

The net to identify these measures was cast very wide indeed, reaching not only the highest echelons in Whitehall and at High Wycombe, but also every observer in Bomber Command. The evidence accumulated was sobering in the extreme. Along with faulty planning, there seemed to be flaws in the training system so serious that they threatened to prevent any improvement in navigation standards. Observers trained in Britain, for example, still had little experience of night-flying before their posting to operational squadrons; they received next to no instruction in astro-navigation, a deficiency that left them practically helpless when it came to checking their position whenever the ground could not be seen. Observers trained overseas, by comparison – and particularly those who came from Canada – knew astro-navigation but were so poor at map-reading they could not make proper use of landmarks to find the target on moonlit nights.²⁶

As Wing Commander S.O. Bufton, the newly appointed deputy director of bomber operations, explained, however, there were no guarantees that the benefits of more rigorous and thorough training would be felt uniformly throughout Bomber Command so long as squadrons (and, indeed, in some cases, individual crews) were independent entities, left to mount operations as they saw fit. It was essential, therefore, that High Wycombe assert its authority and centralize control over the bomber offensive to give it coherent direction. This meant not only 'collecting, sifting, trying and putting into general practice those ideas which emerge in squadrons from time to time' – in short, introducing a coordinated tactical system which would be adhered to by all.²⁷

Bufton had solid backing for his criticism, having recently compared operational procedures in Nos 10 and 405 Squadrons. The former, with long experience of night-bombing, used flares in abundance to mark and illuminate the target, and crews who were absolutely certain they had found the aiming point fired red Verey lights to attract others to it. In No 405, in contrast, flares were rarely used, crews preferring to navigate by landmarks until they reached a point from which they could make a timed run to the target – and, since landmarks were frequently misidentified, the run itself became meaningless. The Canadians would do better, it was clear, if they adopted No 10 Squadron's tactics, but Bomber Command's uncoordinated way of doing things neither guaranteed that its procedures would be communicated to other units nor ensured that they would be adopted when they were. Perhaps, Bufton suggested, a specialist target-marking force was required.²⁸

All four night-bomber group commanders agreed that more had to be done in the way of marking and illumination, but only Air Vice-Marshal R.D. Oxland (No 1 Group) and C.R. Carr (No 4 Group) were amenable to the creation of a special force. Both Slessor (No 5 Group) and Air Vice-Marshal J.E.A. Baldwin (No 3 Group) feared that morale and overall expertise would suffer if the best personnel were skimmed off into an élite formation. Slessor, Baldwin, and Bufton himself were also increasingly inclined to believe that the root of the problem lay in the debilitating influence of area bombing, which, by its very nature, did not demand high standards of target identification and bomb-aiming and therefore had weakened crews' 'determination to find and

hit targets.' This was particularly so when aiming points were selected 'that bore little obvious relation to any military objective.' Finally, the effect of Flak and night-fighters had to be taken into account, as it was clear that when a pilot had to take evasive action his observer was rarely able to chart the changes in course.²⁹

The two most obvious ways to protect bombers against Flak and fighters (adding more armour in the first case, and more powerful defensive weapons in the second) were still rejected because they involved too great a sacrifice in payload and in the altitudes at which aircraft could fly. Height was especially important, since Flak was more dangerous at lower altitudes and was not to be sacrificed lightly. Indeed, about all that could be offered when the question of bomber defence was discussed in late summer was a promise to 'comb-out' air gunners whose night vision was deficient.³⁰ For the foreseeable future, then, Bomber Command's main tactic would continue to be to evade rather than fight.

Finding ways around the German defensive system had been relatively easy early in the year. The main night-fighter zone had been limited to the Dutch coast, leaving open flanks in France, Denmark, and northern Germany, while the searchlight and Flak belts behind it, in the Ruhr and around Mannheim, Frankfurt, and Stuttgart, were not radar-directed. Furthermore, bad weather was still a powerful ally. Lacking both airborne interception (AI) radar and de-icing equipment, the majority of the enemy's night-fighters were severely handicapped in poor visibility and did not fly when icing-up was likely.³¹

A new and disturbing picture of General Josef Kammhuber's organization began to emerge over the summer, however – the result of careful monitoring of German radio and radar transmissions, a regular program of reconnaissance flights, and accurate analysis of the information so gathered. It was apparent, for example, that the open flanks in France and Denmark were being closed as the night-fighter zone was extended to Liège in the west and the German-Danish border in the east, while in some places two crews were being allocated to each air-defence box. Würzburg radar, which plotted height, distance, and course, and was therefore suitable for ground-controlled interception (GCI), was appearing not only in the Flak regiments for which it was originally intended, but also in the fighter zone. At the same time, the formerly safe areas in front of, and behind, the main searchlight belts were being patrolled by Dunkel-nachtjagd (non-illuminated, or dark night-fighting) interceptors whose pilots operated on a freelance basis, picking out targets silhouetted against the moon or cloud, or revealed by the flames from their exhausts. Finally, point defences combining Flak, fighters, and searchlights were being provided for those cities attacked most frequently – Berlin, Hamburg, Bremen, Kiel, Cologne, Düsseldorf, Frankfurt, Darmstadt, and Munich.³²

'A few miles from the coast,' one air gunner recalled, 'Germany seemed a belt of light from north to south,' with searchlights in groups of ten and fifteen or more probing the darkness. 'At first we felt no aircraft could penetrate the barricade of lights, anti-aircraft guns and fighters.' Although he survived the raid on Essen, 'the trip had been four hours and forty minutes on a razor's edge,'

GERMAN NIGHT FIGHTER DEFENCES
AND BOMBER COMMAND

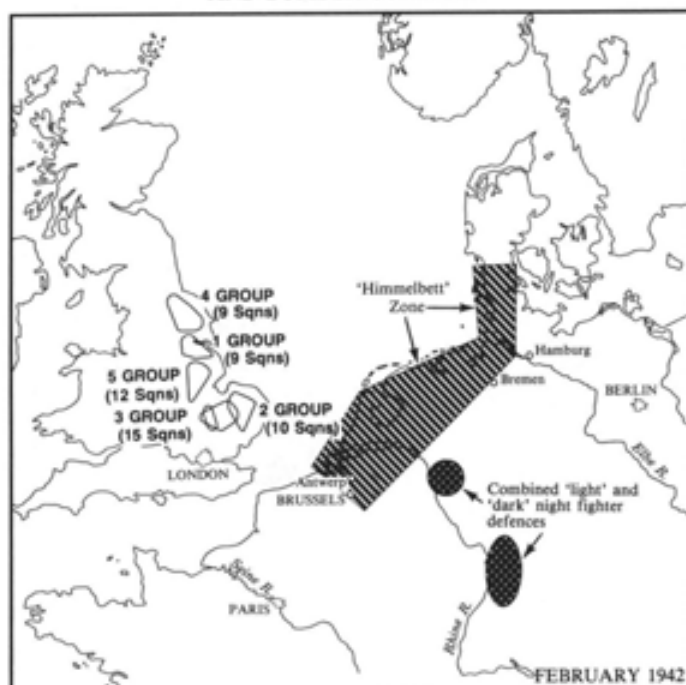
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a description indicative of the constant strain under which bomber crews operated.³³

Weaknesses were identified as well. Even if the number of fighters assigned to the air-defence boxes was doubled or trebled, controllers still seemed to handle only one at a time and each box appeared to stand alone, neither supporting nor receiving help from its neighbours. In time, the reasons for these shortcomings were also discovered. Beyond the fact that Kammhuber was, himself, wedded to the idea that successful night defence demanded strict control from the ground, his system was influenced by the nature and amount of equipment made available to him. Because there was no IFF (identification friend or foe) link between fighters and Würzburgs, the ground controllers could not determine who was who simply by looking at their cathode-ray screens: and that, more than anything else, accounted for the fact that only one interception, by one fighter, was attempted at any one time; that fighters seldom strayed from their own box; and that freelance interceptors rarely entered the controlled night-fighting zones. By standardizing and systematizing procedures, Kammhuber had ensured a crude mission profile which would help his ground controllers distinguish between friendly and hostile aircraft.³⁴

It did not require a complete understanding of why such shortcomings existed to exploit them, however, and the air staff was able to deduce an ap-

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propriate response long before all these details were known. If routes and timings were chosen so as to pass a large bomber force through a minimum number of air-defence boxes in the shortest possible time, the enemy could be overwhelmed. But the AOC-in-C was not ready to impose any such solution on Bomber Command as a whole: not only was it contrary to the spirit of decentralized control which dominated Peirse's approach to his job, but it also seemed to ask too much of his crews, especially given the congestion likely on takeoff. The matter of increased concentration was therefore left to each group to decide.³⁵

Concentration was also opposed by those at High Wycombe and the Air Ministry who feared that a compact bomber force would be an easy target for the enemy's *Dunkelnachtjagd* crews, and even more inviting prey for fighters equipped with airborne interception (AI) radar, which was expected to appear at any moment. In fact, these fears were premature, as experiments with the Lichtenstein B/C AI had only just begun. While it temporarily prevented Bomber Command from fully recognizing the benefits of concentration, however, such sensitivity to the potential of electronic warfare was no bad thing in the long run because it hastened British research on possible counter-measures. Work was already underway to develop a tail-mounted device that would give warning of the approach of AI-using fighters. (Under the code-

name Monica, it would become standard equipment in the summer of 1943.) Alternatively, radars might be jammed by strips of metallic foil dropped by the leading aircraft of an attacking force. For the moment, however, that idea was rejected for fear that the Germans might use it against British radars, too.³⁶

Some procedures that were adopted owed little to the laws of physics. Throughout 1941, but particularly over the summer, it was reported that the enemy's searchlights were doused whenever a bomber's IFF was switched on. On 28/29 August, for example, No 405 Squadron recorded 'IFF used a lot, but mixed reports as to its efficacy, though [Wellington No] 137 used IFF with immediate effect vicinity of Rheydt.'³⁷ There was no scientific basis for this phenomenon and every reason to avoid prolonged IFF transmissions over enemy territory, where fighters could home in on them. Yet, despite having issued firm instructions against unfettered use of IFF once the enemy coast had been crossed, High Wycombe eventually succumbed to the popular belief that something was happening and, on 1 September, allowed that IFF could be switched on briefly whenever 'embarrassment from enemy searchlights and Flak is being experienced.'³⁸

Happy that officialdom had confirmed their irrational convictions, many crews did not take seriously the warning to avoid prolonged use. Describing the 10/11 October raid on Essen, for example, the diarist of No 405 Squadron noted 'IFF on and off used by all captains over the target area with some impression of success, but Q, using it continually over Holland on return and flying at 1,000 [feet] enjoyed complete freedom from both searchlights and Flak.' The most likely reason for 'Q's' easy passage was not its crew's use of IFF, however, but rather that Sergeant V.E. Sutherland was flying so low that he passed over searchlight and Flak batteries before they could react or, by the fickle fortune of war, happened to fly between them. Nevertheless it is easy to imagine how, in the mess or the debriefing room, the talk was not about low-flying or lucky misses but the searchlight-dousing properties of IFF; and how, in time, these alleged properties became an article of faith. It should come as no surprise, therefore, that at Emden, ten days later, John Fauquier switched his IFF on and off 'at one second intervals' and reported that not once was he coned by searchlights.³⁹

