0700 and 1800.

The decoded weather report: 43650 05628 24328 17620 80103.

There were five or six sets of such sheets in operation at any one time and the set lasted for some weeks. The code sheet was changed at each synoptic hour (see Appendix). After some time, the set of sheets (HEFT) was replaced by another set and usually it was brought back into service at a later date. The codes which ceased to be used on DDX altogether were then used on a similar broadcast, call sign DAN, which I believe was transmitted for the German Navy. By the time the codes reached DAN, they were the most complete versions that we had.

Later on, there was a change in the method of coding and we found that the 5-figure groups had become 6-figure groups. Station X must have had knowledge of a change as they had warned Knighting in advance. The day that the change occurred, the same Heft continued in use and gave the following decode:

432450 051528 244928 178820 800103

but it did not take long to see that by adding the two centre figures in each group without carrying tens we got: 43650 05628 24328 17620 80103.

The object of the change was to vary the trigrams which carried the station number (436) and the trigram in the fifth group which often read OxO and which provided a speedy method of finding which code was in use after a change at the synoptic hour.

This intention to improve the security of the code made little difference to Station X's ability to break it and indeed it probably improved their chances. Strangely, DAN still retained the old method using 5-figure groups. The reports sent out by DAN contained many of the reports that had already been sent out on DDX and these were excellent cribs for updating the codes and kindly supplied by the Germans themselves. The Germans looked after their codes, as I never heard that any of them fell into Allied hands.

I never saw any signs that the enemy had any of our UK reports, but there was an occasional report from the London area (station 151-Croydon) which may have come from one of the few spies that are known to have operated in the UK. I did see reports from Greenland on DDX a few times, and I learned after the war that they were probably authentic. There was a small German force which spent some time in NE Greenland operating a weather station until they were captured. Early in the war, some German fishing boats operated in Icelandic and Greenland waters, sending weather

reports, but we did not see these on the broadcasts that we decoded. I do not know whether the Germans ever sent encoded weather analyses or forecasts.

## **THE VICHY FRENCH CODE**

The Vichy Government transmitted weather reports in its own code for the area that it controlled in France and French North Africa. The code comprised a horizontal and a vertical key, each of 25 figures. The received message was subtracted from the horizontal line 25 figures at a time and then by the vertical figure appropriate to each of the horizontal lines. The keys were changed every six hours.

Once we knew the system, it became a diverting form of crossword puzzle to decode the reports (the subtractions were made on the base eleven which added to the fun). The French reports arrived first and we could generally solve the riddle of the keys using them only, but sometimes we would need the North African reports for confirmation. Since we could decode these reports perfectly, they were valuable cribs for breaking DDX.

Just prior to the TORCH landings in North Africa in 1942, there were some negotiations between the Allies and Admiral Darlan, the representative of Vichy in North Africa, and copies of the future Vichy codes were sent to England, where they were received by Colonel Gold, the Deputy Director. Gold rang Dunstable to enquire whether the codes were accurate. As some applied to that day, he was pleased to hear from me that they were, but a little miffed when I said that we had no trouble in breaking them. After the TORCH landings, the Germans took over Vichy France, the reports stopped and that particular diversion was over for us.

## **THE ITALIAN CODES**

When the Italians entered the war in 1940, they commenced sending coded broadcast weather reports. Although I must have deciphered them, I cannot remember anything about them. We received a printed code book from Station X which had been issued to the Italian Navy for coding weather reports from their ships. The Italians never missed the book but we used it rarely as there was very little traffic.

## **THE HUNGARIAN, ROMANIAN AND BULGARIAN CODES**

These three countries used the same type of code, which consisted of a string of random numbers from which the incoming data were subtracted. As the number of figures used considerably exceeded the number of figures expected in any one transmission, the starting place had to be found, which did not present much difficulty to us. If the message 'ran off the end', we carried on again at the beginning. Each country used a different set of figures and the codes were changed from time to time, though not frequently. Once the code had been established by Station X, the reports were valuable cribs for the German ciphers.

