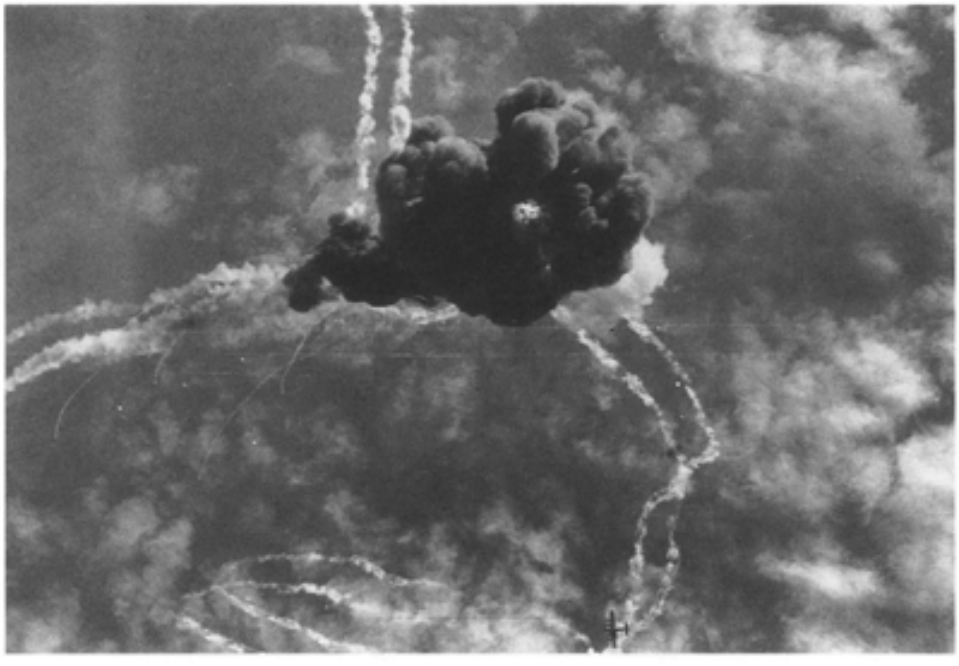
An anti-shipping mine, parachuting through heavy cloud, near the mouth of the Elbe River, 22/23 March 1945. (PL 144275)

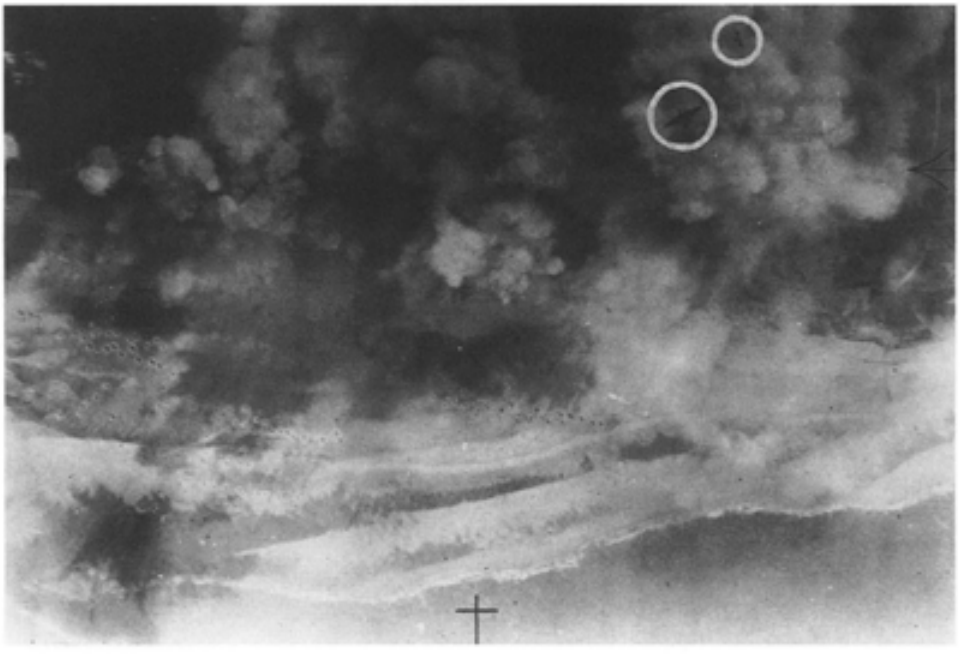
Nos 4, 6, and 8 Groups attacked Gladbach on 24 March 1945 in support of 21st Army Group's crossing of the Rhine. This No 4 Group Halifax, with fuel tanks ablaze, was the only machine lost. (PL 144284)



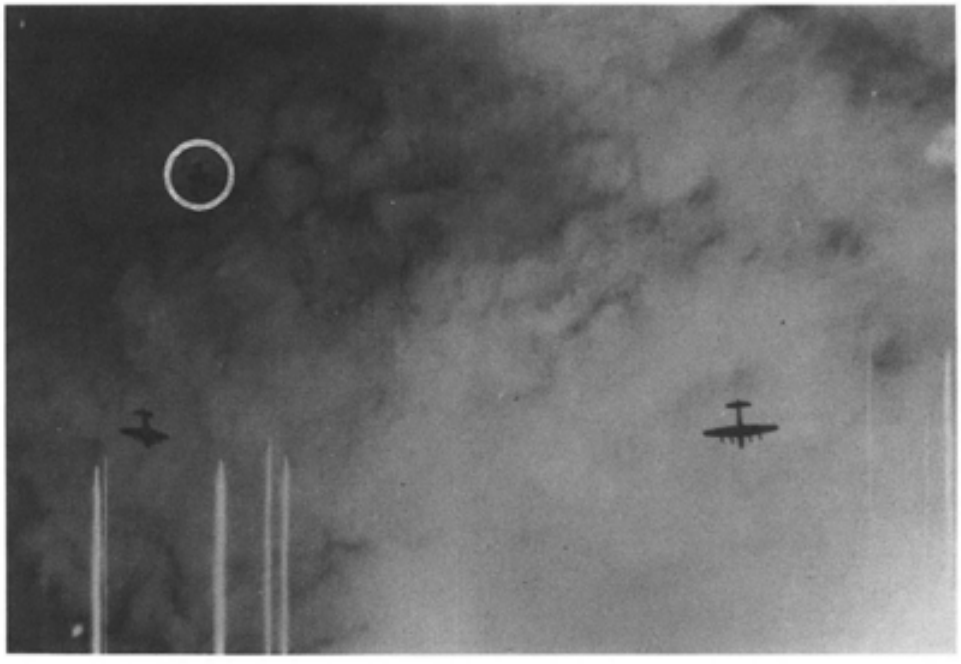
Not a 'Scarecrow,' but a No 3 Group Lancaster blowing up in mid-air over Wesel on 19 February 1945. (PL 144292)

No 8 (Pathfinder) Group markers cascade over Nuremburg, 27/28 August 1943. (PL 144305)

Wangerooge, 25 April 1945, where six of the seven crews who failed to return were lost because of collisions. (PL 144281)



Bomber Command attacked Wangerooge, in the Frisians, twice during the war: on 18 December 1939, when twelve of twenty-two machines were shot down, and again on 25 April 1945, two weeks before the war's end. That day seven of 482 crews were lost, six because of collisions, including two from No 431 Squadron and one each from Nos 408 and 426. All told, twenty-eight Canadian and thirteen British airmen were killed. This photograph shows a bomber falling to the ground, broken in half. (PL 144290A)



This is one of a very few bombing photos that illustrates a night-fighter (a Ju-88, inside the small circle) in pursuit of a bomber. It was taken over Hamburg on 8/9 April 1945. (PL 144293)

Introduction

At the outbreak of the Second World War, the Royal Canadian Air Force had only one bomber squadron on its Home War Establishment. Formed at Halifax on 5 September 1939, No 10 Squadron was equipped with two-seater Westland Wapiti Mark IIA biplanes, with open cockpits, a maximum speed of 135 miles per hour, and the ability to carry no more than a trivial 580 pounds of bombs. These obsolete machines were intended to suppress enemy submarines in coastal waters (and possibly protect Canada's shores from the remote prospect of seaborne attack) rather than carry out strikes against an enemy's military or industrial centres. Indeed, given the unlikelihood of war between Canada and the United States, there were no such targets within range of Canadian-based bombers, even if they had been of the most modern design. Perspectives were different in Europe, where ranges were shorter and bombers took a prominent place in the arsenal of offensive weapons, either to be used against enemy armies (the Luftwaffe's primary concern) or to deliver 'knock-out' blows against enemy war industries and/or civilian population (the doctrinal underpinning of RAF Bomber Command).

Although the Royal Air Force had more appropriate equipment – and more of it – than the RCAF, experience soon taught its commanders that their prewar doctrines were quite impractical. Unescorted bombers, it was discovered, could not fight through to their targets by day without suffering unacceptable losses. Instead, they must rely on evasion and hide from the enemy; in the autumn of 1940, therefore, Bomber Command turned to night bombing in the hope that certain classes of industrial targets – and certainly the largest cities – could be found in the dark.

Bomber crews had trouble navigating accurately at night, and even greater difficulty locating the precise targets they were ordered to attack. Since the strategic bomber offensive was, by 1941, the only way to strike directly at Germany, regardless of its shortcomings the build-up of Bomber Command won broad – though not universal – support. Canada was quick to join in, and the RCAF eventually mustered fifteen bomber squadrons overseas. All of them were formed in the United Kingdom, largely from BCATP graduates, with the first, No 405, being formed in April 1941.

Initially equipped with Vickers Wellingtons, No 405 Squadron flew its first four bombing sorties on the night of 12/13 June 1941 against the railway marshalling yards at Schwerte in Germany. A second squadron, No 408, formed on Handley-Page Hampdens over the early summer and undertook its first mission on 11/12 August, when it attacked the docks at Rotterdam in Holland. Two more squadrons were formed before the end of the year – one on Wellingtons, one on Hampdens – and they both began flying operational missions a month later. Since the RCAF had no pool of qualified and experienced bomber leaders to draw upon, the commanding officers of all these units (and most of their flight commanders) were usually Canadians serving in the RAF or, when there was no alternative, other RAF officers.

By 1942 the nature of the strategic bombing offensive was changing radically. The Butt Report of August 1941 had revealed that on most nights only a minority of crews bombed within three miles of their aiming point – five miles over the smog-ridden Ruhr – an effort that was demonstrably of little use if their goal was the destruction of specific objectives. Since the British War Cabinet considered it to be of the utmost importance to continue carrying the war directly to Germany, however, over the next nine months Bomber Command was projected into an 'area' offensive – what Adolf Hitler (quickly) and Winston Churchill (eventually) dubbed 'terror' bombing. Sir Arthur Harris, who was appointed air officer commanding-in-chief of Bomber Command in February 1942, became the premier advocate and exponent of that approach, sarcastically labelling those who still thought in terms of precision attacks, 'panacea-mongers.'

What Bomber Command lacked in precision it would now make up with numbers. If one hundred machines could not shut down a particular factory in Essen, perhaps five hundred (or a thousand) could destroy the whole city – if not in one raid, then in ten. Yet accuracy could not be entirely dispensed with, even if it was measured in terms of thousands (rather than hundreds) of yards from the aiming point. In an attempt to improve the record, work on a number of electronic navigation aids was accelerated; a specialist target-marking force (the Pathfinders of No 8 Group) was created; and renewed emphasis was placed on the production of more and better bombers able to carry bigger loads of high explosive and incendiary bombs. Accuracy might be slow in developing, but in the meantime more damage would be done.

The next RCAF bomber squadron to be formed overseas – No 425 in June 1942 – was designated a francophone unit, and every effort was made to post francophones to it so as to encourage French-Canadian enlistment in the RCAF. It was the first squadron to form around an RCAF commanding officer (although No 405 had then been commanded by Wing Commander J.E. Fauquier, DFC, for four months, and two of the other three squadrons already in existence also had RCAF officers in command by the time No 425 was formed).

The first four-engined British bomber, the Short Stirling, had entered RAF service as early as August 1940, but was bedeviled with problems throughout its short operational life. The first four-engined machine to attack Germany, in March 1941, was the Handley-Page Halifax, but it, too, had its teething

troubles and initially production was very slow. The first Avro Lancasters were delivered to No 44 (Rhodesian) Squadron, RAF, in December 1941.

All five Canadian squadrons were still flying twin-engined aircraft – Hampdens and Wellingtons – until April 1942, when No 405 Squadron was re-equipped with the unsatisfactory Halifax II. However, allegations that Harris favoured RAF units in the process of re-equipping his squadrons are unfounded. Subject to rational restrictions imposed by the exigencies of maintenance, seniority was the principle on which conversion to newer – and theoretically better – aircraft was based. Old-established front-line squadrons were the first to get them, irrespective of nationality or Commonwealth origin.