As time went on, more and more crews used it continuously, and by the late spring of 1942 this practice was officially sanctioned in a No 4 Group primer on tactics. Then, in June, the Air Ministry approved a modification of the IFF set – the J-switch – that allowed it to radiate continuously for one half-second in every twelve. So much for the danger that the enemy was homing on to electronic transmissions, but perhaps the strengthening of morale was worth the risk. 'We plunged on, now with both turrets useless,' was how Pilot Officer George Sweanor described his first raid (to Kiel) with No 419 Squadron, 'while Flak and searchlights increased ominously in intensity.' Suddenly a powerful blue beam (the white light appears blue when it locks on to you) caught us, and ten more beams arced over to join it. We were blinded! Pat shut his eyes, and tried to weave by instinct while I remembered the boffin and his

new device. I groped my way back to the panel, felt for the [IFF] switch, and began flicking it on and off. We were being flung about the sky by exploding shells ... Then, suddenly, all searchlights arced away. "*My God – it works!*" We shouted in disbelief as our eyes slowly adjusted to the darkness again.' In fact, the IFF had not worked at all. Following some rewiring on the navigator's instrument panel, Sweanor had actually been switching his landing lights on and off – and may, in the process, have persuaded the searchlight crew that his was a German machine.⁴⁰

Concerned at the still-rising casualty rates, Sir Richard Peirse knew that the makeshift use of IFF was not enough and on 22 October he asked Portal to approve a concerted effort to jam all known enemy radars and fighter-control broadcasts. Taking a longer view, the Air Ministry replied that it was too early to begin widespread electronic counter-measures for fear they would be compromised before they were truly effective, and it was suggested instead that High Wycombe take another look at concentration. Peirse was as reluctant as ever and would not issue orders to that effect; but besides directing groups to reduce their time over the target, he did suggest they might experiment if they wanted to. However, the degree of concentration he proposed – no more than a hundred aircraft an hour over the target – was so low that some scoffed it was hardly concentration at all, and certainly not enough to saturate the German defences. Doubling Peirse's figure was, in Wing Commander Bufton's view, closer to what was needed.⁴¹

Quite unexpectedly, the generally lackadaisical compliance with Peirse's relaxed and permissive proposal unleashed the process of centralization in Bomber Command. Within seven days, having discovered that times over target were not, in fact, being reduced, the AOC-in-C brought his own staff into the coordination of raids to a greater extent than ever before. While each group was still free to develop its own plan of attack, these plans now had to be transmitted to High Wycombe for review and, if necessary, for modification based in part on the latest wind and weather forecasts. Once they were approved, no deviation was permitted.⁴²

Circumstances dictated, however, that these new operational procedures would have only a minor impact until a new bombing policy emerged in February 1942. Abysmal weather and Churchill's demand for conservation were combining to limit not only the number of raids but also their size. Operations occurred on just fifty-four nights between 10 November 1941 and 22 February 1942, and more than two hundred aircraft were dispatched on only four occasions, the usual scale being just less than half that number. Few deep penetrations were attempted, and not once was the whole front-line strength of Bomber Command committed to battle. The total night loss rate during this period amounted to 2.5 per cent of sorties flown, a welcome reduction of one full point from the previous summer and early fall, but some raids still produced casualty figures that could only be categorized as alarming. On 30 November/1 December, for example, thirteen of 181 aircraft sent to Hamburg failed to return, 7.2 per cent of those dispatched, while a small raid on Münster

on 28/29 January 1942 claimed five of eighty-four bombers, 6 per cent of the total.⁴³

More acceptable results came on 28/29 December when eighty-six Wellingtons were sent to Wilhelmshaven and eighty-one Hampdens to Hül's. The main railway station and yards at Wilhelmshaven were extensively damaged and the chemical factories in Hül's hit hard, all for the loss of five aircraft (2.9 per cent), four of them Hampdens.⁴⁴ One of the Hampdens, flown by Flight Lieutenant S.B. Brackenbury of 408 Squadron, was shot down in a letter-perfect Helle Nachtjagd interception facilitated by radar-directed searchlights.

The moon was nearly full, and vis[ibility] was very good. About 30 min[ute]s away from the target, Hül's, we could see a large fire directly on track, we identified canal that led up to target, and proceeded to glide in from 14,000'. The flak was right over target, and we did a steady glide at 180 miles an hour. The Nav. released his bombs at 9000' and I started to climb. There was a great fire burning. Having climbed to 14000' again we were over searchlight belt. Stray searchlights picked us up but on turning into them, [I] put them off. Then a bluish searchlight picked us up and I couldn't shake it off. I climbed, dived, and did 90 degrees turns, but to no avail. Then more and more searchlights coned me and it was impossible to look out as it was momentarily blinding. There was no flak [but] I warned the crew to look out for fighters. I flew a straight course to get out of the cone. The W[ireless]/Op[erator] reported an a/c on the st[ar]b[oard] quarter high. We were still in the searchlights when the fighter attacked ... I heard the guns at the back give a burst and just then a white tracer went by. I turned sharply into the attack and then straighten[ed] up. I called up the crew but there was no answer, the i[n]t[er]c[om] was OK. The next attack was made shortly [after] and it was in the same quarter high. As soon as I saw the tracer I again turned into it. I could hear the cannon fire hitting the a/c and then saw port engine burst into flames. I pressed the [extinguishing] button, but nothing happened. I called on the i/c but it was u[n]s[erviceable]. The fuselage behind me was burning, and I think the fire was caused by the flares, which had not been released, having been hit by the cannon fire. The third attack was from the same place. I had no crew to tell me when to take evasive action, so I turned into the attack when I saw tracer. The fourth attack was from the stern. The tracer was going over and by each side, the fuselage was burning, and the engine. I decided to try a crash-land[ing], but at 5000' I decided I couldn't make it. In case any other crew was alive I pushed the call light button then baled out. I saw the trail of flame hit the ground and little red balls rolling on the ground. I lit [sic] safely in a pine tree.⁴⁵

Brackenbury languished in prisoner-of-war camps for the remainder of the war. The three other members of his crew were killed.

The slow pace of the winter's operations are well illustrated in the diaries of Nos 405 and 408 Squadrons. After reasonably successful raids on Wilhelmshaven and Emden in late December, the former flew only eight operations in all January 1942, involving a total of forty-four sorties. Among them, five crews had mechanical failures and brought their bombs back, two could not

find the target and did the same, and two returned early. In February the squadron flew only twenty-eight sorties, of which sixteen either jettisoned their bombs or returned with them. A raid on Mannheim carried out on 14/15 February was typical. With cloud cover varying between 7/10ths and 10/10ths, it was 'impossible for captains to identify sufficient ground features [and] no precise information can be given as regards success of attack.' The diarist added, somewhat optimistically, 'it is thought that most captains were over or near the target.'⁴⁶ Mannheim, meanwhile, reported only a light raid in which just two buildings were destroyed, fifteen were damaged, and one civilian was wounded.⁴⁷

No 408 Squadron had an even unhappier time. Uprooted from Syerston because of runway construction there, the squadron's flying elements moved first to Balderton in mid-December and then, when its grass fields were found to be too soft, when wet, to support fully loaded Hampdens, the operational component went to North Luffenham, leaving the training flights at Balderton and the administrative staff at Syerston. After a good effort in the 28/29 December raid on Hül's (for which the squadron was congratulated by the AOC), it was scheduled, along with the rest of the largely Hampden-equipped No 5 Group, to be used in daylight raids, under cloud cover and with fighter escort, against French, Dutch, Belgian, and German port facilities. These were routinely called off, however, whenever the predicted cloud or assigned fighter escort did not appear as scheduled. The squadron had no more luck than any other in Operation Fuller (the 'Channel dash' of the German fleet units, recounted in detail in chapters 6 and 12), but, because it had also been involved in night-time minelaying in the North Sea, it was able to share some of the credit for damaging *Scharnhorst* and *Gneisenau*, which hit air-laid mines in Frisian waters before reaching port.⁴⁸

Those mines (code-named Vegetables) had not been laid with *Scharnhorst*, *Gneisenau*, or *Prinze Eugen* in mind. Rather, the damage done to them was a serendipitous by-product of an on-going campaign of aerial mining against coastal shipping (code-named Gardening) in which Bomber Command had been engaged since mid-April 1940. Pre-war plans had originally given Coastal Command responsibility for all mining, but since its Blackburn Bothas and Bristol Beauforts lacked the range to carry the offensive to the Baltic, in the end Bomber Command – and more specifically No 5 Group – was assigned the role of long-range Gardening.⁴⁹ The responsibility for siting minefields rested with the Admiralty, and in the beginning the mines (all of them magnetic at this time, ranging between 1000 and 1500 lbs) were sown in heavily used 'choke' points where the water was deep enough (over thirty feet) to prevent their easy recovery. Although technically they could be laid from any height between 400 and 6000 feet, to ensure accuracy most Gardening operations took place at between 1000 and 2000 feet, at an air speed of 180–90 miles per hour.⁵⁰

The initial campaign lasted only until the Blitzkrieg against Western Europe, when No 5 Group was thrown into the Battle of France, and in that time just

over one hundred mines were sown – not very many, but enough to cause casualties and to force the Germans to divert resources to their anti-mining effort. Once France collapsed, the group was ordered to resume Gardening, but although more than one thousand mines were laid by the end of the year, sinking eighty-six ships and damaging another ten (for the loss of only thirty-one aircraft), Gardening was never the group's predominant activity. Mining sorties averaged only about one hundred a month and were usually mounted when cloud conditions militated against bombing missions. Because they required long-distance navigation yet resulted in relatively few engagements with enemy aircraft, it was soon realized that Gardening sorties were a good way to introduce new crews to the rigours of operations and the practice was adopted by all groups.⁵¹

In mid-December 1941, as part of the delayed Bomber Command expansion scheme, the two original RCAF squadrons were joined by a third and fourth, Nos 419 and 420. Allocated Wellington Mark Ic's pending the appearance of faster and higher-flying Mark III's, 419 Squadron was assigned to Mildenhall, Suffolk, in the No 3 Group area, a prewar field with concrete runways and permanent messes and quarters which it shared with an RAF Stirling squadron. Its first raid was flown on 11 January, when two machines were sent to Brest. No 420, equipped with Hampdens, began forming at Waddington, Lincolnshire, in late December and was declared ready for operations on 21 January, when five aircraft attacked Emden and a sixth dropped mines near Heligoland.⁵²

At the outset it had been agreed that a serious effort would be made to post all available RCAF personnel to the new units. No 3 Group, whose AOC was prepared to transfer predominantly Canadian crews from RAF to RCAF squadrons, kept the Air Ministry's promise so far as No 419 was concerned – on 11 January fully 85 per cent of the aircrew were Canadian.⁵³ However, despite the fact that RCAF graduates of the BCATP had been arriving in Britain by the thousands over the preceding seven months, this exemplary level of Canadianization was not always maintained. While the non-flying proportion rose steadily, the percentage of RCAF aircrew fell to 80.25 per cent on 26 January and to 67 per cent on 11 February before rising to 90 per cent by March. That was good compared with Nos 405 and 408 Squadrons, where the Canadianization rates on 31 December had been only 37 per cent and 31 per cent, respectively; and it was much better than in No 420 Squadron where, on 31 January, only one of sixty-eight aircrew positions was filled by a Canadian – because, it was said, RCAF graduates had not been sent to Hampden OTUs early enough.⁵³ Canadians may have been arriving in Britain in quantity, but as Slessor, the AOC of No 5 Group explained, they were not being posted to RCAF squadrons largely on account of oversights made by the Air Ministry and Flying Training Command.