# GERMAN AIR FORCE WEATHER RECONNAISSANCE

From the start of World War II, radio messages from German Air Force (GAF) planes were intercepted at RAF Cheadle and at first deciphered at Bletchley. Later, staff were sent from Bletchley to Cheadle and took over the translation of GAF messages. German long-range reconnaissance aircraft operated at first over the North Sea. Later on, after the occupation of Europe, several routes were flown from Norway and France, covering the Western Approaches and North Sea, the North Atlantic towards Iceland and off North Cape, Norway, to Spitzbergen. Weather reports and reconnaissance of shipping movements were sent back.

The weather reports were not based upon any of the International weather codes, and deciphering these messages was not possible until the body of a German airman was washed up on the East Coast of England. In his pocket was a hand-written card which was the airman's personal copy of the code for enciphering his weather information before transmission to his base. When we received the card at Dunstable, it was quite undamaged and fully legible (a compliment to the makers of the ink). From this time, decoded copies of the reconnaissance reports were sent to us from Cheadle and we could use the weather information. Included in these messages were the shipping reports, and these very often contained depressing details about losses from Allied, especially the Russian, convoys. We had the shipping reports stopped and received only weather reports thereafter.

We received a surprising amount of information from the various flight reports and we had one female who specialized in the collation and issue of them, as the planes mostly flew by daylight. Miss Fraser worked a permanent day shift.

Later, additional information appeared in the messages which we could not decode. Station X eventually sent us an enlarged code and we discovered that some GAF flights were making ascents at particular places, recording temperature and pressure at increasing heights starting from 50 metres above ground. The RAF had made similar flights in England for several years and continued to do so for years after the War. One of these locations for upper air measurements was over Spitzbergen, and a Focke-Wulf 200 crashed there. A Norwegian trapper investigated the wreck and sent some of the documents that he found to the authorities in England via the Norwegian resistance and Commando Units from Shetland. Amongst the loot was the key that we needed, and the Upper-Air Unit made good use of the information. It was said that the trapper had fired his hunting rifle at the plane when it was at its lowest point and brought it down by a very lucky shot.

## ONE-TIME PADS

The Met Office teleprinter network was connected to all the weather forecasting stations in the United Kingdom and with a direct line to ONM Paris for the exchange of reports between the UK and France. The French connection ceased in 1940 and was not restored until 1944, when France was liberated. It was unnecessary to encipher any of the teleprinter traffic, but some collections of UK reports had to be sent abroad by radio, and the staff in the Communications Room encoded this traffic. They used code books containing numbered pages, each page having five-figure groups of randomly-generated numbers arranged in horizontal lines. The signal, already in the International Code, was subtracted from the page lines and then transmitted. A starting group indicated the page and line to be used by the decoder.





Some of these pads may have been used more than once, but for real secrecy no part of such a book was ever used twice. This was the One-Time Pad. IDA sent collections of Manx reports daily to Meteor Almaza, Cairo, using such a One-Time Pad.

On my rest days, I frequently visited my parents' home in West London, and on one such stay I received a 'phone call from Dunstable asking me to go to Victory House, Kingsway, to collect a parcel and bring it back with me. I cycled up to Victory House next day and signed for the parcel, returned home and the following day cycled back to Dunstable with the parcel in my saddle bag and handed it over on arrival. The parcel contained the next issue of One-Time Pads. Apparently, it was not considered safe to send these books via the armed Service Dispatch Riders.

## **OTHER REPORTS RECEIVED BY THE IDA UNIT**

The British Embassies in neutral Sweden and Switzerland sent daily weather reports to the Foreign Office in a diplomatic code, whereupon the Foreign Office sent us the decodes and these were issued on Manx.