Two more Canadian squadrons were formed in October 1942 (both with RCAF commanding officers), bringing the total up to seven, although No 405 was temporarily serving outside Bomber Command. The possibility then arose of creating a Canadian bomber group – the air formation roughly equivalent to an army corps – which was desirable for symbolic reasons and to give more RCAF officers higher command and staff experience. To that end, another four squadrons were hurriedly cobbled together in November.

On 1 January 1943 No 6 (RCAF) Group came into being, commanded by Air Vice-Marshal G.E. Brookes, who was brought over from a training command in Canada to set up his headquarters at Allerton Hall in Yorkshire. Three more squadrons were formed in the summer of 1943, raising the group strength to thirteen. No 405 Squadron had returned from Coastal Command on 1 March, only to be selected to provide the Canadian component of No 8 (Pathfinder) Group in mid-April. It would remain a Pathfinder unit until the end of the war.

The early months of the new group were not entirely happy. Expansion had been too rapid, in air- and groundcrew and in administrative personnel, and the lack of experience soon began to tell. Canadian loss, early return, and serviceability rates were the worst in Bomber Command. Matters were not helped when Overseas Headquarters – with the concurrence of Ottawa, of course – obliged the Air Ministry by detaching three squadrons (Nos 420, 424, and 425) to form No 331 Wing, which was sent to North Africa in May 1943 to support the forthcoming Allied invasion of Sicily and Italy. It remained in Tunisia for six arduous months, twice as long as originally intended, engaged primarily in interdiction bombing of Italian railway junctions and ports. Though their living conditions were harsh, those aircrews were fortunate to have missed the heavy casualties suffered during the later stages of Bomber Command's battle of the Ruhr (March to July 1943) and the initial phase of the battle of Berlin (November 1943).

When No 331 Wing returned to England in November 1943 the three squadrons began converting to the Halifax III – a much superior machine to either the II or V in service with six RCAF squadrons. The Lancaster was generally considered to be the best British-designed heavy bomber of the war in terms of surviveability as well as bombload. Three RCAF squadrons were flying Lancaster IIs, probably the weakest of the Lancaster variants, and would eventually convert to Halifax IIIs. By war's end, however, ten squadrons of No 6 Group would be equipped with Lancasters, six of them with

Canadian-built Xs and four with the Merlin-powered Is and IIIs, both better than the II.

More and more, the air war over Germany revolved about electronics, as counter-measure was met by counter-counter-measure, ad infinitum. Tactical innovations accompanied the technological breakthroughs, and the advantage swayed back and forth as bomber, night-fighter, and Flak struggled to find and maintain an edge in what was certainly the most sophisticated campaign of the Second World War.

An average casualty rate of 5 per cent per mission was considered to be the most that bomber crews could bear without faltering over any prolonged length of time. Losses on that scale occurred between 1 January and 31 March 1944 when, on twenty large raids to Germany, 754 of 13,259 sorties failed to return – a missing rate of 5.6 per cent. Over the same period No 6 Group's loss rate was higher still, standing at 7 per cent. If morale within Bomber Command should ever have cracked, it was in the first few months of 1944. It did not; and the number of airmen who became neuro-psychiatric casualties was infinitesimal.

In the five RCAF squadrons flying Halifax IIs and Vs, 10 per cent of sorties failed to return from just six major raids between 14 January and 20 February 1944. Withdrawn immediately from operations over Germany, they were employed for the next two months on minelaying duties. Their transfer to Gardening operations in order to save them from intolerable losses was not a new policy. Harris had done the same thing with his last Wellington squadrons when, also because of the performance of their aircraft, they could no longer survive over the Reich. The significance of Gardening went far beyond the number of enemy ships sunk or damaged: it not only interfered with German coastal shipping, but also impeded U-boat training in the Baltic.

If their shift to minelaying 'saved' the Halifax II and V squadrons, the rest of Bomber Command was similarly saved in April 1944 when Harris brought the assault on Berlin to a halt. His bombers were needed to prepare the way for the invasion of Europe – Operation Overlord. Placed under the ultimate control of Supreme Headquarters, Allied Expeditionary Forces, in mid-April, Bomber Command's effort was split for the next six months between transportation targets in France and the Low Countries – intended to isolate the Normandy battlefield – and the continuing attempt to destroy the industrial centres of northern and western Germany, especially the Ruhr heartland.

No 6 Group could, and did, participate fully in both these campaigns. In July 1944 No 415 Squadron (which so far had had a most unhappy war in Coastal Command) was transferred to Bomber Command, bringing the group strength to fourteen squadrons.

In February 1944 Brookes had been replaced by Air Vice-Marshal C.M. McEwen, MC, DFC, a demon for training and standards, whose heavier hand soon made an impact on the group. Together with the reduction in loss rates that marked the end of the battle of Berlin, the temporary switch to easier targets, and the acquisition of better aircraft, McEwen's leadership enabled No 6 Group to exceed the performance of comparable bomber groups in the air

and on the ground. In fact, from the time that Bomber Command was returned to Air Ministry control in September 1944 until the end of the fighting in Europe, the Canadian group could claim as good an operational record as any.

It is difficult to document the precise extent of the damage inflicted on the German war effort by Bomber Command. It was certainly substantial, particularly in the degree to which the strategic bomber offensive became a virtual second front before D-Day and before the Americans were heavily involved. However, in a pre-nuclear era, airpower alone could not strike a decisive blow, and postwar analysis showed clearly that the damage inflicted on the German war economy was never as great as hoped (and believed) at the time.

14

The Genesis of a Bombing Offensive, 1933–41

In November 1932, three months before Adolf Hitler rose to power in Germany, four years before the creation of the RAF's Bomber Command, and almost a decade before the first thousand-bomber raid, British Prime Minister Stanley Baldwin rose in the House of Commons and disclosed his fears about what might lie ahead. 'I think it is well,' he said, 'for the man in the street to realise that … whatever people may tell him … there is no power on earth that can protect him' from high-explosive, incendiary, and poison-gas bombs. A country's only hope, since there was no effective air defence, lay in offence; 'which means that you have to kill more women and children more quickly than the enemy if you want to save yourselves.'[1]

Baldwin's message, or at least his claim that 'the bomber will always get through,' made a profound impact on his audience. The main image of the speech, that of a single, cataclysmic attack capable of knocking out a city in one powerful blow, seemed realistic enough to those who had experienced bombing in the First World War (albeit on a small scale) and understood how greatly aircraft technology had advanced since then. It also reflected conventional wisdom within the Royal Air Force which, shaped by Sir Hugh Trenchard, maintained that a powerful air attack launched against the enemy's war economy would produce such crushing damage to both material resources and civilian morale that the opponent would have to sue for peace.

The doctrinal legacy of this 'knock-out blow' was reiterated in more practical terms by Trenchard's successor as chief of the air staff (CAS), Sir Edward Ellington, when he examined the threat posed by the rise to power of Adolf Hitler and the establishment of a National Socialist regime in Germany. Concerned about the vulnerability of the United Kingdom to air attack, should the Germans ever gain airfields in Holland and Belgium, the CAS urged the creation of a strong force of bombers as the best guarantee of Britain's security; and, for the moment, the government agreed. A separate Bomber Command was formed in July 1936, with its headquarters at High Wycombe, some thirty miles west of London.[2]

A series of revisions to the July 1934 expansion scheme came and went as the air staff and the Cabinet struggled to arrive at a bomber strength able to deliver a 'knock-out blow' without bankrupting the Treasury – the staff basing

their calculations on purely military requirements while the statesmen (who, of course, had the final say) tried to balance political, economic, and military factors, usually to the detriment of the latter. Following the Munich Crisis of September 1938, Scheme M, calling for an all-heavy-bomber force of 1360 machines by 1941/2, became the final formal pre-war plan, but it soon had to be revised because of production and development problems involving almost every aircraft type. On 31 August 1939 the total striking force available for strategic operations was about five hundred machines; by mid-September, allowing for the formation of training groups and the dispatch of No 1 Group to France – where it would be primarily engaged in interdiction duties – it was only 349.[3]

Britain had gone to war on 3 September, a fact broadcast to the British public in the sad, flat, disillusioned voice of Prime Minister Neville Chamberlain. Within the half-hour, air-raid sirens sounded over London, prompting Lord Chatfield, minister for coordination of defence, to remark, 'My word, these chaps don't waste much time,' but no bombs fell. 'These chaps,' it turned out, were not bomber pilots of the Luftwaffe but rather Capitaine de Brantes, the assistant French military attaché, returning to London from Paris in his own aeroplane. The sirens sounded in Berlin as well, but there, too, it was a false alarm. Neither capital would be bombed until August 1940.[4]

That was certainly not the kind of air war envisioned by Lord Trenchard, Stanley Baldwin, or Sir Edward Ellington. So far as the German failure to bomb London is concerned, it is clear now, with historical hindsight, that it was contrary to German interests and intentions to conduct an *offensive à outrance* by air against any British city in September 1939. Hoping to fight a series of short, sharp, limited wars against each of his neighbours in turn, Hitler was eager to avoid a general European conflict. He did not regard Britain as a natural or necessary enemy, and the Luftwaffe, in any event, had evolved primarily to cooperate with the army. There was, of course, no good reason why British officials should have known the innermost secrets of German foreign and defence policy. It is evident, however, that they were predisposed to believe that Germany would launch a bombing offensive on London as soon as war was declared, largely because this was the mirror image of what the Air Ministry understood to be the proper application of air power. Furthermore, in October 1936 a joint planning committee had reported that the Germans would have much to gain by launching such an offensive. If poison gas were used along with high-explosive bombs, it was estimated that civilian casualties could reach 150,000 in the first week of war alone.[5]

The possibility that Baldwin's broken city might well be London, coupled with the delays in bomber production, produced a fundamental shift in British thinking in 1937 and 1938 which did much to ensure that Berliners, too, heard only false alarms on 3 September. Not only was Fighter Command to be built up as a shield, to ensure that the United Kingdom survived the first months of war, but, as a hedge against the failure of active air defence, Chamberlain sought an arrangement with Hitler to refrain from attacks against each other's civilian populations; when the prime minister met with the German dictator in

September 1938, at the height of the Czechoslovak crisis, he had already instructed the RAF not to bomb targets likely to put civilians at risk if appeasement failed and war broke out.[6]

Many in the RAF chafed at the prospect of conducting military operations with their 'gloves on,' as they liked to put it, but by November 1938 even diehard advocates of strategic bombing could see the merit of expanding Fighter Command at Bomber Command's expense now that Britain's defences were being bolstered by an early warning radar chain. Accordingly, the constraints on High Wycombe grew stronger. 'I feel I should make it quite clear,' an Air Ministry staff officer replied to a request for information on which German cities were most likely to suffer morale problems in the event of bombing, 'that there is no intention of bombing the civil population as such. Not only has it been definitely forbidden by the Government for political & humane reasons, but also from an operational point of view, which may conceivably carry more weight in war, indiscriminate bombing is a waste of effort.'[7]

It was in this context of limited war, conducted with limited means against limited objectives, that the air staff worked on specific operational plans, and when, on 3 and 4 September 1939, Bomber Command undertook to do what government policy allowed, the results were not particularly satisfying. Seven hours after Britain's declaration of war, twenty-seven Vickers Wellingtons and Handley-Page Hampdens were sent to search for German shipping off the Danish coast. None was found. The next day, fifteen Bristol Blenheims and fourteen Wellingtons were sent to attack German warships in and around Wilhelmshaven and Brunsbüttel. Ten crews failed to find the target, seven were shot down, and the damage done by the rest was negligible. The pocket battleship *Admiral Scheer* was hit by three or four bombs, all of which failed to explode, while the cruiser *Emden* was struck only because a Blenheim crashed into it. Not much to show for an operation which cost 37 per cent of the attacking force,* nor for an organization that, only three years before, had been formed with the idea of being able to destroy virtually an entire city in one day.[8]

The ineffectiveness of these operations might have been more excusable if the poor results could be attributed entirely to the technical limitations of bombsights then in use, but bombsights had nothing to do with bombs that did not explode or the ten crews that failed even to find Wilhelmshaven and Brunsbüttel. Their navigation errors reflected a lackadaisical approach to this subject that had plagued the Royal Air Force for many years. It was well known, for example, that most pilots found their way around England 'by map reading or following the proverbial railway line.' Yet despite flying in familiar and friendly skies by day, at least 478 forced landings had been made in 1937–8 simply because pilots had lost their way.[9]

* In accordance with Air Ministry reporting practices, unless otherwise stated (as is the case here, with the qualifying adjective 'attacking'), Bomber Command loss rates are calculated on the number of aircraft *dispatched* to the target, irrespective of whether they reached their objective or returned to base early for any reason whatsoever.