⁵³ The corresponding figure for groundcrew and tradesmen was 6 per cent, but the responsibility for posting RCAF groundcrew to RCAF squadrons lay with Ottawa.

This business of the Article 15 Squadrons is awfully difficult, particularly until we can persuade the Air Ministry to post Dominion crews to the right OTUs serving the proper Dominion Squadrons ... What happens at the moment of course is that we get dribbles of crews at odd times and they have to go into anywhere where there is a vacancy; subsequently, it is very difficult to move them because it means breaking up crews and usually they are extremely averse to leaving the squadrons with which they have begun their operations.

Slessor, who later observed that the implications of Article XV were both 'senseless' and 'a pity from the broad point of view of Commonwealth unity,' was averse to breaking up crews, particularly if it meant taking Canadians 'away ... from, say, a Manchester or Lancaster Squadron' and posting them to an RCAF Hampden squadron – in which case 'we should never get the heavy Squadrons operational.'⁵⁴

Overseas Headquarters never pressed hard for the breaking-up of formed crews in order to hasten the process of Canadianization, nor even for the transfer of predominantly Canadian crews to RCAF squadrons, but Air Vice-Marshal H. Edwards, the RCAF's AO-in-C Overseas, was not happy with the Air Ministry's apparent inability to post Canadian components (pilots, observers, etc.) to the right OTUs in the appropriate mix and numbers, so they would have a chance to form themselves into all-Canadian crews. Made aware of his dissatisfaction, Air Vice-Marshal J.E.A. Baldwin, who was temporarily acting AOC-in-C of Bomber Command, directed his OTUs to ensure not only that crews with two or more Canadians were posted to RCAF squadrons but that as many crews as possible were 'one hundred per cent Dominion.' The air member for personnel at the Air Ministry, Air Marshal P. Babington, also noted that a special effort must be made to improve the situation. For the future, he added, the only specific problems anticipated related to the supply of observers and wireless operator/air gunners, of whom there seemed to be a temporary shortage.⁵⁵

Edwards thanked the Air Ministry for 'all that you are doing and have done to assist in bringing this perplexing question to a conclusion which will be satisfactory to everyone.' In fact, the AOC of No 4 Group, a New Zealander in the RAF who had one RCAF squadron under his command, was 'very much against the formation of ... all-Canadian squadrons' and, believing mixed units were happier, he told Edwards so. 'I feel that your Canadians miss a lot by being posted to RCAF Squadrons. In RAF Squadrons they mix and operate with English personnel and personnel from the other Dominions, and all get to train and respect each other. The various personnel gain a great deal from their association and assimilate fresh ideas from many parts of the world which broadens their outlook.'⁵⁶

However, Air Vice-Marshal Carr had already been instructed that the political situation was such 'that we must do everything possible, short of interfering with the operational efficiency of any particular crew,' to ensure their complete Canadianization as soon as possible. Five months later, in July, the Canadianization rate for aircrew in 419 Squadron was as laudable as ever, standing at 88 per cent, but the same could not be said of Carr's group. In

405 Squadron, now flying Halifax IIs, only half the aircrew were Canadian. In No 5 Group, meanwhile, where the shortage of Hampden-qualified crews was to have been corrected, the corresponding figure was 59 per cent for 420 Squadron and 41 per cent in No 408, admittedly a vast improvement since December but nothing like what was being accomplished in No 3 Group by Baldwin.⁵⁷

Although RCAF Headquarters viewed the progress in Canadianization up to February 1942 as 'entirely unsatisfactory',⁵⁸ it accepted that effective leadership required operational experience, a commodity that was still in short supply in the RCAF. Thus, as had been the case in Nos 405 and 408 Squadrons, the first commanding officer of No 419 was a Canadian in the RAF, Wing Commander J. Fulton, DFC, who had completed a tour of operations with No 99 Squadron and a posting to the Armament Defence Flight Experimental Section at Farnborough (for which he was awarded the Air Force Cross). The two flight commanders also came from the RAF: Squadron Leader E.G.B. Reid, a British officer, and Squadron Leader F.W.S. Turner, a veteran of Nos 107 and 110 Squadrons and a Canadian participant in the first bomber mission of the war.

Fulton established his presence early, as did his two flight commanders. Apparently ignoring the instructions issued to the senior officers of Nos 405 and 408 Squadrons to restrict their operational flying – presumably with the intention of conserving experienced leaders – Fulton participated in 419's first two raids (with at least one of the flight commanders going on each of the next three) and subsequently flew many more, at times camouflaging his presence by listing his second pilot on the battle order and then taking the latter's place. Every mistake, no matter how minor, was recorded and commented upon, and the commanding officer was not above criticizing himself. After its first raid, for example, the squadron's operational summary noted that Pilot Officer T.C. Cottier's crew checked to ensure that no bombs remained 'hung up' in the bomb bay (that is, had not dropped but were no longer locked in place), while Fulton's forgot this simple task. This was not just petty carping. On 21 January a British pilot inadvertently returned from Boulogne with six 250-lb bombs on board, having failed to check the bomb bay or to activate the jettison bar. Squadron Leader Turner made the same mistake, again at Boulogne, on 28 January, returning with two bombs; and on 31 January Sergeant J.F. Vezina had one bomb hang up. All these crews were lucky. Although bombs were fitted with arming vanes designed to ensure they did not become 'live' until they had fallen some distance through the air, such safety devices were not infallible. Detonation could occur on impact, and any landing made with bombs aboard and which were not still locked in place involved a degree of risk.⁵⁹

Some failed to press home their attacks or to find worthwhile alternate targets. On 21 January one crew returned from Boulogne with a full load of bombs, claiming it was 'too hazy to see anything definite' despite the fact that another had been able to find and attack searchlight and gun positions near the docks. Ten days later a third crew, seeing nothing of Brest, jettisoned its bombs in the Channel, while a fourth, having flown around for an hour look-

ing for a target, brought its bombs back to base. So far as the squadron diary was concerned, all this added up to 'a bad month.' Fulton was especially worried by 'the amazing lack of keenness among some of the observers,' and an instrument technician on the squadron was also aware of problems. Writing to a friend in a letter intercepted by the censors, he noted that so many 419 Squadron crews had been returning with full bomb loads in the past few weeks that he fully expected the British Broadcasting Corporation to report that 'a strong force of Bomber Command aircraft raided Brest & Emden. All our *bombs* returned safely.' Indeed, he continued, he had heard armourers 'complaining that the bombs have got more flying hours in than some of the aircraft.'⁶⁰

Sharing their risks and working tirelessly to correct such faults, Fulton earned a reputation of caring deeply for his men. One crew that completed a mission despite a serious fuel leak and had to make an emergency landing at Exeter, two hundred and fifty miles from Mildenhall, with almost nothing left in the tanks was astounded when, late the next day, their commanding officer flew in to see what had happened to them and berated the pilot for not turning back.⁶¹ This combination of dedication and concern would lead the squadron into taking Fulton's nickname for its own after his death in action, and eventually getting it officially recognized, so it became No 419 (Moose) Squadron, RCAF – the only Canadian squadron to be named after a person.

When the weather was good and operations seemed likely, crews had little opportunity to relax. While they might lounge around in the morning, waiting for orders, once No 419 was placed on 'stand by,' Pilot Officer Jerrold Morris recalled:

captains would follow Flight Commanders to their offices to find out if they were on the battle order. We had only just enough crews to man all aircraft, so unless there was some special assignment calling for a limited effort, everybody would be on ... Each crew was allotted its own aircraft and whenever possible had exclusive use of it. We air-tested the plane in the afternoon, going over all the equipment to make sure that it would be serviceable at night.

It was then time for the briefing.

When everyone was settled, Moose would take the stand and call for silence while the roll was called; then the briefing began. First he would give us general facts about the raid, such as the number of aircraft detailed and the concentration; then the Intelligence officer would outline the nature of the target and reasons for the attack. The Met man took over to give us an estimate of weather conditions likely to be encountered, and finally Moose would run over tactics to be employed, and give advice generally. He usually ended up by saying, 'Enemy fighters – I don't think you'll have any trouble with them. Good luck!'

Next, specific preparations had to be made.

When I got to the hangar, navigators were working around a large table with their topographical maps and plotting charts. Distances had to be entered on the flight plan with airspeeds and height; then the predicted winds were applied, and groundspeeds and courses to fly worked out. This gave an ETA (estimated time of arrival) for each leg. Navigators made their own calculations, and then compared results with others.

When we had finished we went to the locker room, where the rest of the crew members were wandering in to collect their gear. Dressing up was a long process for the gunners; it was a cold ride in the turrets and they wore as much clothing as they could from woollen underwear to electrically heated suits. On top of this went a Mae West buoyancy jacket and parachute harness.

Outside the hangars we stood around and chatted, waiting for transport. The last rays of the sun spread over the flat landscape and there was a chill in the air. The padre handed out flying rations, and the doctor offered caffeine pills to anyone inclined to be sleepy. We scrambled into vans, packed in tight, the navigators hugging their bags of equipment; at each dispersal a crew dropped off and farewells were shouted.

There was work to be done around the machines in the hour before take-off. Gas cocks to check, photoflashes to fuse and mount, detonators to load in the secret equipment [Gee] for emergency destruction and, more often than not, propaganda leaflets to stow near the flare-chute. The wireless operator and navigator had to arrange their gear and settle everything handy in their compartments. Finally the selector panel and bombsight were checked. When we were through we could lie down under the kite and smoke and chat with the ground crew.⁶²

Sometime thereafter, the flying control officer would make his rounds, engines would be started, and it was time to go. Cancellations (usually due to weather) at any time other than the beginning of this procedure obviously took their toll.