Some weather reports came from the Royal Navy via Portishead Radio under the code name PICE. During the upheaval following Dunkirk and the prevailing fear of Fifth Column activity, a Senior Forecaster 'phoning Victory House was overheard whispering "I have a message for you; I will read it backwards E C I P ...". Later, the Senior Forecasters were provided with a 'scrambler telephone' which was used during the daily weather conferences between the CFO and the RAF Group stations. Reading backwards was no longer required.

From the autumn of 1940 until mid-summer 1941, we received weather reports code-named PANTHER from two ships cruising the North Atlantic, the SS *Arakaka* and the SS *Toronto City*. These were the first Weather Ships and we issued their reports on MANX. Tragically, the messages ceased from both ships within ten days of each other and we presumed that they had been sunk as we never heard anything more of them. Recently, their history has been researched and published. The ships were torpedoed by U-boats and lost with all hands.

## **ISSUE OF MANX**

The decoded reports were issued on the MANX broadcast with their station numbers altered and with their temperatures changed from Centigrade to Fahrenheit. At that time, Fahrenheit was always used on weather charts plotted in the UK. Using the Fahrenheit scale enabled temperatures to be given to a half-degree Centigrade using only two figures on the International Code.

# GENERAL

The amount of information decoded by the IDA Unit varied according to the completeness of the codes that we used. When a new HEFT of DDX codes was introduced we could do nothing with DDX until Station X provided new key sheets. Generally, this took only a few days. During this time, we could still supply some information from other sources. Rarely did all the codes from all the countries involved change at the same time.

Routinely, we decoded everything that we could, then collected all the information for each synoptic hour and sent it to Station X. It was carried by Motor Cycle Dispatch Riders on four regular runs each day, the first at 0800, the last at 2200. Station X used all this material to upgrade the codes, and their updates were sent back to us by each return delivery. On one occasion, when no rider was available, I took the bag myself by taxi. This was my only visit to Bletchley Park and I got no further than the guard lodge.

When the IDA Unit first operated, we plotted our decodes onto a weather chart which was shown to the forecasters. As the amount of information increased, the forecasters' assistants took over the plotting and all the UK, neutral and enemy reports were plotted on the same charts.

There does not appear to be any published recognition of the work done by Station X on the breaking of the enemy weather codes. The group under Dr McVittie worked tirelessly to provide all the initial code information and subsequently maintaining and improving the codes. We occasionally met some of the Station X staff, but apart from very guarded telephone calls we had little actual contact with each other. There is a group photograph published in "Codebreakers" which shows both Dr McVittie and Philip Howse.

The members of the IDA Unit knew how much was owed to the abilities of the Station X group and what a valuable contribution it was to the war effort.

We believed that the Germans were unable to obtain very much information about the UK weather. A number of would-be German agents intercepted by British Intelligence had been instructed to provide weather reports and had been given radio transmitters for this purpose. These spies were mostly captured, some executed, others turned round. Everyone at the CFO during the war must have known what the IDA Unit was doing, and it is clear that there was no idle talk outside the office. It seems certain that the enemy was quite unaware of our work. The secret was kept as closely as was the secret of the Enigma decodes.

It would be very interesting to know how much information the Germans actually had and exactly how they obtained it. Our teleprinter service within the UK insured a high degree of confidentiality within the UK, and the One-Time Pad was safe as long as none of the pads found their way into the enemy's hands. In retrospect, after fifty years, the enemy appears to have been very careless in enciphering in his main broadcast material from diverse sources originally enciphered in poorer-quality codes. It was inexcusable of him to use the old DDX codes on later DAN transmissions, but it was a great help to the Allies. We were very privileged to work in the IDA Unit. The work was very interesting as well as being important as a means of defeating the enemy. As all the staff felt this, it was also very pleasant to work in such an atmosphere. I was very sorry to leave the Unit when I was transferred to other duties at Dunstable. The late Tom Hart was the only person who served on the IDA Unit from start to finish and the only man during the unit's last year. After the War, he returned to teaching.