Air Chief Marshal Sir Edgar Ludlow-Hewitt, concerned that Bomber Command was prepared to operate only in fair weather, when it was most vulnerable, had complained bitterly about such low standards shortly after taking it over in 1937. He wanted his aircraft to be equipped with the radio-navigation aids and direction-finding devices commonly and routinely available to civilian flyers. He also demanded that his crews learn astro-navigation so that – somewhat optimistically – they could fly accurately by night; otherwise, he concluded, his command would remain 'relatively useless.'[10] Dr R.V. Jones, then assistant director of instrument research at the Air Ministry, agreed. He was 'astonished by the complacency that existed regarding our ability to navigate at long range by night. The whole of our bombing policy depended on this assumption, but I was assured that by general instrument flying, coupled with navigation by the stars, Bomber Command ... could find pinpoint targets in Germany at night, and that there was therefore no need for any such [radio navigation] aids ... I was not popular for asking why, if this were true, so many of our bombers on practice flights in Britain flew into hills.'[11] But despite the strong support of Sir Henry Tizard, the Air Ministry's scientific adviser, no progress was made on the provision of navigation aids, while the sextants required for astro-navigation (and designed to Air Ministry specifications) were only just coming into service in September 1939. Bomber crews were thus in no position to do any better than a year before, when Tizard had predicted that the best would be 'pretty certain' only 'of being within ... ten to fifteen miles ... of one's objective' on all but the brightest nights.[12]

Doctrine throughout the 1930s had anticipated that most bombing would be undertaken by day from about 10,000 feet. All bombsights then in service relied on bomb-aimers' (still officially 'observers') being able to see the target clearly enough to direct their pilots to the bomb-dropping point – that notional place in the sky which, when aircraft speed, attitude and altitude, wind velocity and direction, and the ballistic characteristics of the bomb were taken into account, promised a satisfactory hit. The technology required to solve this equation (any error in calculating just one value could produce spectacularly inaccurate results) was several years away, however, and even then it would offer only a partial solution. With the Mark IX bombsight, used by all but No 5 Group in 1939, a miscalculation of wind speed by a mere five miles per hour caused a bombing error of about one hundred yards. The alternative tachometric sight provided to No 5 Group did not require such exact calculations of wind speed,* but demanded dangerously straight and level flight (given the likelihood of opposition) and so was seen to offer little advantage over the Mark IX.[13]

Lack of appropriate gadgetry was not the only problem within Bomber Command. It was only in May 1939 that observers (usually groundcrew whose

* The average miscalculation of wind speed on operations, it turned out, would be about twenty miles per hour. The Mark XIV bomb sight used by most of Bomber Command after 1943 still had a bombing error of 330 yards for a fifteen-mile-per-hour windfinding error.

flying duties had been treated as subsidiary and secondary to their normal responsibilities) were accorded the status of specialists and began to receive advanced training, but war had broken out before many of them graduated.[14] Moreover, the absence of any effective opposition during interwar exercises meant that the survivability of a bomber force on operations had come almost to be taken for granted. The potentially devastating effect of anti-aircraft fire (or Flak) on aircraft flying in daylight at the preferred bombing altitude of 10,000 feet was more or less ignored, and it was assumed that speed would allow the new generation of fast bombers to pass through enemy defensive zones quickly enough to make it difficult, if not impossible, for pursuing fighters to catch up.

The Air Ministry had nevertheless concluded that bombers must have some defensive capability, and in 1933 it had pioneered the development of hydraulically operated turrets mounting multiple machine guns. The calibre of these guns had been selected five years before, after much deliberation. Having rejected very light machine-guns (.28-inch) because of their lack of punch, and cannon (20-millimetre and larger) because of their slow rate of fire and small beaten zone, the air staff ultimately chose the familiar .303-inch calibre weapon of First World War vintage rather than the new .5-inch. That was probably a mistake, and one that should have been recognised at the time. That an error might have been made was acknowledged in 1938, after it was learned that the Luftwaffe was adding armour to its fighters, but attempts to fit larger, heavier turrets, housing larger, heavier weapons, to aircraft designed to carry .303 calibre guns were unsatisfactory.[15]

Although Bomber Command was prohibited from attacking the interior of Germany, the first night operation over the Reich also occurred on 4 September, when ten Whitleys carried five million propaganda leaflets (code-named Nickels) to Hamburg, Bremen, and nine cities in the Ruhr – areas known to have had strong socialist or communist sympathies before Hitler came to power.[16] The lessons this operation taught about the physical rigours of long-distance night flights were valid for the whole war. Even without an enemy present, night-bomber sorties (which could not, in the 1940s, be flown at altitudes high enough to avoid bad weather) would be uncomfortable at best and dangerous at worst. On 27 October, for example, one crew reported that they 'experienced icing conditions at 1,000 feet, and ten-tenths cloud with sleet at 2,000 feet. Crystalline ice formed over the turrets, leading edges and cabin windows. At 10,000 feet the temperature was –22°C, the front turret was frozen and the trimming tabs jammed by ice … The cockpit heating system was useless, and everyone was frozen with no means of alleviating their distress. Some members of the crew butted their heads on the floor and navigation table in an endeavour to feel some other form of pain as a relief from the awful feeling of frost-bite …'[17] As a result, they 'felt incapable of cohesion of thought or action, and the rear gunner could not have resisted fighter attack. In any case his vision was totally obscured by ice on the turret.' Rather less was learned about the enemy's defences. Fighters attacked only twice, on 7/8 and 8/9

September, and the attacks were not pressed home, while Flak, considered 'heavy' at times, was not particularly effective, either. Only fourteen aircraft were lost at night between 3 September 1939 and 8/9 April 1940 – the start of the Norwegian campaign – and not all of those were due to enemy action.[18]

While crew comfort and the enemy's state of preparedness were obviously important factors in planning for future operations, the 'Nickelling' lesson that should have counted for most was that navigation by night was considerably more difficult than by day. Indeed, during the first weeks of the war navigation errors were to cause the British government considerable embarrassment as Bomber Command aircraft flew over, or crashed on, neutral Belgian, Dutch, and Danish territory and, on one regrettable occasion, shot down a Belgian fighter. These incidents led initially to an outright ban on further night-time leaflet operations and then, when this was lifted, to a carefully selected 'south-about' route into Germany which decreased the likelihood of British aircraft overflying neutral territory, but which also increased the time spent over the enemy's defences. Although the Air Ministry soon withdrew these restrictions, it continued to prohibit Nickelling west of Saarbrucken, Frankfurt, Paderborn, and Bremen in order to avoid accidental incursions into France and the Low Countries. Accidents still happened, however, and as late as 27 March 1940 an Armstrong-Whitworth Whitley of No 77 Squadron was shot down over Rotterdam by a Dutch fighter. One of the crew was killed and the remainder (including Flying Officer W.P. Coppinger, from Cadomin, Alberta) were interned until the German assault on Holland six weeks later brought about their release.[19]

Lack of basic navigation skills was only part of the problem. Before the war, the air staff had been confident that not only whole cities, but also specific objectives within them could be seen by night from safe bombing altitudes. In particular, the planners assumed that crews should have little difficulty identifying so-called self-illuminating targets like steel mills and oil refineries, or those that lay near prominent geographical features such as rivers and lakes. The experience gained from Nickelling proved otherwise. On clear nights, from 12,000 feet and above, they could barely discern relatively large towns or bodies of water, while roads and small villages could be distinguished only below 6000 feet. Large factory-type buildings (which would be the targets of precision attacks) stood out only below 4000 feet, a suicidal height at which to fly in the face of Flak.

Target-finding at night might yet be practicable, it was suggested, if crews made a timed run to the aiming point from a known landmark, but for the moment that remained an unrealistic proposition. For one thing, the air staff still doubted whether the requisite degree of bombing accuracy could be achieved in cloud (the characteristic winter weather pattern) or when there was no moon. For another, although German air raids on Warsaw and other Polish cities had arguably freed Britain from its promise to US President Roosevelt to refrain from 'the ruthless bombing … of civilians in unfortified centres,' because of the threat of retaliation the British government was not about to authorize attacks likely to cause non-military casualties even if they were

unintentional. Daylight operations, meanwhile, continued sporadically (and largely ineffectively) against German naval forces.[20]

The muted response to Nickelling was appropriate to the threat, but it also reflected the fact that the Luftwaffe, like the RAF, had anticipated that strategic bombing would be carried out by day and had set its priorities accordingly. Thus, while its prewar doctrine had at least addressed the problem of night defence – the intention being to rely principally on Flak, supplemented by searchlights and fighters in a number of well-defined zones – the concept could not be implemented effectively.* Priority had been given instead to the expansion of the day-fighter arm, so that of the eleven specialist night-fighting Geschwader authorized on 24 June 1939, only seven had been formed before the outbreak of war and all of them were subsequently assigned to daylight operations. The need for a night-fighter arm was reconsidered in October, but when it was re-established only three Staffeln were formed, on Me 109s and Me 110s. There seemed little point in committing more men and machines to the task when the enemy was only dropping paper.[21]

The Air Ministry accepted this 'phoney war' in the air because it allowed the further strengthening of Fighter Command while High Wycombe was not forced to 'lead trumps from a short suit.' On 22 November, however, under pressure from the Cabinet, the air staff told Ludlow-Hewitt to give priority to the German fleet and to attack it in strength, by day. The first such raid was launched on 3 December, when twenty-four Wellingtons were sent in clear weather to the Heligoland Bight, where they attacked two German cruisers, eight merchant ships, and a number of smaller vessels. One cruiser and one merchantman were reported hit, and a minesweeper sunk, with no loss to the bomber force despite the appearance of several enemy fighters. Indeed, one Me 109 was believed to have been shot down. A second raid was launched on 14 December, when twelve Wellingtons discovered a battleship and a cruiser near the mouth of the Elbe. The cloud base at 800 feet precluded any bombing but did not hinder the efforts of German fighters, which accounted for five of the Wellingtons.[22]

The results obtained four days later were even more discouraging because of the restrictions that still limited what could be bombed, despite Whitehall's insistence that the German fleet be attacked in strength. In perfectly clear skies, twenty-four Wellingtons sent to patrol the German coast found three large warships and four destroyers at Wilhelmshaven and made a good pass over the target. The ships were too close to shore and potential civilian casualties for the attack to proceed, however, and no bombs were dropped. The nearly one hundred enemy fighters in the area, well positioned to intercept because of the warning provided by Freya radar stations on the Frisian Islands, faced no such constraints and, in an entirely unequal contest, they shot down twelve of the Wellingtons. Anti-shipping searches continued into the spring of 1940 but,

* In September 1939 the Flak service accounted for about one-third (107,000 officers and men) of total Luftwaffe strength, and was equipped with 2600 heavy anti-aircraft guns (88 mm) as well as 6700 light and medium guns (20- and 37 millimetre). The lethal range of an 88 millimetre shell burst was about thirty feet, for about 1/50th of a second.

unless there was good cloud cover, crews were told to stay away from the German mainland. Losses were negligible, just ten of some 650 sorties (about 1.5 per cent), but so were the results. Few ships were sighted and only one, U-31 (a type VII-A ocean-going submarine), was sunk.[23]

By early 1940, then, British planners were in an understandable quandary. Maritime patrols were producing very little result, while daytime operations near German ports involved unacceptably high casualties. The loss rates likely on raids further inland could only be imagined. Meanwhile, even the most enthusiastic proponents of precision night attacks were beginning to admit that their bomber crews could not win the 'never-ending struggle to circumvent the law that we cannot see in the dark.' As a result, the chief navigation officer at High Wycombe concluded, the most that could be expected of astro-navigation (and even the radio aids then under investigation) was to give pilots a general idea of where their targets were.* Neither would direct a bombing force to a specific aiming point.[24]

Looking to the future, but persuaded that Bomber Command required additional time to build up its strength, the air staff now began to argue that the focus of bombing should shift from producing physical damage, which required sustained and intensive operations and demanded more accuracy than Ludlow-Hewitt could guarantee, to lowering enemy morale, which it wishfully thought could be accomplished by as few as two hundred sorties a week. The idea was to dispatch small numbers of aircraft (perhaps no more than thirty) to Germany each night, dispersing them in time and space through as many air-defence zones as possible and setting off almost continuous alarms over the whole Reich. This would upset the 'nerves and digestion' of the German population and might eventually make living conditions so unpleasant that those employed in the war industries would be 'loth to continue at work.'[25]

Momentous results were not anticipated from such an approach in anything but the long term. If real, rather than psychological, damage was to be done, and done quickly, target intelligence suggested that oil was the weak link in the German economy, Russian and Romanian supplies notwithstanding. The destruction of just one major refinery would have a direct impact on the German war effort, while neutralizing the twenty-two largest facilities (of which fifteen were less than 150 miles from the North Sea coast) 'might well prove decisive.'[26]