You went through all the motions, the briefing room, news of the target, the tension of waiting, even the final 'good luck' could be said, and the operation scrubbed. Everyone would be ready, physically and emotionally and the bubble was pricked. Rarely would such a cancellation release any jubilation; most of us went about our duties with no mention of fears or anxieties, just tried to make as many trips as possible, learning to build a shell against emotion. But inwardly we were bound to think.⁶³

A period of good weather and sustained operations would probably have helped the squadron to shake off the problems Fulton had identified, but as we have already seen, the first two weeks of February were marked by cloud, snow, and rain. Raids took place only on the nights of 6/7 and 10/11 February, in complete overcast, and neither could be judged successful. Indeed, Brest was so covered by cloud on the first occasion that three crews returned to base without attacking anything, while another, making more than one serious navigation error, finally jettisoned its bombs from an altitude of 2000 feet only seventeen miles from Nottingham. On 12 February the squadron participated in Operation Fuller. Three aircraft were dispatched, but only Fulton returned;

having seen nothing through thick haze, low cloud, and intermittent rain, he brought his bombs back. The next day, the first Wellington Mark III arrived and conversion training began. The shift to IIIs was not a major one and the squadron was not taken off operations, but because of the training effort only a few sorties were flown each night.⁶⁴

In No 420 Squadron, the first CO, Wing Commander J.D.D. Collier, DFC, the unfortunate Squadron Leader V.T.L. Wood, commander of B flight who was lost on the squadron's first mission, and Wood's successor, Squadron Leader G.L.B. Harris, were not Canadian; the officer commanding A flight, Squadron Leader G.C. Campbell, was, however, having joined the RAF in 1938. Because it was equipped with Hampdens, already obsolescent for most night-bombing operations, No 420 was heavily involved in mining operations, mainly off Heligoland, as well as in attacks on French ports, during its first few weeks of operations. In addition, six aircraft were committed to Operation Fuller, of which two, including that piloted by Squadron Leader Harris, the second flight commander to go missing in just three weeks, failed to return.⁶⁵

Bomber Command's unhappy performance in Operation Fuller was, in many respects, a fitting end to a most unsettling winter campaign that, since 10/11 November, had cost 116 aircraft on night bombing operations,⁶⁶ and had done little physical damage to Germany. Altogether, as *The Spectator* had suggested as early as 26 December, it was a complete puzzle to the British public.

The RAF has in the last week been well plastering Brest by night and day. It has visited Ostend. It has looked in at St. Nazaire. Once or twice, rather less recently, it has got as far as Wilhelmshaven, but a raid on Germany seems now the exception rather than the rule. The public is perplexed by this change of tactics, and with some reason. Weather, no doubt, has something to do with it, and no one wants to see brave men and good machines risked recklessly, but the Air Minister has promised repeatedly such intensified and sustained assaults on Germany's productive power and communications as will materially affect the future of the war. That, of course, is what our own interest demands, and Russia at the same time is entitled to expect from us the exertion of every possible effort against Germany. It is virtually on the RAF alone that we must rely for that. Actually, instead of 1941 ending with a crescendo of attack, Germany, except for a few towns in the north-west, has rarely had so long a period of uninterrupted nights. Some authoritative statement of the cause, and, if the facts justify it, a reiteration of Sir Archibald Sinclair's assurances regarding our intentions, would relieve the growing perplexity considerably.

Two days after Fuller, a new directive issued to Bomber Command dramatically altered how (and how frequently) all four Canadian squadrons would be employed. The policy of conservation was abandoned and High Wycombe was told to conduct operations 'without restriction, until further notice' against the industrial centres of western Germany except when weather conditions were 'unfavourable or ... your aircraft are likely to be

TABLE 3
The Changing Shape of Bomber Command, 27 March 1941–4 February 1943

Aircraft Type	Number of Operational Squadrons and Aircraft			
	27 March 1941	6 March 1942	18 September 1942	4 February 1943
<i>Light Bomber</i> Blenheim, Boston, Ventura, Mitchell Mosquito	9 squadrons (218 aircraft)	6 squadrons (91 aircraft)	4 squadrons (65 aircraft)	6 squadrons (95 aircraft)
<i>Medium Bomber</i> Whitley, Hampden, Wellington	32 squadrons (512 aircraft)	27 squadrons (509 aircraft)	11 squadrons (163 aircraft)	20 squadrons (354 aircraft)
<i>Heavy Bomber</i> Halifax, Stirling, Manchester, Lancaster	5 squadrons (80 aircraft)	11 squadrons (167 aircraft)	20 squadrons (335 aircraft)	33 $\frac{1}{2}$ squadrons (642 aircraft)

exposed to extreme hazards.⁶⁷ The new directive of 14 February 1942 was the handiwork of Air Commodore J.W. Baker, the director of bomber operations. Concluding that German morale was now at its lowest point since the beginning of the war, due largely to the Wehrmacht's failure to defeat the Soviet Union before the onset of winter, he urged that a renewed bombing offensive be opened against the large industrial centres of the Ruhr, adding that the objective should be the complete destruction of their built-up areas, something he now considered possible for the first time. His vision was not based on any startling increase in High Wycombe's strength since March 1941. Having lost just over a thousand crews in the past twelve months (and still seeing trained crews as well as formed units allocated to other theatres and commands), in March 1942 Bomber Command was only marginally larger than it had been a year before. In terms of equipment, moreover, now that the United States was in the war, it was inevitable that much American production originally intended for the RAF would go, instead, to equip the US Army Air Forces.⁶⁸ Although these losses would be offset to some extent by the appearance of the four-engined Stirlings, Halifaxes, and Lancasters, with their greater bomb-carrying capacity, the number of heavy bomber squadrons immediately available was not yet sufficient to make an appreciable difference (see table 3).⁶⁹

The destructive potential of the new blast bombs (complemented by torrents of incendiaries) also contributed to Baker's optimism, but the most significant innovation lying behind the new directive was Gee, the radio-navigation aid which had been hovering in the background and now, like a 'magic box of tricks,' was 'expected to produce the answer' to all of Bomber Command's woes. Originally scheduled for delivery in November or December 1941, the first hand-crafted Gee sets had begun to appear in January 1942 and they would be in good supply once mass production began in the spring. Moreover, it was assumed that Gee would serve not only as a navigation aid, able to guide crews to the target area, but also as a blind-bombing device that would

enable them to hit 'a selected area in or through 10/10ths cloud,' thereby increasing the number of nights when effective bombing was possible from an average of three a month to twenty.⁷⁰ Bad weather for takeoff and/or landing would prevent operations the other ten nights.

Such results were expected because of Gee's simplicity, security, and synchrony. Relatively easy to maintain, robust (the overall serviceability rate was 95 per cent between April 1942 and March 1943), involving no tell-tale emissions to attract fighters, and usable by an unlimited number of bombers, Gee consisted of three widely spaced transmitters in the United Kingdom sending out synchronized pulse signals and an airborne receiver which, after measuring the difference in time of receipt of these transmissions, provided the basis from which the aircraft's distance from each transmitter could be calculated. Transferring this data to specially prepared lattice-grid maps, a Gee operator could then establish his position and pass course corrections to his pilot.⁷¹

Moreover, the prospect of bombing through thick cloud, when the enemy's night-fighters were usually ineffective and often did not fly, and only radar-directed Flak was a real threat, was promising. Heavy, punishing, bombloads should be deliverable at little or no cost. Indeed, the only drawbacks were that Gee would, in time, be discovered by German radio intelligence and jammed – probably within six months of its introduction, but perhaps not before other navigation devices still in the developmental pipeline could be made operational. All parts of the Ruhr were within its range; cities in the area were large enough that near misses would still count; and they were all apparently susceptible to incendiary attack. But to achieve the greatest impact, Baker's offensive would have to begin soon, before the Wehrmacht recovered in the east and civilian morale improved. When he learned (just a few days after completing his work) that Gee could not be fitted to all aircraft for some time, Baker argued that the campaign should commence as scheduled, with those crews having Gee marking targets for those who did not.⁷²

Gradually, the pieces of a new bombing strategy were fitting together. Additional justification came when the Ministry of Economic Warfare (MEW) produced a list of objectives that coincided nicely with Baker's selection and gave it even greater credibility. Nothing was more important than the Ruhr. On 14 February, then, the 'primary object' of Bomber Command's operations became 'the morale of the enemy civil population and in particular, of the industrial workers,' and to that end High Wycombe was given a list of 'selected area targets,' of which Essen, Duisburg, Dusseldorf, and Cologne were the most important. To make sure there was no misunderstanding about what was being called for, the next day Portal told his DCAS to remind High Wycombe that 'the aiming points are to be the built-up areas, *not*, for instance, the dockyards or aircraft factories where these are mentioned.'⁷³

The new directive challenged everything Sir Richard Peirse had stood (and fought) for over the previous year, but his opinion no longer counted. He had been relieved of his command on 8 January 1942, victim of the costly raid on Berlin in November and the serious doubt as to whether, because of his con-

victions, he was the man to lead a sustained 'area bombing' offensive. When reports had begun to surface that the morale and confidence of Bomber Command was plummeting, his fate was sealed.⁷⁴

Arriving at High Wycombe on 22 February 1942, the new AOC-in-C, Air Marshal Arthur Harris, did not rush the implementation of the new directive. First, the German warships missed during Fuller were to be attacked in their home ports. Thus on 22/23 February fifty aircraft were sent to Wilhelmshaven to attack the floating repair dock, and then, on 25/26 and 26/27 February, to Kiel. Although no warship was damaged in the first raid on Kiel, almost 150 workmen were killed – about 3 per cent of the total number of German civilian deaths attributable to bombing in all of 1942 – when the accommodation ship *Monte Samiento* was hit and burnt out. The next night *Gneisenau* was knocked out of the war, with the loss of 116 of its crew; but the Danish town of Vejle, a hundred miles away, was also attacked by bomber crews who had lost their way.⁷⁵

Another raid slightly outside the main scope of the new bombing directive also deserves mention, both as a portent of things to come in terms of the intensity and technique of Bomber Command operations and as an illustration of how, from time to time, political considerations influenced target selection. French factories had, until now, been more or less immune to attack because of the fear of killing civilians, but with the development of new target-marking methods the opportunity to do damage to this virtually undefended class of target (and perhaps bolster French morale) could finally be seized. Churchill actively promoted the project and the Renault factory at Billancourt, just outside Paris, was selected as the target.⁷⁶

On 3/4 March 235 bombers, including crews from all four Canadian squadrons, set out in three waves, the first comprising of the most experienced personnel. The plan, laid down at High Wycombe and marking a new era in centralized direction, depended on strict timings, abundant use of flares, and a high degree of concentration over the target; since there was no Flak, bombing would be conducted from very low level. The raid met most of its goals. The target was easily seen, marking was good, and practically every crew claimed it had hit the factory. Indeed, perhaps the only criticism that could be offered was that made by Wing Commander J.D.D. Collier, leading No 420 Squadron, who noted that the flares were so numerous they were a 'hindrance,' their smoke blocking out details and forcing him to spend 'nearly an hour' looking for an aiming point before he could drop his bombs.⁷⁷ Three hundred bombs fell on the complex, knocking out two-fifths of its buildings, disrupting production for a month, and destroying 2300 trucks in an attack lasting just under two hours. Only one bomber was lost, but French casualties were heavy; 367 civilians, mainly factory workers living in the vicinity of the plant, were killed – too many for this type of attack to be repeated on a regular basis.⁷⁸