# APPENDIX 1

## International Meteorological Code for Synoptic Observations

IIIC<sub>L</sub>C<sub>M</sub> wwVhN<sub>h</sub> DDFWN PPPTT UC<sub>H</sub>app RRT<sub>x</sub>T<sub>x</sub>E

The meaning of the letters are as follows:

II	identification number of station
C <sub>L</sub>	form of low cloud
C <sub>M</sub>	form of medium cloud
ww	weather at time of observation
V	Visibility
h	height of base of cloud
N <sub>h</sub>	amount of cloud of which the height is reported by h
DD	wind direction
F	force of wind
W	past weather
N	total amount of cloud
PPP	pressure in millibars and tenths, initial 9 or 10 omitted
TT	temperature in degrees Fahrenheit (UK) Celsius (Europe)
U	relative humidity
C <sub>h</sub>	form of high cloud
a	Characteristic of pressure change in last three hours
pp	amount of tendency in fifths of millibars
RR	rainfall in millimeters at 0700 for preceding 13 hours and at 1800 for preceding 11 hours
T <sub>x</sub> T <sub>x</sub>	maximum temperature at 1800
T <sub>n</sub> T <sub>n</sub>	minimum temperature at 0700 given in place of T <sub>x</sub> T <sub>x</sub>
E	state of ground

Synoptic observations were made at the same time all over the world and the times of major observations were at 0100, 0700, 1300 and 1800. The times of minor observations were 0400, 1000, 1600 and 2200.

Every observation comprised the first five groups of the six shown above; the sixth group was reported only at 0700 and 1800. All times were GMT.

## APPENDIX 2 (References)

*Code Breakers - The inside story of Bletchley Park*. Edited by FH Hinsley and Alan Stripp. Oxford University Press, 1993.

*Weather Study*, by David Brunt FRS, 1941.

The ill-fated first UK-weather ships, by RJ Ogden. *Weather*, **50**, pp.381-384.

*The Sledge Patrol*, by David Howarth, Collins, 1957.

*British Intelligence in the Second World War, Volume 4*, by FH Hinsley and CAG Simkins. London HMSO, 1990.

# THE SPECIAL LONG-RANGE FORECAST UNIT IN 1944

Photograph, letter and note reproduced by kind permission of the National Meteorological Library, Bracknell, UK



<b>IMPORTANT.</b> All communications must be addressed to <b>THE DIRECTOR.</b> In reply to this letter quote  Telegrams:— "WEATHER, TELEX, LONDON." Telephone:— DUNSTABLE 455
--

**METEOROLOGICAL OFFICE,  
DUNSTABLE,  
BEDFORDSHIRE.**

21 December, 1944.

Dear Sir Nelson,

Thank you for your letter of 16 December.

Below is a list of the people appearing in the photograph of the "Special Forecast Unit" (Reading from left to right)

<u>Back Row.</u>	<u>Front Row.</u>
L.A.C.W. P. Gonty	Miss P. Lutt.
L.A.C.W. M. Oughton	Mr. C. Douglas
L.A.C.W. M. Jarrett	Cpl. E. Ford
L.A.C.W. F. Dougherty	Dr. S. Petterssen
L.A.C.W. S. Stedman	Miss G. Beverley
L.A.C.W. E. Morrison	
L.A.C.W. S. Milligan	
L.A.C.W. B. Williams	
L.A.C.W. M. Clappitt	

Yours sincerely,

*James Pitting*

Sir. H. K. Johnson, F.C.B.,  
Director,  
Meteorological Office,  
Victory House.

D. M. O.

Dr. Petterssen asked me to send you this photograph of the Special Long Range Forecast Unit who assisted in the preparation of Eta's contribution to the SHAEP Conferences.

9th September, 1944.

*Beverley*  
m. o. 2(c)