Hoping for the best, and anticipating that the gloves would eventually come off, the then CAS, Air Chief Marshal Sir Cyril Newall, approved the oil plan in principle on 22 February 1940, and Bomber Command began the slow process of converting to a night-bomber force. After 6 March, crews from Nos 3 and 5 Groups joined those of No 4 Group on Nickel and reconnaissance flights and their training in night operations was accelerated. As this happened, Ludlow-Hewitt became increasingly optimistic about what they might achieve and on 25 March reported that, with experience and practice, his force should

* In late September 1942 it was estimated that astro-navigation would, at best, bring crews within twelve miles of the target.

be able to fulfil 'the major destructive part of our plan by precision bombing at night,' while targets in the Ruhr could be dealt with 'if necessary in quite a leisurely manner by night, taking advantage of suitable weather conditions.'[27]

It all seemed so easy, but beneath the surface there was reason for concern. When Ludlow-Hewitt left High Wycombe in April 1940 his replacement, Air Marshal C.F.A. Portal (who would be knighted in July), was far from convinced he could accomplish the task. Speaking for his new staff, 'our general opinion,' he told the CAS, 'is that under war conditions the average crew of a night bomber could not be relied on to identify and attack targets at night except under the very best conditions of visibility, even when the target is on the coast or on a large river like the Rhine. Under the latter conditions about 50% of the average crews might be expected to find and bomb the right target in good visibility; if the target has no conspicuous aids to its location, very few inexperienced crews would be likely to find it under any condition.'[28] Furthermore, it was not certain that the introduction of navigation aids would markedly improve the situation because of the 'poor type' of individuals selected to be observers over the previous few years.[29]

A reason to lift the restrictions on bombing came on 8–9 April 1940, when Germany invaded Norway and Denmark. Indeed, the day before Hitler moved, Sir Richard Peirse, deputy chief of the air staff (DCAS), had urged the opening of an air offensive to prevent what he regarded as Germany's next gambit – securing bases in the Low Countries in order to move the Luftwaffe closer to its targets in England and to provide air defence in depth for the Ruhr. The deputy director of plans also urged action. 'We know the brittleness of German morale,' he pointed out with quite unjustified optimism, and so should begin night operations 'directed towards the moral and psychological factor.' The three service chiefs also agreed with Peirse but cautioned that the government might yet be reluctant to unleash an air offensive while Britain had not been bombed.[30] They were right: the political restrictions remained in force throughout the Norwegian campaign.

Nor did the Blitzkrieg against France and the Low Countries, long regarded as the likely signal for expanding the air war, bring about an immediate change. Again concerned that Britain was throwing away an important advantage, the DCAS implored his superior, Newall, to find a way to free High Wycombe's hand. Even if Holland were lost, he explained, the Allied armies might yet 'stabilise a line in Belgium,' and an attack on the Ruhr before the Luftwaffe had built up its defences in the Netherlands might yield significant moral and physical results. The War Cabinet took up the issue the next day, but thought it was not yet propitious to begin bombing German targets. Chamberlain and Lord Halifax continued to worry about the German threat to Britain's aircraft factories and aerodromes, and on this issue they were supported by the new secretary of state for air, Sir Archibald Sinclair, and the CAS, both of whom emphasized the weakness of Fighter Command in the face of German forces operating from Dutch airfields. The new prime minister, Winston Churchill – he had succeeded Chamberlain on 10 May – was also persuaded. 'We should not allow our heavy bomber force to be frittered away and

thus deprive ourselves of its principal deterrent effect, and of the ability to deliver its heavy blow.'[31]

The perfect irony of the situation, and of these remarks, was apparently lost on everyone concerned. That the Germans were in Holland, and held Dutch bases, clearly demonstrated that they had not been deterred by the threat of aerial attack. Indeed, the only people who had been deterred – from carrying out their own air plan – were the British themselves. On 15 May, however, with the Germans pouring west from Sedan (and following the Luftwaffe's bombing of Rotterdam the day before), the gloves finally came off and High Wycombe was authorized to attack oil refineries and railroad targets east of the Rhine. The first raid occurred that night, when nearly a hundred bombers were sent to sixteen different targets in the Ruhr. Only one aircraft was lost, but the bombing was quite futile – one dairyman killed in Cologne, and two people wounded in Münster.[32]

Two nights later, forty-eight Hampdens bombed Hamburg and twenty-four Whitleys attacked Bremen, looking for oil refineries, while six Wellingtons bombed Cologne's railway yards. Fires were started in Hamburg and Bremen, and forty-seven people were killed; but in Cologne, as elsewhere in the Ruhr, damage was inconsequential. 'We drove through many of the Ruhr centres … the Allies were supposed to have bombed … the last few nights,' an American radio correspondent observed on his way from Berlin to the Western Front on 19 May. 'We naturally couldn't see all the factories and bridges and railroad junctions … but we saw several, and nothing had happened to them. The great networks of railroad tracks and bridges around Essen and Duisburg … were intact. The Rhine bridges at Cologne were up. The factories throughout the Ruhr were smoking away as usual … The British have failed not only to put the Ruhr out of commission, but even to damage the German flying fields.'[33]

Oil refineries and factories, even if they could be hit, were objectives unlikely to have any immediate effect in stemming the German Blitzkrieg and, after a quick visit to France, when he saw at first hand the look of defeat, Winston Churchill ordered the Air Ministry to shift its attack to the Wehrmacht's lines of communication. The density of Western Europe's sophisticated transportation networks meant, however, that unless a dozen or more key nodal points could be destroyed simultaneously – something High Wycombe could hardly hope to do – alternative routes would always be available to the enemy. Knowing this, Portal argued that the bulk of his force should continue its longer-term campaign against the Ruhr, but the directive he received from the Air Ministry on 19 May was unequivocal. Although oil remained on the target list, the railway marshalling yards supporting the German advance were the first priority during this 'critical week.'[34]

Once the last remnants of the British Expeditionary Force had left Dunkirk and the Germans had turned towards Paris and the southwest, Portal was directed to 'give priority to operations in support of the French land forces.' Oil remained the main strategic objective, with aircraft factories in major cities as the recommended alternative on dark nights, but he was warned that these raids were not to 'degenerate into mere indiscriminate action.' They did,

although not by design. Industrial haze over the Ruhr and poor navigation by many crews (who, in a continuing effort to spread the alarm, made their own way to the objective by whatever route they preferred) meant that many targets were never identified. German records reveal that 70 per cent of the bombs dropped fell on open countryside.[35]

The fall of France simplified High Wycombe's war, for there was no longer any need to support the army in the field. There were also complications, however, since no one was quite sure how to employ Bomber Command in a defensive struggle for survival. What were the best targets? The Luftwaffe and its bases? Maritime invasion preparations – a target that, in the event, cost Bomber Command some fifty aircraft between June and October? The German aircraft industry? Oil? Or, given doubts about the willingness of British workers to 'carry on in the face of wholesale havoc and destruction,' enemy morale? Moreover, against which of these targets could it operate most effectively? And if Britain was *in extremis*, battling to survive, should the whole strength of the command be thrown into the fray now, against uncertain results, or should it be conserved for better days to come?

At the end of June the Foreign Office was uncritically quoting 'reliable sources' to the effect that the British air raids launched so far against Germany were 'creating havoc and causing panic among the civil population.' People were living in a state of 'acute nervous tension,' it was said, and 'sleepless nights' were having the desired effect on industrial production. Nerves were so frayed that workers had 'begun to imagine and take refuge from non-existent aircraft during the day, as well as at night.' Perhaps, then, an all-out campaign against German industrial centres, putting aside the question of civilian casualties, might have a significant impact on morale and save Britain from invasion.[36]

From 19 June to 13 October High Wycombe received six directives from the Air Ministry (four arrived before 24 July), each of which set down new priorities and methods of attack. These directives reflected changing appreciations of the greatest threat facing Britain, the choices alternating between air raids and invasion, and they established the target lists accordingly: aircraft assembly plants; aircraft storage facilities; airfields in Holland, Belgium, and northwest France; oil; and barges and troopships in the German-held Channel, North Sea, and Baltic ports. Despite their differences, however, these directives had one thing in common: they all provided lists of specific objectives. That issued on 13 July, for example, limited the main effort to fifteen factories and plants, ten of which were related to the aircraft industry and five to oil.[37]

High Wycombe was not happy with any of the new directives. Convinced, still, that his crews could not find and destroy precise targets, Portal asked permission in mid-July to make for the larger industrial towns instead in order to 'undermine morale.'[38] His request was denied, the Air Ministry insisting that material destruction had to be the 'primary object,' but when the Luftwaffe accidentally bombed central London on 24/25 August, Prime Minister Churchill demanded immediate retaliation. About fifty crews were sent to Berlin the next night; six were lost and the bombing, carried out through fog,

was as inaccurate as ever, with most damage occurring to farmland south of the capital. Within the city itself, they managed to destroy one wooden summer house and to injure two people. The Germans bombed London again the following day, deliberately this time, but the air staff, trying to avoid a tit-for-tat campaign, selected industrial targets in Leipzig as Bomber Command's next objective. That was not good enough for the prime minister, however, who believed that since the Germans had begun to 'molest' London, it was time to 'hit them hard, and Berlin is the place to hit them.'[39]

Inch by painful inch, both British and German bombing policies were slipping from ones aimed at precise objectives to ones of area bombing with psychological overtones. On 2 September, for example, Portal observed that although he was not yet involved in attempts to burn down whole towns, 'that stage would come.' The next day Churchill asked that Bomber Command 'pulverise the entire industry and scientific structure' of the German war economy; and, three days later, he called for a series of 'minor' but 'widespread' attacks on smaller German towns intended to destroy the civilian population's faith in their air defences. Portal responded with a list of twenty such places and urged that it be made public in order to provide a clear statement that, 'as a reprisal for each night of indiscriminate bombing by the enemy, one of these towns would be selected for indiscriminate bombing by the RAF.'[40]

For the moment, Newall was neither persuaded by Portal nor cajoled by Churchill. But when the Germans dropped thirty-six large and powerful mines on London by parachute, a method of delivery which obviously precluded any attempt at aiming, the prime minister again demanded retaliation. Although he made it clear that he understood it was better to 'concentrate upon limited high-class military objectives,' he asked that Berlin also be attacked with aerial mines. Recoiling at the prospect of engaging in 'indiscriminate frightfulness,' the air staff pleaded that Berlin should be attacked with bombs, not mines, and that High Wycombe should be directed to aim for useful targets like 'the few great power stations' situated in the German capital. The bombing directive issued on 21 September reflected this advice and, when Berlin was attacked, two nights later, the 129 aircraft dispatched were sent to eighteen specific objectives. On 30 September the discontented Portal again made the point that since his crews could not reduce the enemy's means to fight, their efforts should be focused 'primarily against the will of the German people to continue the war' and should thereby meet what his biographer has called both the 'tactical' and the 'emotional' need of the hour. The air staff, however, still did not agree that the German people should become the primary target. Nor did the secretary of state for air, who argued that nothing would be achieved through what he called 'promiscuous bombing';[41] but Sinclair was never a man to press unpopular views in the corridors of power.

As AOC-in-C, Portal had a perfect right to be heard on matters affecting the employment of his command, but he had no reason to assume that the CAS would accept and follow his advice, particularly where it strayed into the realm of high policy. He was not without influence, however, of a powerful, if

unofficial, kind. Churchill cultivated an informal process of seeking and expressing opinion outside the formal chain of command, and Chequers, the prime ministerial country home, lay only a few miles from High Wycombe. At least once, in mid-July, Churchill took advantage of a visit by Portal to broach the subject of bombing Berlin, an idea that the latter enthusiastically endorsed.[42]

The extent to which Portal's opinions had weight through this process depended, nevertheless, on Churchill's willingness to dictate to the Air Ministry and the air staff; and that, for all his dabbling in target selection, the prime minister did only rarely. On 4 October, however, having properly impressed his truculent master, Portal was appointed chief of the air staff, *vice* Newall; and the next day Sir Richard Peirse, who had sided with Portal and Churchill on the question of attacking cities during the winter, moved to High Wycombe as AOC-in-C Bomber Command. There were now two officers in key appointments who favoured the idea of carrying the war directly to the German civilian population, with the senior of them, at least, in intimate contact with the prime minister. When Portal now made more widely known his desire to attack industrial areas as often as possible and (following the example of the Luftwaffe's attack on Rotterdam) to make 'the maximum use of fire' during these raids, no one objected. Oil would be the top priority on moonlit nights, but on darker nights Bomber Command was to 'make a definite attempt … to affect the morale of the German people.'[43]

The new offensive, which began immediately, was soon under fire from Churchill for its lack of intensity. It was a 'scandal,' the prime minister complained, 'that the discharge of bombs on Germany is so pitifully small … even on good nights' because so few bombers were available. It was also beyond comprehension, he added, that suggestions he had made to improve the situation were being ignored. 'If, instead of simply turning all these down, you and the Secretary of State recognised the need of increasing the bomb delivery and set to work to contrive the means of doing so, it would be a very great help.' Portal lost little time passing on this complaint to High Wycombe. For his part, Peirse reassured the CAS on 13 November that he would not only try to send a large number of bombers to Berlin carrying the largest available bombs, but also that he would 'pick out targets well and evenly spaced … in an attempt to ensure that the whole city receives some weight of attack.'[44] Clearly, if the spread of attack was so significant, non-industrial damage and civilian casualties were being seen as the direct objectives of Bomber Command's operations, and not merely as by-products of raids on military targets and war industries.