Five days later, on 8/9 March, came the initial raid launched in conformity with the new bombing directive – in effect, the first attack of the first battle of the Ruhr. Essen was the target, the aiming point was the centre of the old

town, and Gee was used to support the new Shaker plan of attack, which involved a first wave of aircraft laying a flare path six miles long upwind of the aiming point to mark the approach, a second wave of fire-raisers, and then the main force, carrying both high-explosives and incendiaries. Many of the 211 aircraft dispatched found the general target area, one pilot from No 420 Squadron reporting he could see the flares over Essen 'when approaching the Dutch coast.' But marking was not as good as anticipated, even with Gee, and much of the main force, partially blinded by smog, went awry.⁷⁹

The failure of the Shaker technique on this occasion was a disappointment, but it could be attributed to the crews' unfamiliarity with the new equipment, since only eleven of the twenty markers had actually used Gee. Navigation could be expected to get better as crews became more comfortable with, and confident in, the device. But this did not happen quickly. Following a second raid on Essen on 9/10 March, there was 'no evidence that any attack was delivered on the primary' while Duisburg and Hamborn were both bombed. The next night solace was taken from the fact that although Essen was covered in cloud, 'one aircraft over Dortmund may ... have achieved useful results.' The outcome was better on 12/13 March, when Kiel was the target and Gee was used as a navigation aid to the limit of its range; and even more encouraging at Cologne, one night later, when 50 per cent of the attacking force bombed the city. The markers, illuminators, and fire-raisers all did a good job, and the main force had no difficulty in finding the objective. However, on both these raids skies were relatively clear and this may have had more to do with improved results than Gee or Shaker.⁸⁰

Weather and the lunar cycle forced a ten-day break in major bombing operations following the Cologne raid, but Gardening continued on a more intensive basis than ever before. Harris had decided that all groups should take part in aerial mining as an alternative to 'wasting' bombs on naval targets and, indeed, on 25 March Bomber Command secured the responsibility for mine-laying in home waters as well, so long as it did not 'prejudice' the 'normal bombing effort.' In No 5 Group, meanwhile, half of all sorties flown during March were to lay mines, and by the end of the month the total number of ships sunk by aerial mines since April 1940 stood at 157 (159,465 tons), with a further twenty-four damaged (99,646 tons).⁸¹

As the weather and moon conditions improved, Bomber Command returned to Essen and again employed the Shaker technique of marking and fire-raising which, since it had received its Gee sets, now involved No 419 Squadron in the first wave. Despite good visibility on 25/26 March, crews were drawn away from the city by 'large fires burning in the open country to the north,' while the next night there was 'no indication that any useful concentration was achieved over the target or over any other built-up area.'⁸² Once again, Gee was something less than the anticipated revolutionary improvement. 'It could take us to the Ruhr,' one senior officer recalled, 'and within sight of the objective, but the precise aiming point, more often than not hidden by smoke and industrial haze, had to be discovered by visual means – an almost impossible

task in the deluge of heavy flak bursts and dazzling searchlights.⁸³ Pilot Officer Jerrold Morris would have agreed.

Long before you reached the target area you would see ahead of you a confusing maze of searchlights quartering the sky, some in small groups, others stacked in cones of twenty or more. These often had a victim transfixed, as if pinned to the sky, their apex filled with red bursts of heavy flak. The ground would soon be lit with lines of reconnaissance flares like suspended street lights, here and there illuminating water, perhaps a section of river, that you would frantically try to identify. As the raid developed, sticks of incendiaries criss-crossed the ground sparkling incandescent white, until a red glow would show the start of a fire.

The Germans liberally sprayed the ground with dummy incendiaries and imitation fire blocks in the neighbourhood of important targets, hoping to attract a share of the bombs. Gun flashes, photoflashes, bomb-bursts, streams of tracer of all colours, and everywhere searchlights – it was all very confusing, especially when the air gunners were directing the pilot to avoid flak and searchlights in all directions at the same time.⁸⁴

Operations over Essen and the rest of the Ruhr looked much the same from the German perspective. On 26/27 March Wilhelm Johnen, the pilot of an Me 110 from *I/Nachtjagdgeschwader 1* based at Venlo in Northern Belgium, was patrolling an area near Duisburg which, so scattered was the bombing, he mistook for the main objective.

A bare twenty minutes later I reached the scheduled height of 17,000 feet and circled above my beacon west of Wesel. The sky towered majestically above me and the stars seemed to be closer, so wonderfully bright was the night ... The earth was far away ... How dark it was below. Here and there I could see the blood red glow of the blast furnaces which, now that the enemy was approaching, would be extinguished. A few searchlights suddenly went on and began their play in the sky ... From south to north in a broad sweep glittered a smooth grey ribbon – the Rhine ... The first flares fell and flooded the landscape with a ghostly light. The British were looking for their target.

Told to attack 'any machine caught in the searchlight beams above 15,000 feet,' the ceiling set for the Flak, he very quickly found a Wellington.

Hesitantly the white beams flitted to and fro like the arms of an octopus until at last they had caught a bomber. The British machine was flying at about 14,500 feet and took no avoiding action. The gunners below made him their target but they were shooting too far ahead. I decided to attack. Risop [Johnen's radio operator] quickly transmitted the code word 'PAUKE, PAUKE' to the ground station. I dived from my superior altitude and got the bomber in my sights. The air speed indicator needle rose to 330 mph. The bomber grew ever larger in the sights. Now I could clearly see the tall tail unit and the rear gunner's Perspex turret. My machine came into the searchlight area and a few well-aimed bursts lashed the bomber's fuselage, tearing off huge pieces of the fabric. The Tommy was on fire and turned over on its back.

Later that night Johnen (who would end the war credited with thirty-four enemy machines destroyed) attacked a Stirling (the first he had ever seen), but his Messerschmitt was riddled by one of the bomber's gunners, set on fire, and then exploded at 9000 feet. Johnen parachuted to safety, but Risop was already dead.⁸⁵

Bomber Command's loss rate over Essen, given the meagre damage done, was cause for concern: thirty-five of 893 sorties (3.9 per cent) overall, but twenty of 369 sorties (5.4 per cent) on the last two raids. Of these, just over half had been shot down by night-fighters,⁸⁶ yet to many crews Flak was the main worry.

The most alarming factor of the German defences was undoubtedly the searchlights. They had master beams, radar controlled, during the preliminary search ...once caught, every searchlight in range would fix you and, wriggle and squirm as you might, you couldn't shake them off. Then the guns joined in and filled the apex of the cone with bursts; it was a terrifying thing to watch. All too often the sequel was a small flame, burning bright as the aircraft fell towards the ground, followed by the beams all the way down, as if loath to leave their victim; then darkness, until the beams lifted to begin their search again. Everyone dreaded being coned; if it happened, the only sensible thing to do was to head away from the defended area by the shortest route, but pilots often executed hair-raising manoeuvres, falling into spins or diving almost to ground level: some got away with it.⁸⁷

Harris needed a success. He was undoubtedly aware of the Air Ministry's unhappiness with Bomber Command under Peirse, and the rumblings of discontent had not stopped. Group Captain Bufton (deputy DBOps), for example, worried that High Wycombe was wasting what might be a last, 'fleeting opportunity ... to prove its worth and for the Air Staff to justify its bomber policy,' while Air Commodore Baker (DBOps) still seemed to view Bomber Command as a poorly knit team badly in need of 'imaginative, co-ordinated and positive direction and control.'⁸⁸

So far, Harris and the air staff had been at odds over almost every issue that came before them except targeting. Although the AOC-in-C agreed that the appearance of Gee and other navigation aids required dividing the observer's responsibilities between two specialist aircrew categories – the navigator, who would guide the pilot to the target area, and the bomb-aimer, who would direct him on the run-up to the aiming point – he was not at all happy with the air staff's decision to do away with second pilots on heavy bombers. That proposal, while increasing the number of operational captains available, nevertheless ran afoul of long-standing conventional wisdom regarding the complexities of piloting large aircraft. 'We all moaned like hell and didn't believe it could be done,' Morris recalls. 'We were used to relieving each other every few hours, and thought the fatigue would be excessive on long trips.' But the AOC-in-C's arguments against the policy went unheeded, as did his request to double the commitment of crews to Bomber Command to four tours, two operational and two at OTUs.⁸⁹ Moreover, he greatly feared that he would continue to lose

squadrons and individual crews to other commands. The 'situation now and the outlook for the future is desperate,' he told his group commanders. 'This is directly due to inexcusable, needless, and fantastic extravagance in posting broadcast throughout the world, for every conceivable job except bombing, vast numbers of OTU trained bomber crews, many of whom have never started, let alone completed, an operational tour ... I am at present engaged in a riot with the personnel side of the Air Ministry, whom I have filled with alarm and despondency on the subject.'⁹⁰

There was also harsh criticism outside the air force. Although Harris bristled at what he felt was uninformed sniping by parliamentarians and the 'gutter' press, his real complaint was over the demands made by the army and navy not only to secure a greater allocation of air resources for themselves, at Bomber Command's expense if necessary, but to have a greater say in the making of air policy as well. That was unlikely so long as Churchill supported the bomber offensive unequivocally. On 13 March, however, after the first three unproductive raids on Essen, the prime minister was inclined to think that while bombing was 'better than doing nothing, and indeed is a formidable method of injuring the enemy,' it was not going to be decisive.⁹¹

Searching for a dramatic (and inexpensive) illustration of area bombing's potential, and with the Ruhr apparently too tough a nut to crack, Harris settled on the ancient Hanseatic port of Lübeck, included in the February directive as an alternative industrial objective. Situated on the Baltic, relatively easy to find, poorly defended, and, above all, extremely susceptible to fire because of its narrow streets and old, timbered houses, the city was attacked by 234 aircraft on 28/29 March 1942. In clear skies, aided by a nearly full moon which 'facilitated pin-pointing of coastal features despite the presence of ice,' Bomber Command registered an outstanding success. Employing mixed bomb-loads (the total force carried 144 tons of incendiaries and 159 tons of high-explosives, including as many 4000-lb blast bombs as possible), 191 crews claimed to have bombed the city centre, turning it into 'one mass of reddish orange glow,' destroying 1425 buildings and severely damaging another 1976. Over 90 per cent of the total were residential buildings, so it was surprising, perhaps, that only 312 people were killed and 136 seriously wounded; but 15,000 were rendered homeless. Bomber Command's casualties were heavy: twelve aircraft (including one from No 419 Squadron) failed to return, a loss rate of 5 per cent, many falling victim to *Dunkelnachtjagd* crews.⁹²

Losses, and the weather, again persuaded Harris to give his men a week's rest from major raids, but not from Gardening, with its normally manageable casualty rate. On 1/2 April No 419 became the first Wellington squadron to join the mining campaign, and by the end of the month it had laid thirty-one mines without loss. (The RCAF total for the month was ninety-eight.) No 408 Squadron was not so fortunate, however. On 27/28 March, when most of Bomber Command was attempting to support the naval and commando raid on St Nazaire, it committed eight aircraft to lay mines on the north-west German coast, including five freshmen crews sent to the Nectarines minefield skirting

the Frisian Islands. These five all returned safely to base, but the three veteran crews, sent to the Yams minefield on the Wilhelmshaven approaches, were never heard from again.⁹³