At this stage of the war, the adoption of a bombing policy aimed at German morale through attacks on built-up areas reflected, by and large, an assessment of what Bomber Command could do best, precision bombing being clearly beyond its competence. But there was also an emotional element to policy-making, tied to public demands and fed by the media, that the RAF must respond in kind to the bombing of British cities. If any excuse were needed on this score, it was provided by the German attack on Coventry on 14/15 Nov-

ember and by subsequent raids on Bristol and Southampton. Planning for the retaliatory Operation Abigail, designed to cause maximum damage to a selected German town, began almost immediately, but because of poor weather it did not take place until 16/17 December. One hundred and thirty-four aircraft were sent to bomb the centre of Mannheim – the first occasion when a raid was designed to open with an incendiary attack and follow-on crews were told to bomb whatever fires they saw – and results seemed to be good. About three-quarters of the crews reported having found the city, and 'dense black smoke' was everywhere.[45]

The first campaign against German cities was over almost as soon as it began, however, despite Ministry of Information assurances that the enemy would 'not stand a quarter of the bombing' endured by the residents of British cities. Because of operational and training losses – mainly the latter – the front-line strength of Bomber Command had fallen by a quarter in September and October and it now needed some nursing. Moreover, most operational losses had occurred in the bad weather usually reserved for morale attacks on non-specific objectives, and it seemed sensible, therefore, to restrict operations to clear nights, when precise targets might be bombed successfully. Photographic evidence from Mannheim reinforced this view, proving that the damage to the city was much less than claimed by the crews involved and calling into question the utility of area raids. The most compelling argument for switching objectives came from a special committee struck to analyse the enemy's fuel situation, which, that same 16 December, issued a grossly optimistic report suggesting that the meagre effort (6.7 per cent of sorties to date) made by Bomber Command against Germany's synthetic oil plants had actually done significant damage.[46]

Although photographic evidence available a week later showed that recent attacks on refineries at Gelsenkirchen had, in fact, failed, the special intelligence committee was inclined to believe what it wanted to believe and to ignore any contrary indications. Germany was not only facing a fuel crisis, it said, but her oil industry was extremely vulnerable to attack. Momentarily persuaded that something useful could be achieved, Portal bent with the wind and outlined a bombing program aimed at knocking out Germany's seventeen largest synthetic oil plants and restricting attacks on area targets to those nights when the weather was bad. Notwithstanding its own reservations about the importance of synthetic oil to the German economy and doubts about the vulnerability of refineries (and despite continuing and legitimate concern over German naval strength), the War Cabinet gave its approval to the new program. On 15 January 1941 Sir Richard Peirse was informed that oil was 'the sole primary aim' of his offensive.[47] Even aerial mining, a subsidiary task for Bomber Command since the war began, was removed from the bombing directive.*

* It was reintroduced, at the Royal Navy's insistence, ten days later, but only for inexperienced crews or to test out new bomber types before they became fully operational.

Try as he might, the AOC-in-C had difficulty complying with the new policy. Bad weather in January and February restricted operations against oil targets to three nights, while industrial targets were bombed six times, ports five, and miscellaneous naval objectives nineteen times. Never a genuine or a strong proponent of an oil offensive in the first place, and satisfied it was not a practicable objective, Portal now cast about for an alternative, telling Peirse not only that he preferred to return to mass attacks on industrial areas, but also that if the attack on oil was suspended 'we have the consolation of not having wasted much on it since the Cabinet decision.' The CAS then informed his fellow service chiefs that while it was 'virtually impossible for a pilot to select and bomb a particular object on a dark night or in bad weather,' it had 'been proved that even under adverse conditions of weather and enemy activity an *area* can be attacked with success.' By now Peirse did not agree, arguing still that oil targets should and could be destroyed, but at least one of his group commanders was not so sure. Only 'the most obvious targets' had been hit hard, Air Vice-Marshal J.C. Slessor recalled, and then only 'on the clearest moonlight nights.'[48]

In early March, however, with an alarming increase in Allied shipping losses, the prime minister directed that air attacks concentrate on U-boat bases and construction yards. Portal did not like being told to pull the Admiralty 'out of the mess they have gotten into,' but the directive he issued on 9 March complied fully with Churchill's instructions. Coastal cities like Hamburg, Kiel, and Bremen, as well as several French ports, would bear the brunt of bombing until mid-summer, and Bomber Command's contribution to the aerial mining campaign, abandoned just a few months before, would be intensified. Steps being taken to improve performance now assumed a new importance. Instead of allowing crews to make their own way to the target, for example, group staffs were beginning to lay down set courses and timings aimed at increasing the number of bombers over the objective at any one time. (No 4 Group tried for a hundred bombers an hour, No 3 Group for two to three dozen.) There was also a push to accelerate development of radio and radar aids to navigation, although for the moment this met with apathy on the part of the Air Ministry and 'the union of navigators,' which High Wycombe's radar officer found 'remarkably conservative about adopting new ideas.'[49]

At the same time, bomber protection and the German air-defence system were finally being accepted as important and worthwhile areas of investigation. Until the end of 1940 recommendations to improve armament and add armour plating had been dismissed out of hand, the planners at the Air Ministry declaring that bombloads could not be sacrificed and that it was not the business of bombers to engage fighters in combat because the contest could never be made equal. Indeed, they went so far as to argue that crews caught by fighters (and, of course, surviving the encounter) should be told that 'their tactics were faulty.'[50] As the number of bombers being shot down increased, however, British intelligence intensified its effort to unravel the mystery of the air-defence organization established by General Josef Kammhuber, then commanding the Luftwaffe's sole Nachtjagddivision but soon (in August) to become

GERMAN NIGHT FIGHTER DEFENCES
AND BOMBER COMMAND

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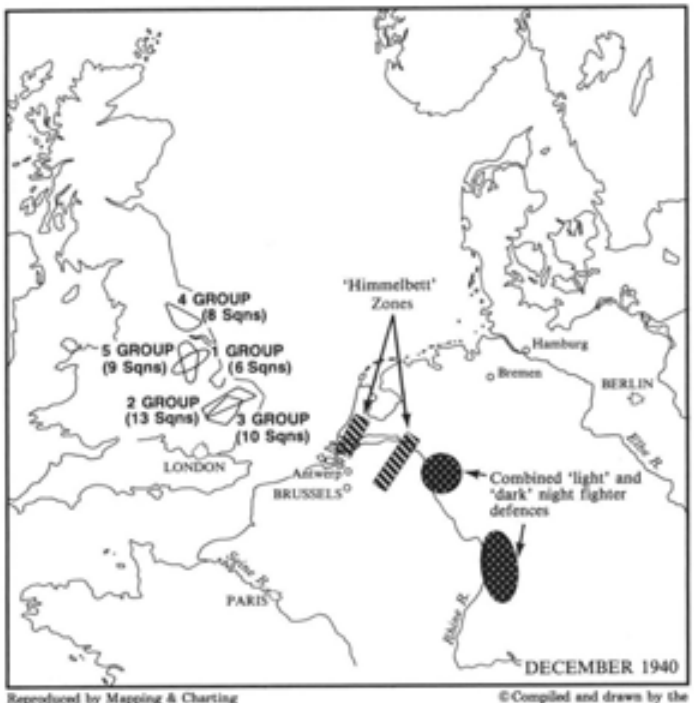
General der Nachtjagd and commander of an expanded, all-night-fighter XII Fliegerkorps.

Much was known already. A network of Freya radar stations on the North Sea coast provided early warning of the approach direction (but not height) of aircraft out to a distance of one hundred miles and passed this information on to a series of combined night-fighter/searchlight 'boxes,' ranging between twenty and forty miles wide and sixty miles deep, established behind the Zuider Zee and along the Rhine. On receipt of a Freya warning, the fighter assigned to each box was scrambled to patrol its allocated air space until the searchlights illuminated a bomber, when interception could begin – a technique Kammhuber called Helle Nachtjagd, or 'illuminated night-fighting.' Behind these boxes lay a Flak zone which, early in 1941, was just beginning to be assisted by Würzburg gun-laying radars.[51]

Once this essential structure was analysed, patterns could be discerned: losses to fighters were highest on clear nights; lowest on cloudy nights and outside the searchlight zone; and unaccountably rare above 14,000 feet, even though this was well within the range of grouped searchlights. As a result, High Wycombe began to introduce counter-measures. Routes were planned, when practicable, to skirt Kammhuber's line or to take advantage of gaps identified in it; and pilots were told to bomb from 16,000 feet, a height from

GERMAN NIGHT FIGHTER DEFENCES
AND BOMBER COMMAND



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which it was felt – optimistically, it turned out – they could still see specific objectives on the ground. When deep penetrations were required, it was also recommended that pilots make maximum altitude over the North Sea, dive through the defensive Flak and fighter belt at best possible speed, and then regain height in the German interior, where defences were weaker.[52]

Unhappy with the futile effort to destroy specific objectives, the air staff and the secretary of state for air began in April 1941 to exert subtle but continuous pressure on the prime minister to resume area raids and to enlarge Bomber Command, so as to 'raise the intensity of our bomber offensive … to an intolerable pitch.' It was not until 9 July 1941, however, that a new bombing directive was issued which, following 'a comprehensive review of the enemy's … political, economic, and military situation,' disclosed that 'the weakest points in his armour lie in the morale of the civilian population and in his inland transportation system.' From that date, Germany would be attacked more often and with greater intensity. The number of medium and heavy bombers in squadron service would rise from 388 in March 1941 to 449 in July and 549 in December, and consideration was being given to expanding Bomber Command to 168 heavy, six medium, and twenty light bomber squadrons.[53]

Canada's part in this growth was considerable. In the beginning, the Canadian contribution had been limited to the efforts of the relatively small number of individuals who had joined the RAF in the 1930s, some of whom had been involved in the earliest raids. On 1 March 1941 the first RCAF pilot graduates of the British Commonwealth Air Training Plan (BCATP) arrived overseas, joining thirty-seven observers who had come at the end of November 1940. By mid-April 1680 Canadian graduates were in England, the vanguard of many thousands who would serve with Bomber Command and, in fact, account for at least a quarter of its aircrew strength.[54]

The initial RCAF overseas bomber squadron, No 405, was formed at Driffield, Yorkshire, on 23 April 1941. Allocated Wellington Mark IIs powered by Rolls Royce Merlin Xs, the squadron was assigned to No 4 Group, whose Whitleys were fitted with the same engine. The second squadron, No 408, was formed two months later, on 24 June. Equipped with Hampdens, it was assigned to No 5 Group, which also flew Hampdens, and based at Lindholme, also in Yorkshire. The creation of these two squadrons within six months of the Ralston-Sinclair Agreement (see chapter 1) gave relatively quick recognition to Canada's role in the bomber offensive, but it also required certain concessions. While Ralston had accepted that squadron and flight commanders would probably have to come from the RAF, the orders authorizing the formation of Nos 405 and 408 stated that a majority of the aircrew would be British as well, at least at the outset.

Squadron records confirm that situation. On 18 June 1941 only 16.5 per cent of the pilots in No 405 were Canadian, and of these more than half were Canadians in the RAF. One reason for this composition was that No 405 Squadron was the only Wellington unit in an otherwise Whitley group, and it took some effort (and intergroup cooperation) to winkle RCAF trainees out of No 3 Group's Wellington Operational Training Units (OTUs). Once advised of the problem, however, High Wycombe promised to intervene and apparently did, for in August 45 per cent of the aircrew were identified as Canadian (either Can/RAF or RCAF) and by late fall the RCAF content had risen to 53 per cent. In No 408 the earliest Canadianization figures available show 25 per cent of aircrew positions held by RCAF personnel. Groundcrew and tradesmen figures were considerably lower, and in their first few months the overall RCAF component on both squadrons rarely exceeded 5 per cent.[55]

Flying was the most important element in preparing a squadron for operations: local flying to familiarize pilots and navigators with the regional geography so they could return to base with confidence after long, arduous night operations; cross-country flying to improve navigation and crew cooperation in general; and fighter affiliation exercises – simulated combat manoeuvres – to increase the chances of surviving Flak and night-fighters. The hours available to achieve this practice depended, of course, on the weather, about which nothing could be done, and also on the supply and serviceability of aircraft, both of which could be managed.

It took almost a month before No 405 had twelve Wellingtons, all apparently new machines, but by the end of May none was fit to fly 'owing to nacelle

bearing weakness.' The necessary repairs had been made by 3 June, but the next day two other machines undergoing modification were lost, one being burnt out completely following a Luftwaffe raid on Driffield. Replacements arrived the next day, but then all twelve machines were again declared unserviceable, this time because of additional defects in the engine mountings. It took five days before the first four could be modified and repaired, and only seven had been fixed by 11 June. As a result, from 6 May to 11 June, the day before the squadron's first operations, flying had occurred on only seven days. In No 408, in contrast, where Hampdens began to arrive on 10 July, there were few interruptions in flying training due to unserviceability.[56]

Serviceability also depended on the expertise, experience, and efficiency of the groundcrews. At this early stage of the war there was no great pool of experienced servicing personnel in either the RAF or the RCAF, so although new squadrons were provided with a nucleus of trained mechanics and technicians, many were posted in directly from training schools. These men could not be expected to cope effectively with all the problems likely to be encountered in maintaining complex and sophisticated systems under operational conditions. Initially, at least, their presence could be cause for some misgivings. The commanding officer of No 408 Squadron was horrified when he learned he would lose a number of RAF tradesmen as soon as their RCAF replacements arrived, and he protested immediately. In all their training the in-coming Canadians had never worked on Hampdens, he explained, and they were therefore totally unfitted to assume immediate responsibility for maintenance. In the event, the British tradesmen remained with No 408 for two more months, combining their normal duties with the on-the-job training of their RCAF colleagues.[57]

The process of working a new squadron into shape would have been easier if it had remained in one spot. Both Canadian squadrons had to move a month or so after their birth, however, which meant changing over workshops and food services, shifting records, and reorganizing quarters. The moves also interrupted flying training. Of the two, No 405 probably suffered most because, when it left Driffield, it was quitting a permanent, prewar station with all the amenities and comforts provided for the peacetime RAF, while Pocklington, the squadron's new home, had only been opened in June 1941 and the Canadians were its first operational tenants. Nissen huts, built of prefabricated corrugated iron on a concrete base, were the order of the day, and they were cold and damp for much of the year. The 'dreary camp,' John Searby recalled, was 'not a comfortable billet.' Lindholme, No 408's first station, had opened in June 1940, a year before the Canadians arrived. Syerston, in Nottinghamshire, their next billet, was 'wedged between the main A 46 road and the River Trent,' and dated from December 1940.[58]

The crucial factor in operational training, particularly in light of the inconveniences and difficulties noted above, was that the squadrons have experienced senior officers. No 405's first commanding officer was Wing Commander P.A. Gilchrist, who had joined the RAF in 1935. A veteran of No 4 Group's night operations in Whitleys, he had already been awarded the Distin-

guished Flying Cross 'for gallantry and devotion to duty.' Wing Commander N.W. Timmerman, DFC, who had enlisted a year later and was already a veteran of fifty bombing operations, went to No 408. Each understood the importance of having experienced flight commanders. Timmerman recalls that he spent some time 'persuading 5 Group Headquarters to pry loose two flight commanders, RAF-Canadians like myself, from their units.' Gilchrist was also successful in acquiring experienced Can/RAF flight commanders.[59]

No 405 Squadron's first operation came on the night of 12/13 June 1941, when five aircraft were detailed to bomb the railway yards at Schwerte, a small industrial town in the southeast corner of the Ruhr.* As was common in new squadrons, servicing and maintenance problems reduced the scheduled scale of effort. One crew did not take off owing to radio failure and blown fuses, while another, encountering engine problems en route, turned back, jettisoning its bombs east of Groningen in Holland. This was contrary to rules – except in the direst of circumstances, bombs were not to be dumped on occupied Europe – and may have reflected nervousness and uncertainty when confronted with the ordeal of flying over enemy territory for the first time. The three crews who reached Schwerte did so at altitudes between 7500 and 10,000 feet and reported they had bombed the target area, 'bursts being seen and fires observed.' However, they also admitted that 'results were difficult to assess owing to ground haze.' The thirty-eight crews sent from other squadrons (there were also raids on Soest, Hamm, Osnabrück, and Hüls) reported much the same. Some, having difficulty even finding the target area, resorted to bombing on their estimated time of arrival (ETA) – that is, when the navigator thought they should be over the target, based on his calculated course and estimated ground speed – a dubious approximation in most cases.[60]

The squadron's next operation came three nights later when, with ninety-eight aircraft from other squadrons, seven crews were ordered to bomb the main railway station at Cologne, just west of the landmark Hohenzollern bridge over the Rhine – a clear target indicator if ever there was one. One machine failed to take off, the crew reporting gun trouble, and one failed to return. Five crews claimed to have bombed the target, one from as low as 1200 feet. This machine, flown by a British sergeant pilot, was also attacked several times by an Me 110 from 'all directions except frontal' and suffered severe damage. Both engines were hit, and the main plane, rudder, rear turret, and fin were all holed.[61]

Had High Wycombe known the actual results of this raid, it would have taken little comfort from them. The Germans recorded only fifty-five high-explosive bombs falling on the city – the load carried by about a dozen aircraft – and material damage was negligible. Results were even worse the next night, when six Wellingtons from No 405 were among a hundred bombers raiding Bremen. Only two Canadian crews claimed to have found the target through

* Transportation targets enjoyed a new strategic significance after the Germans attacked the Soviet Union on 22 June, the air staff hoping not only that their destruction would slow the delivery of men and materiel to the Eastern Front but also that the Luftwaffe would be compelled to retain fighters in the west. .

low cloud and haze, and both did so by dropping down to the potentially fatal altitude of 1200 feet. On 22/23 June three of the eight 405 Squadron Wellingtons sent to Wilhelmshaven reported having been 'on target' and another claimed to have been in the vicinity (three others returned early, and one sortie was cancelled), but the bombing again left much to be desired. The only victims were the inhabitants of a small village four kilometres south of Wilhelmshaven, where one house was hit. There was little improvement the night of 4/5 July when the objective was German warships in the French port of Brest. The weather was good, with excellent visibility, and all the crews 'clearly identified the target and … claimed to have straddled the dock and the cruiser.' But the ship was not damaged.[62]

By now, No 405's effort on most raids had risen to nine or ten machines, and the number of non-starters and early returns was falling as groundcrews learned to cope with the pace of maintenance and repair work in an operational setting. Aircrews were also gaining confidence, and that was just as well, for on 24 July the squadron faced a stern test of an entirely new kind. For some time – and despite heavy losses on earlier such raids – the Air Ministry had been eager to undertake a daylight attack against German warships in French ports, both to destroy these enduring threats to Atlantic convoys and to entice the Luftwaffe's day-fighters into the air. *Gneisenau* and *Prinz Eugen*, then at Brest, were selected, and just before noon on the 24th one hundred bombers were sent out, in perfectly clear skies. Nine came from 405 Squadron. 'All our a[ir]/craft, in face of intense *Flak* and fighter opposition, are known to have been over the target at an average height of about 12,000 ft. Owing to an error in the setting of the distributor arm, one a/craft failed to release its bombs. One a/craft definitely straddled the cruiser, and all the a/craft bombed the target with success, some direct hits being certain … The docks and surrounding districts were severely pasted. The *Gneisenau* was enveloped in smoke from fires, both on the target and on the quays.' Enemy fighter activity was heavy, but some successes were reported. One crew was 'attacked in successive air - battles by four enemy a/craft … Fine evasive action and return fire from the rear gunner and the front gunner accounted for two Me's.' With their Wellington extensively damaged, all the crew except the two pilots moved on the flight home to the tail 'in order to weight it down.' The machine crashed three hundred yards from the English coast and everyone was rescued.[63]

There is an unmistakable sense of exhilaration, excitement, and accomplishment in the squadron's record of this raid. Bombing appeared to have been accurate (*Gneisenau* and *Prinz Eugen* were not hit hard, but the dock complex was damaged); moreover, there had been no flinching in the face of strong opposition, although losses amounted to one-third of the squadron's effort. Wing Commander Gilchrist was shot down, but although he evaded capture and eventually made his way to England, he did not return to the squadron (or Bomber Command) again. Squadron Leader R.C. Bissett, DFC, took over temporarily until Wing Commander R.M. Fenwick-Wilson, another Canadian in the RAF (who had been awarded an Air Force Cross in April for bravery in non-combat flying), arrived. One other aircraft was lost, while another, badly

damaged, crashed in England. Fortunately, casualty rates so high were not the norm – the loss rate for the entire Schwerte force was just 3.6 per cent, and for all five raids only 1.8 per cent – but single squadrons could suffer severely on any given night.[64] The disruptive effect of such disproportionately high casualties was never easy to undo but was hardest on new squadrons still coming to grips with operations, especially when senior leaders were lost.

After a brief rest, six crews set out for Cologne on 30/31 July, bombing on ETA and reporting only that 'some part' of the city had been attacked. Through 'momentary breaks' in the cloud cover German searchlights had been effective, and for the first time crews complained about searchlight dazzle, the blinding effect of intense light reflecting off smears, scratches, and scrapes on their Perspex (acrylic resin) windscreens. They were not exaggerating. A British artillery officer who flew on a raid at this time commented that searchlights were perhaps the enemy's 'most effective defensive weapon' because they successfully 'prevented us from seeing where we were.'[65] With armoured glass ruled out because of its weight, some squadrons cut out 'clear vision panels' (holes), an unpleasant alternative, even in summer, because of the cold; in others, groundcrews were admonished to take extraordinary care in polishing the Perspex.

On 11 August No 408 Squadron was declared operational and four Hampdens were dispatched to bomb the dock area of Rotterdam in company with thirty other aircraft. The weather was poor, however, with cloud above 7000 feet and mist or haze below, and two crews returned to base with their bombs; the other two, believing they were over the docks, dropped their bombs but could not see any results. Weather was also bad the next night when three aircraft were sent to attack the railway marshalling yards at Hanover. One crew 'had engine trouble and returned to base, dropping bomb load on Lingen.' The others flew through (they could not get above) 10/10ths cloud and an electrical storm en route to the target – which was clear – but no measurable results were observed. Indeed, if the example of one crew from a British squadron at about this time is any indication, the Canadians were probably nowhere near Hanover. Sent to Mannheim through 10/10ths cloud, the RAF crew navigated by dead reckoning to their ETA, broke cloud, followed a river, found a town, and bombed it. When they returned to base, looked at a map, and checked their calculations, they discovered they had bombed Epinal, on the Moselle in France, 150 miles away. They also learned that the Flak which fired on them while they believed they were over the North Sea had come from the Birmingham defences in central England.[66]

Flying conditions remained bad for the rest of the month, and both Canadian squadrons spent an extremely frustrating time flying through the murk to an educated guess at where they should be. In the last week of August, however, No 408 was withdrawn from the night order of battle. It had been decided that Fighter Command's daytime Circus operations (see chapter 6) needed additional bait to draw German fighters into battle. Hampdens were manoeuvrable (although desperately undergunned), and No 408 was among the squadrons High Wycombe selected for the task. After spending a few weeks practising

formation flying (and painting the bellies of their aircraft blue), the Canadian crews tackled their first Ramrod on 17 September, six aircraft going to Marquise, near Lille, to bomb a munitions factory. All returned safely, but they had not identified the target – even in daylight – and did not bomb. A second Ramrod, this time directed against the marshalling yards at Abbeville, was ordered for the next day, but when their fighter escort failed to appear the Hampdens returned to base. Abbeville was the target again on 20 September, and on 21 September the Ramrod made for the railway repair shops at Lille, where they caused only minor damage. All six bombers were hit by Flak, but managed to maintain formation and return safely. The next day the power station at Mazingarbe was the objective, but that mission was cancelled after the squadron had been airborne for ninety minutes. Then it was time to repaint the Hampdens: the squadron was to return to night operations.[67]

No 408 was fortunate that its commitment to daytime bombing did not extend beyond the realm of Ramrod operations. Unescorted operations by daylight – mostly the concern of No 2 Group – were far more deadly, leading to a loss rate of 7.1 per cent between July and November 1941, while that for night raids was only 3.5 per cent.[68] Night attacks remained unfruitful, however, and the damage visible in reconnaissance photographs bore no relation to what it should have been if the crews' claims were valid. For one thing, the general purpose bombs then in use – filled with relatively inefficient Amatol and featuring 'too much metal, too little explosive' no matter what their size – were found to be malfunctioning at an alarmingly high rate. Worse, there had been no discernible improvement in bombing accuracy despite the introduction of the fire-raising technique as a rudimentary form of target-marking – in part, it was argued, because the enemy's decoys, set alight in open fields, were so convincing. German records tend to confirm this explanation. In May 1941 over half the bombs dropped by Bomber Command fell in the country, away from villages, towns, and cities.[69]