After this brief interlude, Bomber Command returned to the Ruhr, attacking Cologne, Dortmund (twice), Hamburg (twice), and Essen (three times) between 5/6 and 17/18 April. The results were every bit as bad as before. Bombing photographs rarely showed the target, and bomb damage recorded by subsequent photographic reconnaissance flights was negligible. More unsettling still, several of these raids had occurred in the marginal weather that simply had to be overcome (presumably with Gee's help) if the sustained area offensive called for by the 14 February directive was to have any chance of accomplishing its objectives; in that respect it was clear that current methods of target-finding and marking were inadequate. The Dortmund raids of 14/15 and 15/16 April were typical. Despite using Gee, most crews from No 419 Squadron could not identify the target area with any certainty and so could only assume they had dropped their incendiaries in it. When other squadrons arrived, the fires they aimed at may or may not have been in the city. On 14/15 April, when the cloud cover was not particularly heavy, one 420 Squadron pilot claimed no more than that his 'bombs dropped over Germany.'⁹⁴

Whether Gee would ever live up to expectations as a blind-bombing device was becoming increasingly doubtful. An advanced design whose performance startled the Germans when they tested a set recovered from a downed bomber, Gee was nevertheless neither flawless nor capable of pinpoint accuracy. Its systemic error – due entirely to deficiencies inherent in the equipment and having nothing to do with mistakes made by operators – meant that, even with a purportedly accurate fix, a crew could be sure only that it was somewhere within a rough diamond-shaped area three to four miles long by one-half mile at its widest point.⁹⁵

A concrete illustration of Gee's limitations came on 22/23 April, when sixty-nine aircraft were sent to Cologne with instructions to bomb on their Gee-fix only. Although some bombs fell on the city, others hit as far as ten miles away. No 419 Squadron had 'a black night.' Of eleven aircraft detailed for the raid, three suffered Gee failure – one before takeoff (the sortie was scrubbed), one on the way to the target (the pilot bombed Balkenburg), and one on the homeward route. Two other machines returned early with unserviceable rear turrets and, following a 'misunderstanding,' one rear gunner baled out from a perfectly serviceable aircraft over Ipswich.⁹⁶

Perhaps the only redeeming feature of these and other recent raids was that the loss rate fell one full percentage point from the average incurred between 8 and 27 March. But casualties were never distributed equally and on some nights individual squadrons suffered heavily. Of the 13 aircraft missing from 360 sent on the two Dortmund raids already described, No 420 Squadron lost two and No 405 Squadron three (half of its effort for the night of 14/15 April).⁹⁷ Flight Lieutenant J.D Pattison, a former fighter pilot and Battle of Britain veteran who had recently joined 419 Squadron, was over the city on

14/15 April, and he described the raid (his first) as a 'strange sight to the novice.'

The target area was brilliantly lit up by flares which were being shot up from the ground to aid the night-fighters by silhouetting the bombers against the low cloud and haze. Off our starboard bow, as we ran in to bomb, there was a huge cone made up of about seventy-five searchlights and reaching up to over 15,000 feet. Into this cone, *Flak* was being pumped by many guns in the area ... The flares, fires, and searchlights made it very uncomfortable around the target as it was lit up like day. One feels so conspicuous in a bomber which has neither darkness nor cloud to hide in ... As we came up to the Dutch coast on the route home, I was just beginning to think the whole thing was fairly easy and the dangers much exaggerated, when things started to happen off our port side. About five miles away a searchlight came on, followed immediately by five or six others, forming a cone at about our height, 12,000 feet, into which they started shooting flak. Almost at once the aircraft in the apex of the cone caught fire and began to glow, as it descended slowly. The searchlights held it all the way down, as it burned like a great golden star, and exploded as it hit the deck. After that incident we got out to sea as quickly as we could. Some poor chap, almost safely over the coast, had been unlucky enough to fly smack over Ostend; that was a good lesson for me; I never again underestimated what we were up against.⁹⁸

There was still reason to experiment with Gee in area attacks, however, and to this end Rostock, another old and inflammable port on the Baltic, was attacked on four successive nights. The first raid, when incendiaries made up two-thirds of the bombload, was a failure, most bombs falling in the suburbs rather than the city centre. The second saw more aircraft over the town, but the Heinkel works, the main industrial target, was not hit. The third attack finally did damage, while the fourth – again employing two-thirds incendiaries – was, in the words of the British official history, a 'masterpiece.'⁹⁹ Fifty-two bombing photographs showed the target area, and thirteen revealed the Heinkel factory. The fifty-five bombers from Nos 3 and 5 Groups (including 420 Squadron), directed all four times to make low-level precision attacks on the factory while the rest bombed the city as a whole, eventually did so accurately, No 3 Group bombing from about 6000 feet, No 5 Group from below 2000, and the entire raid was over in less than an hour. All told, the four raids – but mainly the last two – destroyed 70 per cent of the old town, briefly persuading Joseph Goebbels, German propaganda minister, that 'community life ... is practically at an end.' Despite the appearance of cataclysmic damage, however, production at the Heinkel works actually returned to 100 per cent within three days.¹⁰⁰

With Rostock apparently destroyed, Bomber Command turned to other targets over the next month, generally avoiding the Ruhr when conditions there favoured the defence. Nevertheless, losses could still be heavy on occasion. No 419 Squadron suffered 12 per cent casualties in the month or so following the Rostock raids, and on 28/29 April very nearly lost its commanding officer. Wing Commander Fulton was attacked by a Messerschmitt 110 over Kiel

which, his rear gunner recalled, was 'about 100 yards away when I spotted him.' 'I only got in about twelve rounds before he began firing. Cannon shells and machine-gun bullets smashed into our "Wimpey." When the fighter closed in to twenty yards the "wingco" flung the kite over, stuck the nose down, and turned back into the dark, away from the moon.' Damage to the aircraft was extensive. The hydraulics had been hit, so that the undercarriage dropped and the bomb-bay doors fell open, the port airscrew was splintered, there were countless holes in the fuselage, and the rear gunner had to be chopped out of his turret. But Fulton made his way back to Mildenhall, made a successful belly landing in which no one was hurt, and was subsequently awarded a DSO.¹⁰¹

During these last raids operational research suggested that Gee was doubling the number of aircraft arriving over the target area, leading one observer to describe it as an 'unqualified success' as a navigation aid. (Even Harris, now, was prepared to admit that as a blind-bombing device it was an abysmal failure, and that its sole contribution was to get bomber crews 'into [the] neighbourhood' of the target.) Yet as much as Gee was helping to solve the problem of closing the last ten or twenty miles to the target area, many crews were still being fooled by decoy fires near the objective.¹⁰² When it happened again at Mannheim on 19/20 May, Harris was livid.

It is apparent from the night photographs and from the reports of crews, that almost the whole effort of the raid was wasted in bombing large fires in the local forests, and possibly decoy fires. Nevertheless, in spite of the now incontrovertible evidence that this is what in fact occurred, the reports of the crews on their return from the raid were most definite in very many cases that they had reached the town and bombed it. Many reports spoke of recognising features of the town and the river, and of fires being definitely located in the town. The cause of this failure is beyond doubt to be found in the easy manner in which crews are misled by decoy fires or by fires in the wrong place. If any fire is distinctive in its nature and comparatively easy to recognise it is a forest fire. The results on this occasion show that few if any of the crews took the trouble, or alternatively came low enough, to make certain of the nature of the fires. AOCs must again personally impress on crews the fearful waste of effort which is occasioned if, after all the labour in providing them with training and with aircraft, their operations are rendered nugatory owing to lack of skill or carelessness in pushing home their attacks to the correct objectives. In particular, somehow or other we must cure this disease, for it is a disease, of wasting bombs wholesale upon decoy fires ... Apart from impressing upon them the necessity to avoid being sold dummies or misled by other peoples' efforts, they must be made to realise that, within the short compass of their operational career, if they do not on every flight make some worthwhile contribution to the aim of destroying valuable objectives then the whole of the effort that has been put into training and mounting them is being thrown away and the conclusion of the war indefinitely postponed.

If such failures continued, Harris added, crews were to be told (as they had been after the first two raids on Rostock) that they would be sent back to

Mannheim again and again until the job was done properly. He also warned his group commanders that if they did not exercise closer supervision, the 'large number of influential people who ... are quite convinced that the Bomber force is not justified ... will have their way in destroying it, and consequently possibly the RAF also as a separate service.'¹⁰³

That, of course, was a wild exaggeration. Despite the general staff's talk about forming a ninety-squadron army air force, and the navy's desire to increase the resources available for maritime war, the RAF's independence was still secure. There was, however, considerable discontent with the government's bombing policy and with the way the bombing offensive was being conducted. Although Lord Cherwell, Churchill's scientific adviser, fully endorsed the concept of area bombing, arguing that 'dehousing' the German labour force was a worthwhile objective in itself and that direct damage to factories was not necessary, both Sir Henry Tizard, scientific adviser to the air staff, and P.M.S. Blackett, head of operational research at Coastal Command, believed that High Wycombe must do significantly more in the fight against the U-boat. In time, their opinions, along with those of the naval and army staffs, led to the creation of a formal inquiry under Mr Justice Singleton to study the most effective use of the bomber force and, in particular, to suggest ways in which it could contribute more to the Battle of the Atlantic. Although the inquiry caused a few anxious moments at High Wycombe, Singleton concluded that, since it was impossible to predict how accurate bombing might become in eighteen months, and since, in the interim, Bomber Command could not bomb accurately enough to damage U-boat factories, there was nothing to be gained from issuing a new bombing directive giving priority to these targets.¹⁰⁴

Others found different reasons to object to area bombing. Slessor, never an advocate and now, as ACAS (Policy), in a position of some influence, complained that the operations of Bomber Command were 'not co-ordinated with our strategic policy as a whole.' In particular, he was concerned that 'the directive under which Bomber Command are operating contains no reference to the G[erman] A[ir] F[orce], lays down the primary object as the morale of the civil population, and in the list of priority targets only includes three out of twenty-nine that have any direct relation to the German aircraft industry at all.' Acknowledging the difficulty in attacking the latter, Slessor nevertheless believed it necessary to revise the 14 February directive to include such targets 'even if it only means selecting objectives for area bombing which will lower the morale and dislocate the lives of workers in the aircraft or associated industries.' Group Captain Bufton went further, arguing that only daylight raids on aircraft factories (like that against Augsburg conducted, experimentally, on 17 April, which cost seven of the twelve Lancasters involved) could do significant damage. Air Vice-Marshal N.H. Bottomley, ACAS (Ops), agreed that such targets needed attention, and asked that they be included as alternates in the night-bombing campaign.¹⁰⁵

More threatening still was the powerful evidence that area bombing would not seriously dislocate industrial production, either directly, by the destruction of physical plant, or indirectly, through its impact on workers' morale. Closer

study showed that the examples cited by Lord Cherwell to justify a 'dehousing' campaign against Germany indicated that there was no 'panic resulting either from a series of raids or from a single raid' in the English cities bombed during the enemy's night-time Blitz, while the loss of production attributable to air raids on Hull and Birmingham in 1940 and 1941 had been no more than 5 per cent. At the same time, the officer who analysed the effects of the Luftwaffe's attacks on Bristol, and who had originally concluded that worker morale was more vulnerable than factory buildings, admitted that he, too, had been wrong. Morale had actually recovered very quickly, he explained, so 'our primary aim ought to be the direct destruction of the factory.'¹⁰⁶

Portal and Harris were not to be swayed, however, and they took comfort from recent prisoner-of-war interrogations, neutral newspapers, and intelligence agents suggesting that German morale could be severely strained 'by bringing home to the maximum number of German civilians the utmost horrors of war.'¹⁰⁷ To persuade others of this effect, however, and to satisfy them that anything other than an intense and sustained area offensive was misguided, would require yet another convincing demonstration by Bomber Command, involving the largest possible force and the lowest possible casualty rate. Harris arrived at a characteristic solution, dramatic in its stark simplicity. A thousand bombers over a single city on a single night had the right, Wagnerian, ring to it.