Suspicions that that might be the case had produced two tactical changes in July. The practice of blind bombing on ETA through heavy cloud was suspended, crews being told to attack instead 'any … town or built-up area' they could see. The instruction to bomb from 16,000 feet or more, adopted in April but not always followed, was also rescinded once it was realized that, from that height, crews could not 'recognise even the target area.' Pilots were directed to fly lower, in order to pick out their precise aiming points; and if that proved impossible they were to bomb from a height which would allow them to hit 'the particular town in or near which' the aiming point was situated. It was acknowledged that these aiming points might include town squares, churches, or municipal buildings even when, for example, railway marshalling yards or road junctions were the objective of the attack.[70]

This renewed slippage towards area bombing did not go unnoticed. Slessor, for one, warned High Wycombe that it would not 'get away with it'; crews could not be expected to put themselves at risk to hit a specific target when the aiming point was not that target. For his part, Air Vice-Marshal A.T. Harris (Slessor's predecessor at No 5 Group and now DCAS) was concerned not only

that embarking on an area campaign directed primarily against German morale was 'a counsel of despair, based on the previous failure of night bombing and the breakdown of the theory of precision attacks,' but also that it 'implied an unbounded optimism … about what could be achieved at this moment.' With the evidence against Bomber Command's effectiveness mounting, however, the army and navy agreed for the first time in the summer of 1941 that Portal might be right – that the weight of bombs dropped on Germany, not their specific location, was what was going to be important in the long run. 'We must destroy the foundations upon which the [German] war machine rests,' the chiefs of staff declared: 'the economy which feeds it, the morale which sustains it, the supplies which nourish it, and the hopes of victory which inspire it.'[71]

The case for area bombing was confirmed by the findings of D.M. Butt, a civilian member of the War Cabinet staff whose report on Bomber Command's operations, presented in August 1941, became a seminal document in the evolution of bombing strategy. Examining aerial photographs triggered by bomb releases on the hundred-odd raids mounted between 2 June and 25 July, Butt concluded that on average no more than one sortie in five bombed within five miles of the correct target, while over the Ruhr on dark or cloudy nights perhaps only one bomber in ten got within five miles of the objective. Industrial haze – smog – was the major culprit in the Ruhr's especially disheartening statistics. Not yet a true conurbation, the major cities in the valley were nevertheless close to each other and they shared several confusing characteristics. Belching forth smoke and well protected by Flak, all were railway towns bordering rivers or canals. Given any combination of cloud, darkness, fatigue, fear, and navigation error, as well as the understandable inclination of bomber crews to believe they were where they were supposed to be, one city could easily be mistaken for another.[72]

Crews who knew where they were and what to look for should not have been so easily fooled, particularly outside the Ruhr. 'This part of Europe is crisscrossed with some large rivers which are easy to pick out in the moonlight,' one navigator would recall, mentioning the Rhine, Ems, Weser, Elbe, and Spee, and because his bomb-aimer 'was very good at map reading … he could easily recognize those rivers, their bends and tributaries, and I could rely on an accurate pinpoint from him.' But the moon was not always shining; not everyone was a good map-reader; and until early 1942, when specialist bomb-aimers were added to crews (replacing the second pilot, by then considered a luxury), the observer was over-worked.* He had 'more than enough to do … to get the aircraft within a few miles of the target … Apart from all the other difficulties … the work he had done as a navigator left him no time to get his

* Hampden crews at this time comprised one pilot, an observer, and two wireless operator/air gunners. Wellingtons carried two pilots, an observer, two wireless operator/air gunners, and one air gunner. More highly trained specialist navigators replaced observers in the fall of 1942. There was even greater specialization in Halifax and Lancaster crews, which, along with the required number of gunners, normally comprised a pilot, navigator, wireless operator, air bomber, and flight engineer.

eyes conditioned to the darkness, which he would have to do before trying to spot the aiming point.'[73]

An RCAF observer serving in an RAF squadron provided some answers based on his experience of operations in August. Despite the dangers involved in obtaining the necessary fixes – it took about two minutes of straight and level flight to obtain one good sight, and about five such observations to fix one's position – more observers had to learn to use astro-navigation, something taught in Canadian BCATP schools but not everywhere else. Beyond that, Pilot Officer Allan Fawley had learned that he needed an aiming point he could see clearly and trust, and urged that 'crack' crews be selected as the fire-raising force. Finally, he thought that squadrons and groups should regularly be given particular objectives of their own, so they could learn to memorise the landmarks on the way. When small targets (and the stars) could not be seen, however, Fawley could do no better than to recommend the bombing of large areas based on ETA, in order to cause at least some damage.[74]

Although it had been decided that larger fires must be set, the better to mark the target, the time was not yet ripe for all of Fawley's observations and ideas to be shared and implemented. Instead, the AOC of No 4 Group proposed that High Wycombe insist on more detailed and critical post-raid debriefings to instil determination and discipline among the crews. Otherwise, he argued, 'some of them would take less trouble in finding their particular objectives.' This follow-up would entail increased reliance on bombing photographs as evidence of satisfactory performance; but it also meant that intelligence officers had to be warned against accepting statements they 'would like to accept' and against asking leading questions likely to 'invite an affirmative answer.'[75]

This was one of the first occasions when the dedication of bomber crews to their task was questioned, but given the impossibility of exercising direct operational control over individual crews, Air Vice-Marshal Carr's suggestions seemed reasonable enough. Nevertheless, his memorandum did not address the central problem of night bombing put forward in the Butt report – that crews were having difficulty coming within a five-mile radius of their aiming point whenever flying conditions were less than ideal. And if they did find the target, their average bombing error was about half a mile. No amount of dedication would enable crews to see landmarks or stars through cloud, and greater determination would offset only some of the limitations of bombsights then in use.

The main hope for the future, therefore, lay in technological advance and, in the late summer of 1941, there was room for some optimism in that regard. The Mark XIV bombsight, then undergoing tests, needed only good wind readings to manipulate automatically data relating to air speed, target height above sea level, atmospheric pressure, and the terminal velocity of the main bomb being carried to reduce the average error (on test flights) to as little as sixty yards from a height of 10,000 feet. (Over Germany in 1943, however, errors of two to three hundred yards would be 'the common order' from the same altitude – and more from higher up.) More importantly, on 18 August 1941 the Air Ministry decided that a radio-navigation aid, code-named Gee,

was ready for operational use, and a week later instructions were issued to fit it to bomber aircraft on the factory assembly line, beginning no later than December. The Telecommunications Research Establishment responsible for Gee was also intensifying its work on a second navigation aid called Oboe.[76]

The sooner both these navigation aids appeared the better, as little was going to be accomplished from raids like two flown by No 405 Squadron in late August. Sent to Kiel on the 19th/20th, its crews ran into a series of thunderstorms over the North Sea and could only guess they had reached land, close to Sylt, near the Danish-German border, by the heavy Flak they encountered. All but one crew reported they had attacked the target (judging from their time of arrival and what they could discern of the Flak dispositions), but none saw results, not even the crew that dropped down to 4000 feet. The crew that did not attack Kiel 'toured Schleswig-Holstein for half an hour' looking for something on which to drop their bombs, but eventually gave up and returned to base. Kiel reported little damage and no casualties.[77]

Three nights later the target was Mannheim, but the weather was so bad that, with one exception, the crews observed 'no land or water features' near the target. Although all five claimed hits on the city and reported there was 'little doubt that the target area was bombed with success,' their photographs showed 'only cloud' and that 'no fires of importance' had been started. German records indicate that a total of six high-explosive bombs struck the city, badly damaging one house and injuring one air-raid worker.[78]

15
The Offensive at Risk, Fall 1941–Spring 1942

There was no chance, as the summer of 1941 turned to autumn, that the bombing of Germany would be suspended altogether, but the operations of Bomber Command came under increasingly harsh scrutiny following the revelations of the Butt report. Sir Richard Peirse had to admit that the number of aircraft reaching the target was 'appallingly low,' and as an initial step to improve things he urged his group commanders to 'take a personal grip' to 'kill … complacency' – the second time in just a few weeks that Bomber Command's disappointing performance was linked to a lack of intensity and dedication on the part of its crews.[1]

Valid as Peirse's criticisms may have been, some – including J.C. Slessor – believed that the recent strictures against bringing bombs back to England, even if the target could not be seen, had contributed to the indifference. These restrictions merely reinforced the impression already held by many crews that it was sufficient to 'pitch hundreds of tons into open country' with little concern for accurate navigation. Bomber Command's senior air staff officer (SASO), Air Vice-Marshal R.H.M. Saundby, sympathized with Slessor, but he knew that Peirse could not be budged from his position. If the primary objective could not be located, the alternates given in their briefings, 'any good-looking built-up area in Germany' or certain approved targets in occupied territory, would be acceptable substitutes.[2]

Interpreting these instructions permissively, crews could easily justify sorties which went nowhere near the main objective. Accordingly, there is little wonder that when RAF scientists extended Butt's research in the fall of 1941 they duplicated his results. Two-thirds of the bomb-release photographs showing ground detail had been taken between four and forty miles from the assigned target, while over the Ruhr, even on bright, clear nights, the best to be hoped for was that 30 per cent of the attacking force would arrive within five miles of the aiming point. When weather conditions were bad, or there was no moon, the figure fell to 15 per cent. In raids against Berlin, where there was less smog and fewer large cities nearby to cause confusion, results were marginally better, while those for targets on the coast were almost twice as good.[3]

Weather conditions were clearly an important variable in these results, but everyone anticipated that the electronic navigation aids then being developed

would eventually lead to a substantial rise in the number of aircraft reaching the target. In the meantime, the extremely effective 4-lb incendiary bomb just making its appearance would have to suffice as the only way of enhancing prospects of finding, marking, and damaging the objective. Larger, fiercer fires, started in the right places, would not only attract more of the attacking force to the target area but would also produce more widespread destruction than scattered bursts of high-explosive.[4] Still uncomfortable with the idea of area attacks, however, and wary of German decoys, Peirse ignored instructions to experiment with large-scale incendiary raids and continued to mount operations against transportation targets when good weather was forecast; against industrial areas (but without increasing the proportion of incendiary bombs) when it was not; and on a scale he considered practical – about five sorties a month per aircraft, often in small packets. In addition, to spread the German defences as well as to cause the widest possible alarm, he usually selected two primary objectives on those nights when Bomber Command went out in strength.[5]

Once it returned to night operations during the last week of September 1941, No 408 Squadron was most often employed against transportation targets and specific war industries. But despite favourable weather forecasts, raids on Karlsruhe, Hamburg, Essen, Hüls, and Mannheim were all hindered by cloud, haze, or fog, and consequently failed to live up to expectations. The last two operations in October were probably the most frustrating. On the 29/30th, ten RCAF crews joined thirty-five others for an imaginative attack on Schipol (Amsterdam) airport, where German bombers (recently returned from a raid on England) were parked: but the weather was so bad, with gale-force winds, heavy cloud, snow, and sleet, that the target could not be identified and, since there were no authorized alternates in the area, most crews returned with their bombs still aboard. Again, on Hallowe'en, ten crews made for the Blohm and Voss shipyards in Hamburg, but only three saw the docks through cloud, the rest bombing the city centre or outlying communities.[6]

No 405 Squadron, meanwhile, had sent eight aircraft to Berlin on 7/8 September, and several crews reported seeing their 'actual aiming points.' They may not have been exaggerating, as four factories were damaged and 2800 civilians lost their homes. Turin, in northern Italy, was attacked next, with the intention of exploiting the 'mercurial temperament' of Germany's ally. The Canadians enjoyed a magnificent view of the Alps on their outward flight, but they found the target blanketed by cloud and could only bomb the glow from fires started by earlier arrivals. Raids on Frankfurt, Hamburg, Stettin, and Essen followed over the next three weeks, and then, on 12/13 and 14/15 October, they participated in two large attacks on Nuremburg, ideological home of the Nazi party, an important railway centre, and the site of diesel, electronics, and ball-bearing factories. The first, mounted in good weather, seemed to be a complete success, with 'huge blazes' being reported around the railway yards, but according to German records very little damage had been done. The heaviest bombing had actually occurred at Lauingen, sixty-five miles away, and at Lauffen, ninety-five miles distant and near Stuttgart's decoy fire – two towns which, like Nuremburg, were located on wide rivers and might

easily have been mistaken for that city. Thick cloud, snow, and icing dominated the second raid and, as might be expected, results were poorer still, two-thirds of the force (but none from 405 Squadron) deciding to make for alternate targets.[7]