The Expansion of Bomber Command, Summer 1942

While Bomber Command had been experimenting with night operations, the enemy had been developing his defences. Now, in the spring of 1942, High Wycombe's main concern was with General der Nachtjagd Josef Kammhuber's system of radar-assisted, ground-controlled interception.

Piecing together the changes in the German air-defence puzzle had taken several months. That Freya provided the enemy with early warning of air raids had been acknowledged since at least October 1941. Würzburg had been identified shortly thereafter (and a nearly complete set captured in the commando raid on Bruneval on 27 February 1942), but that it was used to control fighters as well as Flak was not fully understood until installations were discovered around night-fighter bases at St Trond, Belgium, Domberg in the Scheldt Estuary, and later in Denmark. Intelligence officers were then able to deduce how the system worked: the Freya stations gave a generalized warning of impending attack and furnished the Würzburgs with the data on the enemy's course and height they needed to begin their search. These assumptions, tested through aerial reconnaissance and electronic monitoring of the enemy's response to such probes, completed most of the rest of the picture. By May 1942 High Wycombe knew not only that German controllers handled only one interception at a time, but also that fighters rarely strayed beyond the range of their ground control radars – information that had allowed the staff to deduce the size, shape, and boundaries of the night-fighter 'boxes.' Corroborated by casualty statistics showing that the enemy usually did better against dispersed raids, this analysis persuaded Sir Arthur Harris (he was knighted on 11 June) of the value of concentration.

Although Kammhuber had lost the searchlights on which his defensive system had originally relied so heavily – he called their transfer to the major cities to satisfy disgruntled Gauleiters 'a terrible blow' – their absence was more than compensated for by new equipment and better tactics. Almost every night-fighter box now had two Würzburg or the improved, longer-range Würzburg-Riese ground radars, one to track the bomber, the other to direct an interceptor to a position a few hundred yards behind its quarry. The old Freya early warning chain was also being supplemented by longer-range radars, Mammot and Wasserman, with height-finding and identification friend or foe



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capabilities (IFF),² while General Wolfgang Martini's Horchdienst, the German radio intelligence service, had greatly expanded its surveillance effort. By eavesdropping on the warnings of Bomber Command operations passed to Allied shipping in the English Channel and monitoring the testing of electronic equipment that had to take place prior to a raid, Martini was often able to predict as early as mid-afternoon not only that an attack was planned for that night, but also which squadrons were involved and what routes they would be taking. Unhappily, from Kammhuber's perspective, there was no direct link in the chain of command between his headquarters and Martini, and the informal arrangements to exchange information sometimes broke down; but when the system worked, the night-fighter force was given a considerable head-start in the coming battle.²

Night air defence had also been the object of considerable scientific research. Spanner, an infra-red device to detect hot exhaust gases and flames introduced as early as 1941, was known to the British and featured in their assessments of German capabilities until August 1942, but it was too often fooled by ground fires (and sometimes even the moon) to be of much use. Of more immediate importance, the IFF set developed for the Freya and other early warning radars allowed more detailed and specific warnings to be passed to the Würzburg operators, whose equipment still had no IFF. The great breakthrough, however, was the appearance of Lichtenstein B/C airborne interception (AI) radar, finally available in quantity in the late spring and early summer of 1942.³

Kammhuber was not responsible for the delay. Although he may not have recognized the importance of radar when first appointed in 1940, he had soon learned precisely what he wanted: a lightweight apparatus with streamlined aerials, giving 360° search and having a range from five hundred yards to ten miles. But he had not enjoyed the support of his superiors, Göring for one declaring that 'a fighter cannot have things [ie, aerials] sprouting from its head.' Then, when the need for airborne radar could no longer be challenged, weaknesses in the German electronics industry, particularly in those sectors designing and producing vacuum tubes, and the non-technical bent of most of the Luftwaffe's senior staff, caused further delays.⁴

With the help of Martini, however, Lichtenstein was ready for testing in the early summer of 1941. The set was not all that Kammhuber had asked for, having only 140° horizontal search, 60° vertical, and a range between two hundred yards and two miles. Design and production problems delayed the project, however – many of the first sets produced were routinely unserviceable – and, apart from six successful interceptions in August and September 1941, when the equipment was being tested, the first AI-assisted victory did not occur until June 1942. By then, Lichtenstein's reputation as an untrustworthy device

² Fitted in aircraft and consisting of a combined receiver and transmitter, both British and German IFF equipment responded to signals emitted from air-defence radars with distinctive and sometimes coded replies which indicated the nationality (and sometimes the type) of aircraft.

was widespread, as was the knowledge that it robbed fighters of twenty-five miles per hour in speed, leaving some types with only the barest margin of superiority over the bombers they were trying to track. In time, modifications and refinements in design, production, and calibration produced a reliable piece of equipment, but even so Kammhuber had to overcome the prejudices of a group of fighter pilots who, like all their ilk, still preferred to slip anything that tied them to the surly bonds of Earth. Although AI radar theoretically extended their freedom by making freelance operations more practical, used in the way Kammhuber intended it would be just another bothersome link to ground control. Rather than allowing his fighters to stalk their prey all the way into Germany and back, as the British expected, he was determined to strengthen his system of ground-controlled interception in a procedure called *Himmelbett*.⁵

Himmelbett was the logical successor to, and extension of, all Kammhuber's previous thinking about air defence. As he conceived it, airborne radar would simply replace searchlights as the main tool in 'illuminating' enemy aircraft. Once the early warning radars picked up approaching aircraft, determined they were hostile, and passed on their height and bearing to the ground control stations, the Würzburg operators would swing into action, one – the 'blue' – fixing on the night-fighter circling his beacon, the other – the 'red' – tracking whichever bomber (if there were more than one) offered the best chance of interception. When both Würzburgs had picked up their targets, the data they provided were passed to plotters who translated this information into graphic form by projecting coloured dots representing the bomber and the fighter onto a translucent screen. Now the ground controller took over. Watching the situation unfold before him, he passed courses, speeds, and altitudes to the fighter pilot, vectoring him into a position slightly below and about a mile or so behind the bomber, where the chances of his AI acquiring the target were good. The controller then maintained a watching brief while the fighter's radar operator guided his pilot into visual contact. If an attack could not be made before the fighter ran up against the boundary of its 'box,' however, the pilot was required to return to his beacon and await the next call, leaving the bomber to some other fate. If two fighters were stationed in the 'box,' a second set-piece attack was perhaps already underway against another target.

Simple, orderly, even elegant, *Himmelbett* was seductive, if inflexible. All that was required to defeat Bomber Command, it seemed, was to expand the system so that no part of Germany or its western and northern approaches was left unboxed. When that had been achieved, enemy bombers could be engaged all the way to the target and back through a succession of ground-controlled interceptions, and there would be no reason ever to resort to the potential chaos of freelance pursuit.⁶ In early May 1942, then, Kammhuber asked for sufficient resources to extend his system throughout the Reich. That would entail

⁵ This emphasis on inflexible, centralized control was in sharp contrast to the decentralization and flexibility of German army doctrine as expressed in the mission-oriented orders of *Auftragstaktik*, with which Kammhuber would have been familiar before his transfer to the Luftwaffe.

production of six hundred additional Würzburgs, the provision of 270 night-fighters and crews (three new Geschwader), an equal number of Lichtenstein B/C sets, and an additional 150,000 ground personnel. He also asked that work begin to develop panoramic radar, which would give 360° coverage, and purpose-built night-fighters that would not be transferred out of his command even in the event of emergencies elsewhere.⁶

Had Bomber Command been causing serious damage to Germany or had the Luftwaffe been free of its massive commitments in the east, Kammhuber's requests might have received a more sympathetic hearing. But in May 1942 the night air war was, for Hitler and his acolytes, still a minor, incidental skirmish, almost a side-show, while the scale and intensity of operations in the Soviet Union were still growing. Kammhuber's demands were therefore denied. The design of specialized night-fighters was put off; most Junkers Ju 88s and Dornier Do 217s continued to be allocated to the Ostfront as bombers; radar development did not receive a higher priority; and, at the political level at least, Flak remained the air-defence weapon of choice.⁷

For the immediate future, then, Kammhuber would have to rely on a force cobbled together from what was available: some two hundred machines – about 60 per cent of establishment – made up of a disparate collection of Me 109s without radar available for point defence over target cities; Do 217s equipped with dive brakes and bomb racks and rightly regarded as 'absolute monsters' in the night-fighter role; and Me 110s and Ju 88s, eventually the mainstay of the force but which, with their Lichtenstein antennae, were only marginally faster than the current Halifax and Lancaster variants. For all these reasons, the Himmelbett system grew more slowly than Kammhuber had hoped for. Expansion took place mainly within the original western belt, extending from the tip of Denmark to Paris, in the Ruhr, and around the Frankfurt, Mannheim, and Stuttgart industrial complex. Parts of Germany, particularly in the south and east, were left without adequate fighter protection, and it was still possible for a bomber force to burst through the outer crust into relatively ill-defended air space. Everything hinged on the results obtained over Holland, the most heavily used bomber route. It was here that the best pilots, controllers, and ground support units were concentrated – and it was here, for the moment, that Bomber Command's losses were highest.⁸

Himmelbett had been designed to meet the needs of night air defence as they had developed over the past year, when Bomber Command crews had gone about their business individually. Unknown to the Luftwaffe, however, the scale and style of the bombing offensive against Germany was about to expand and change dramatically. At the time of his appointment as AOC-in-C, Harris could normally call upon four or five hundred crews on any given night, but he was now contemplating launching a thousand bombers, organized into a compact stream no more than forty miles wide, 'against a single target in a single night.'⁹ The material effect of such a blow might be great but the moral effect would surely be greater, both on the enemy and on those in Britain who were incessantly questioning the value of the 'strategic bombing' campaign. To have the desired impact, Harris knew that his 'thousand plan,' or Operation

Millennium, had to be directed against a major industrial centre 'round which the enemy was bound to concentrate effective and heavy defences. So far all that the Lübeck and Rostock attacks had proved was that we could saturate the passive defences of a town by concentration of attack; it remained to be seen whether the active and passive defences of a vital industrial area could be similarly overcome.¹⁰ It was the requirement to swamp the enemy's defences and to produce 'mass destruction around the aiming point'¹¹ that demanded the use of a great many aircraft, but there was nothing special about the figure of one thousand other than its public relations value.