No 408 Squadron, after its return to night operations, lost only one of ninety-five sorties until the end of October, but No 405's losses – three of ninety-three, or 3.2 per cent – placed it on the same curve that now applied to all Bomber Command, showing an increase from 2.2 per cent in early summer to 3.5 per cent by mid-fall. When those aircraft severely damaged and either written off or requiring extensive repair were added to the tally, the trend was even more disturbing. It almost doubled from 3.9 per cent of sorties in May to 7.7 per cent in August. Furthermore, both loss and damaged rates continued to be at their highest during the poor weather favoured for area operations, largely because of the many accidents that occurred when flying conditions were bad. In short, Bomber Command's least effective raids were now also its most costly and, instead of lasting the predicted twenty-three sorties, operational aircraft were averaging only eleven.[8]

Such losses compounded the problems created by shortfalls in aircraft production and shortcomings in the aircrew training system. So long as navigation remained as poor as ever, the only way to increase the amount of explosives falling on the target was to increase the amount carried each night – 15 per cent of 500 tons hitting an objective was better than 15 per cent of 100 tons. Larger aircraft, with bigger payloads, were an obvious remedy, but complications in the Short Stirling, Handley-Page Halifax, and Avro Manchester/Lancaster programs – all heavy bombers with larger bomb-carrying capacities – were delaying their appearance as front-line aircraft.[9]

When, therefore, the government decided in late September 1941 that Bomber Command must grow, in order to increase the tonnage dropped on the Ruhr, the Ministry of Aircraft Production (MAP) again found it convenient to prolong and extend the production of current types rather than to convert factories to the manufacture of the latest designs. Unhappily, however, the need to replace damaged and missing machines continued to eat up the resources intended for expansion, while the British aircraft industry, never as efficient as MAP wanted to believe, continued to lose ground in its effort to meet the projected output of established designs.[10]

Short of its full strength by 316 heavy and medium bombers in mid-August 1941, and with production forecast to be in arrears by another 425 machines at the end of the year, the Air Ministry had to cut back High Wycombe's immediate expansion plans even before submitting those for long-term growth to the Cabinet. Thus the formation of additional medium- and heavy-bomber squadrons, including those promised to the RCAF by the Ralston-Sinclair agreement, would have to be postponed: only forty-eight could be counted on to be operational by the end of the year instead of the seventy-five originally planned. As a result, Air Vice-Marshal L.F. Stevenson, senior RCAF officer overseas, advised Ottawa that, rather than wait for the necessary aircraft to be completed, BCATP graduates intended for these units

should be sent to the RAF where they could gain experience – subject to recall to newly formed Canadian squadrons when they were required. In the event, only two RCAF squadrons, Nos 419 and 420, were added to High Wycombe's order of battle before the end of the year, and the Air Ministry's willingness to break up crews in order to exercise that recall provision was never tested.[11]

Slowing down Bomber Command's rate of expansion was, at least in one respect, a blessing. By the fall of 1941 Peirse was running short of experienced aircrew, particularly pilots, not only because of casualties and the transfer of some squadrons to the Middle East and Coastal Command, but also because of changes in the training system. When expansion had seemed likely in the spring, and the flow of crews to Bomber Command needed to be accelerated, the syllabus at operational training units had been curtailed with the aim of producing pilots in as little as six weeks. But the experiment was not a success. Graduates of the abbreviated syllabus were not adequately trained for bad-weather flying and their inexperience was a major factor in the elevated accident rate observed since late summer. In other words, by late 1941 there was a fundamental incongruity between what Peirse was being asked to do and the resources he was given to do it with. As losses outstripped the supply of aircraft and properly prepared crews, the more likely Bomber Command was to fail. Moreover, given the fact that inexperienced crews tended to be killed, injured, or captured at higher rates, the process of self-destruction could only accelerate with each attempt.[12]

Here was a powerful argument for a strategy of conservation. The prime minister had raised just such a possibility in mid-August, when the disheartening conclusions contained in the Butt report were first circulated, but Sir Charles Portal had successfully parried his thrust at that time and then, through the director of bombing operations (DBOps), had argued that the area offensive against selected German cities should actually be intensified.[13] 'It must be realised,' Air Commodore J.W. Baker explained: 'that attack on morale is not a matter of pure killing, although fear of death is unquestionably an important factor. It is rather the general dislocation of industrial and social life arising from damage to industrial plant, dwelling houses, shops, utility and transportation services … from interference with all that goes to make up the general activity of a community.'

Basing his plan for the destruction of Germany's forty-three largest cities on evidence accumulated from the Luftwaffe's raid on Coventry in November 1940, Baker concluded that all commercial and social activity within any city could be reduced to nil within a six-month period if one ton of bombs was delivered accurately for each 800 inhabitants. Allowing for known navigation and bombing errors, weather and wastage, Baker calculated that Bomber Command would have to carry 75,000 tons of high-explosive to Germany in order to achieve the desired result. That would require a front-line force of 250 squadrons equipped with 4,000 heavy bombers – a seven-fold jump from the thirty-four night-bomber squadrons on the current order of battle – each flying six sorties a month.[14]

Although the prime minister was reconciled to enormous increases in production which came close to meeting these requirements – 11,000 machines were to be manufactured in Britain by July 1943, and another 5500 would come from the United States – Baker's proposal went too far and it momentarily rekindled the doubts Churchill had expressed about bombing just a month before. The prime minister was especially unhappy with the putative mathematical precision of the arguments put forward by Baker and with their underlying premise that 'bombing by itself will be a decisive factor in the present war.' 'On the contrary,' Churchill responded, 'all that we have learnt since the war began shows that its effects, both physical and moral, are greatly exaggerated. There is no doubt that the British people have been stimulated and strengthened by the attack made upon them so far. Secondly, it seems very likely that the ground defences and night fighters will overtake the Air attack. Thirdly, in calculating the number of bombers necessary to achieve hypothetical and indefinite tasks, it should be noted that only a quarter of our bombs hit the target.' Improving this last statistic by a factor of two, he added, would halve the size of the force required, thereby easing pressures on the aircraft industry. 'The most we can see is that [bombing] will be a heavy and, I trust, a seriously increasing annoyance [to the enemy].'[15]

On 7 October, however, for reasons best known to himself, Churchill suddenly acknowledged that not only was bombing 'the most potent method of impairing the enemy's morale we can use at the present time,' but also that Bomber Command deserved to expand 'on the largest possible scale.' The opposition to area (and fire) bombing within the air staff melted away shortly thereafter, a change that may have been prompted by the War Cabinet meeting of 20 October, which revived the early 1941 idea of allocating first priority to the Battle of the Atlantic and attacks on U-boat bases – something against which almost all senior RAF officers could unite. In any case, on 25 October, the same day that the Air Ministry was asked to give special attention to Hamburg, Kiel, Bremen, and Wilhelmshaven, High Wycombe was invited to undertake a massive fire raid (by 1941 standards) involving as many as 60,000 incendiary bombs. If results were 'fully satisfactory,' Peirse was told, 'it may well be that we shall find ourselves able to undertake the systematic destruction of German towns at a much earlier date than we have been able so far to hope for.'[16]

If external support were needed for such an enterprise, it came, conveniently, from the *Sunday Express* which, on 2 November, commented sharply on Bomber Command's recent lack of 'persistence, regularity, and enterprise against targets in Germany. Berlin has been off the RAF visiting list for six weeks … There is a tendency in official circles to blame the weather for decreased RAF activity over Germany. Yet no one would dare suggest that the … Halifax and Stirling bombers [then entering squadron service] are fair-weather planes or accuse their crews of less fortitude and resolution than those who manned the Wellingtons and Whitleys a year ago.'

Five days later Berlin was attacked despite a weather forecast so miserable that – at Slessor's insistence – No 5 Group (including No 408 Squadron) was

withdrawn from the operation and sent to Cologne instead. Heavy cloud, icing, hail, sleet, and electrical storms plagued the crews who made their way to the German capital, where the enemy defences proved to be alert despite the weather. Twenty-one machines were lost, 12.4 per cent of those dispatched, and only half of the crews who returned claimed to have found even the outskirts of the city. Seven public or commercial buildings were damaged, fourteen houses destroyed, and eleven people killed.[17] No 405 Squadron's experience was typical. Ten crews took off for Berlin, five attacked the general vicinity of the target, and four chose alternates at Kiel and Wilhelmshaven. One aircraft went missing, three were damaged, and one crash-landed on its return to England. All in all, the squadron diarist concluded, the operation was 'practically abortive.'[18]

Flight Lieutenant J.E. Fauquier (of whom we will hear more in this book) had been uneasy about the operation from the first few minutes of his briefing, when the meteorologist had been 'nervous and seemed unable to make up his mind about the wind velocity for the return to base.' Although everything went well on the way out, Fauquier soon found that, because of the overcast, 'we had nothing but dead reckoning and forecast winds to get us to the target.'

> Finally, we reached the point where we thought, and hoped, Berlin lay … dropped our bombs and turned for home. It wasn't long before I realised we were in trouble because the winds had increased greatly in strength and were almost dead ahead. Eventually, I lost height down to a few hundred feet – to avoid icing conditions and to save fuel since the head wind would be less strong.
>
> I have seen the North Sea in many moods but never more ferocious than that night. Huge waves of solid green water were lifted from the surface and carried hundreds of feet by the wind. After what seemed like hours in these appalling conditions I realised we were unlikely to make base. I had little or no fuel left and told the crew to take up ditching positions … It was then I saw briefly one of those wonderful homing lights and made a bee-line straight for it.

Landing at a non-operational airfield amidst stakes erected to thwart enemy invasion landings, Fauquier and his crew were immediately surrounded by members of the Home Guard quite prepared to lock them up until contact could be made with station Pocklington. 'Utterly fatigued, half frozen and disgusted,' Fauquier, like most of the rest of No 405 Squadron, bitterly resented 'being launched on a major operation against the German Capital in weather totally unfitted to the task.'[19]

No 5 Group suffered no losses over Cologne, but the aiming point was just as difficult to find as it was at Berlin and the bombing was equally erratic. Only eight high-explosive and sixty incendiary bombs fell on the city. At Mannheim, meanwhile, seven of fifty-three Wellingtons from Nos 1 and 3 Groups were lost, while nine of ninety-three aircraft on minor operations went missing. Overall losses for the night totalled thirty-seven, 9.4 per cent of sorties dispatched.[20]

That was enough for the prime minister, who immediately called Peirse to Chequers. Maintaining that the previous night's casualties were unnecessary and could not be justified, particularly in light of the weather over Germany, Churchill berated the AOC-in-C and directed him to conserve his force for the present. He made the same point to Sir Archibald Sinclair and to Portal: 'I have several times in Cabinet deprecated forcing the night bombing of Germany without due regard to weather conditions. There is no particular point at this time in bombing Berlin. The losses sustained last week were most grievous. We cannot afford losses on that scale … Losses which are acceptable in a battle or for some decisive military objective, ought not to be incurred merely as a matter of routine. There is no need to fight the weather and the enemy at the same time. It is now the duty of both Fighter and Bomber Commands to re-gather their strength for the Spring.'[21]

Despite the pressure they had applied to Peirse, the under-secretary of state and the CAS protested bitterly that they had not 'forced' the operation and that neither of them regarded the bombing of Germany as a matter of mere routine. Industry, transportation, and morale were 'decisive military objectives,' well worth the cost. But the prime minister was adamant and the policy of conservation stood. Although bombing would not be suspended altogether, operations would not take place 'if weather conditions were unfavourable or if our aircraft were likely to be exposed to extreme hazards.'[22]

Portal's gambit – indeed, all of his twisting and turning since August – had failed. Conservation meant that, for the next few months at least, there would be no sustained area offensive against enemy morale. But if the alternative to doing nothing was to strike at specific targets, something had to be done about the lackadaisical approach to navigation that still permeated much of Bomber Command. How else could one explain the performance of one No 5 Group crew, sent to Düsseldorf, which bombed the vicinity of Dunkirk?[23]

It was also important to forge ahead with production of the new families of bombs developed to replace the now-discredited General Purpose series: the relatively thin-skinned, cylindrical (and therefore 'unaimable') High Capacity blast bombs, including the 2000-pounder and 4000-pounder 'cookie,' and the considerably more aerodynamic (and consequently more accurate) Medium Capacity series, with stronger casings and better able to penetrate buildings but which sacrificed only a little in terms of blast effect.[24] Profound improvements in navigation, it was agreed, depended on the electronic aids originally promised for November and December, but the introduction of the Gee radio-navigation aid had to be delayed because of production problems, while Oboe, the subject of research since June, was still under development and would not be ready until late 1942 at the earliest. A third possibility, modification of the downward-looking centimetric Air to Surface Vessel (ASV) radar so it would 'picture' the ground below, was raised in November; but even if the project proved feasible (as it eventually did, producing the device known as H2S), this could only be a long-term solution. In the interim, therefore, more conventional steps would have to be taken.[25]