To obtain one thousand aircraft, Harris could not rely on Bomber Command's resources alone without using every machine and crew from OTUs and Heavy Conversion Units (HCUs). If Coastal and Army Co-operation Commands joined in, however, the required number would be available, using only the most experienced OTU pupils and their instructors.¹² This was a bold gamble. There was a great deal to be gained if it succeeded.

We should have before us a definite and attainable goal, a measure of what could be achieved as soon as our expansion really began. The result of using an adequate bomber force against Germany would be there for all the world to see, and I should be able to press for the aircraft, crews, and equipment we needed with far more effect than by putting forward theoretical arguments, however convincing, in favour of hitting the enemy where it would hurt him most. Such a demonstration was, in fact, the only argument I could see which was at all likely to prevent our squadrons from being snatched away and our effort diverted to subsidiary targets, or to extract the equipment we so desperately needed, the radar navigational aids and the target indicators, from the torpid departments which withheld them for so long.¹³

There were also risks. If the raid failed to do visible, palpable damage, the future of the strategic bombing campaign might be even more imperilled, while if losses were heavy Bomber Command's front-line strength and its replacement capability would both be severely affected.

Harris quickly received the approval in principle of Portal and Churchill, the latter declaring on 17 May that he was prepared to accept the loss of a hundred aircraft on the proposed operation. (Harris believed he might lose only sixty, so this was something of a bonus.) Not wanting to lose the initiative, within two days he produced a plan for an attack on either Hamburg or Cologne, knowing that the final choice, depending on the weather, would have to be delayed until the last minute.¹⁴

It remained only to secure the cooperation of the other commands and services. After broaching the subject with the First Sea Lord, who exercised operational control over Coastal Command, the prime minister assured Harris (through the CAS) that there should be no difficulties from that quarter, and on 21 May its AOC-in-C, Air Chief Marshal Sir Philip Joubert de la Ferté, offered 250 machines – the lion's share of the three hundred Harris needed to raise from outside Bomber Command. Flying Training Command added thirty, and the OTUs another 370. Including the Blenheims from No 2 Group and Army

Co-operation Command, and those aircraft from Fighter Command carrying out intruder operations against night-fighter airfields along the route, well over a thousand aircraft would be committed to the proposed raid, now scheduled to take place a few days either side of 30 May because of the advantages accruing from moonlight.¹⁵

Operation Order No 147 was issued on 23 May. Hamburg, a favourite target but outside Gee range, would be the primary objective and Cologne the alternate on 27/28 May. Two days later, with planning almost complete, the Admiralty suddenly vetoed Joubert's offer and Flying Training Command halved its commitment, leaving only eight hundred bombers available for Millennium. A last-ditch effort had to be made to find the necessary crews and aircraft for the operation, now postponed by bad weather, and it was decreed that all OTU and HCU crews would take part.¹⁶

The revised operation order was issued on 26 May, prescribing the exact routes to be followed and the timings to be adhered to on the way to and over the target. Crews were told, for example, to turn for home no later than zero plus ninety minutes, 'wherever they may be and whether they have dropped their bombs or not,' to ensure that the raid lasted no longer than the scheduled hour and a half. The height of attack was left for each group AOC to decide, except that the minimum bombing altitude was established at 8000 feet to avoid the worst of the light and medium Flak. Emphasis would be given to fire-raising, with crews carrying 'the maximum load of 4-lb and 30-lb incendiary bombs, made up as necessary with H[igh] E[xplosive] bombs.'¹⁷

Harris could not keep so large a force on stand-by indefinitely, but weather delayed Millennium until the morning of 30 May 1942, when conditions over the Ruhr/Rhine were predicted to be good enough for an attack that night against Cologne. Once the AOC-in-C had decided upon the alternate target (just after 0900 hrs), High Wycombe and group staffs worked out the final procedures and tactics for the raid. Fuel requirements were calculated, after which it was possible to stipulate the weight of bombs which could be carried and the mix between incendiaries and high-explosives. Concentration points and times were worked out so that crews taking off from all over England would merge smoothly into one large bomber stream, and every squadron was allocated to one of its three waves. For those worried about the risk of collision, given the density of aircraft over the target, the operational research scientists had predicted that only two crews were liable to be lost that way.¹⁸

The four RCAF squadrons contributed a total of seventy-one aircraft and crews, but only after much work. Taken off operations on 18 April to begin converting to Halifax IIs, No 405 Squadron spent the last few days of May 'working with fury' so as to be ready for Millennium. By 27 May sixteen crews were qualified on the new aircraft, and fourteen machines were fully serviceable. Two more were ready by the 29th, and a seventeenth became available the next day when one Halifax from the squadron's conversion flight was outfitted for operations. Bombing-up was a problem, however, as the groundcrews 'could not get the bombs out of our dump fast enough. Every vehicle was hauling bomb carts ... The logistics of aircraft carrying double the

previous loads needed some methods which we had not yet mastered.' No 408 Squadron had also just begun to convert to a new type, but for Millennium would muster nineteen Hampdens and its sole Manchester. Nos 419 and 420 committed eighteen Wellingtons and fifteen Hampdens, respectively.¹⁹

In No 419 Squadron crews were apprehensive when the target was announced – 'the much dreaded Cologne' – but when the intelligence officer also stated that 'around 1,150 aircraft would be on this target, we all got a terrific boost.'²⁰ They got an additional boost at takeoff. Double summertime meant there were still glimmers of light in the western sky at 11:30 PM, and, 'when we got to our kite and stood around smoking,' one participant recalled: 'a couple of bombers passed overhead going eastward, then a couple more. The air started to roar with aero engines; we could see bombers everywhere ... Shortly after this we taxied down and took off. When we got settled down we started to see aircraft everywhere. The sky was full of them. There were Stirlings, Hampdens, Lancasters, etc.; I don't think there was a single type of British bomber in use that we did not see that night.'²¹

No 419's Gee-equipped Wellingtons reached Cologne in the first wave. The weather was fine, with bright moonlight and only a small amount of cirrus cloud, and the aiming point in the city centre was clearly visible. The weather was just as good for the night-fighters, of course, but 419's crews commented on the relative lack of opposition. Fulton, the squadron's commanding officer, noted that the 'ground defences seemed very ineffective,' while Squadron Leader D.L. Wolfe thought that 'the large number of A[ir]C[raft] ... completely upset Flak and searchlight prediction. No fighters seen or evidence of fighters.'²² Squadron Leader J.D. Pattison, the one-time fighter pilot now well-acquainted with bomber operations, reported the same: 'The moon was full, so we didn't expect much darkness to hide in ... [but] the enemy defences were completely foxed from the outset. There was no serious Flak all the way in. When we first got to the target area, the defences appeared to be trying to pick up the aircraft with searchlights, but by the time we left they had given it up as a bad job.'²³ Only Flight Sergeant A.H. Harris noted seeing 'several fighters ... about 10 miles north-west of Cologne,' too far away to matter. It was, as the squadron diary noted, a 'piece of cake.'²⁴

By the time Nos 405, 408, and 420 Squadrons arrived over Cologne with the rest of the last wave, fires were burning fiercely and the city was much easier to find. This was also the most highly concentrated part of the bomber stream, and that which would suffer the fewest casualties. The enemy's defences en route had been overwhelmed, while over the target the moderate Flak had diminished significantly. Yet this part of the raid was not entirely without incident. John Fauquier, now commanding No 405, was coned by searchlights as he left the scene, two other crews saw aircraft going down in flames, and a third was 'approached from astern by s[ingle]-e[ngined] enemy aircraft without engaging.' But it was Pilot Officer R.S. Turnbull of 405 Squadron's conversion flight who had the closest encounter with the enemy – possibly with one of the fighters Flight Sergeant Harris had glimpsed ten miles north-west of the target. For at this precise location, the squadron diary reported,

Turnbull (who had completed one tour as a non-commissioned pilot with RAF squadrons, winning a DFM, and who would reach the rank of wing commander by November 1942) was 'approached from below and dead astern by Me 110 which closed to 100 yards and fired 10 second burst then broke away to star-board. Our rear gunner replied with two bursts as E[nemy]/A[ircraft] broke away. Our A/C hit in tailplane, but no casualties.'²⁵

No 408 Squadron's lone Manchester was forced to return early, as were two of the Hampdens, but the other seventeen crews reached the target and bombed successfully. No 420 Squadron also had an easy time, although one of its Hampdens crashed into a Lancaster after landing at Waddington and was badly damaged, with two crew members hurt. Indeed, as it turned out, landing was one of the riskier parts of Operation Millennium. Never as tidy a process as takeoff, it took over three hours for all the aircraft returning from Cologne to set down, either at their own base or, for one reason or another, at someone else's. All told forty-one aircraft went missing – giving a loss rate of 3.9 per cent of the 1047 sorties, of which about 870 had actually bombed the target. Three-fifths of all bombing photographs were plotted within three miles of the aiming point.²⁶

The crews knew even then that they had witnessed a resounding success. Pattison concluded (with some exuberance and exaggeration) that 'this raid will go down as one of the greatest events of this war. We had very nearly wiped a great city of three-quarters of a million people off the map in ninety minutes.'²⁷ Another Canadian participant, whose enthusiastic views were noted by the censors, was happy to be punishing Germans in this fashion: 'The Jerries are going to be crying for mercy in the near future, and we'll go on pounding them until they quit. I'll be able to say I took part in the greatest bombing raid in the history of the world. It gives me real pleasure to sit up there and see the German cities burn. We really made up for the blitzing of London and added some.'²⁸

Harris was equally elated with the success of his tactical experiment. Although more German fighters than usual had been scrambled, he had saturated the enemy's defences with a bomber stream no more than twenty miles wide, narrow enough that it had passed through only eight night-fighter boxes and been engaged by very few of the enemy crews standing guard. Better still, while the loss rate was actually a little higher than that suffered during previous attacks on Cologne, it was lower than average for raids conducted on moonlit, cloudless nights; and for the last, most concentrated wave, in which three RCAF squadrons flew, casualties were an astonishingly low 1.9 per cent. Moreover, there was considerable evidence that Flak, not fighters, had been the major cause of casualties, a conjecture that was substantiated after the war. Only twenty-five ground-controlled Himmelbett interceptions were carried out, while hundreds of pilots and radar operators remained idle, bypassed by the bomber stream.²⁹

More significantly, it was certain that exceptional damage had been done – a fact borne out by photo-reconnaissance flights conducted a week later. 'Damage seen in Cologne resulting from this raid is on a larger scale than

anything yet seen in any German city. Damage is heavy and widespread. Not only are large areas of the centre of the city devastated, involving the destruction of public and administrative buildings and business premises, but industrial and residential property in all suburban areas have been seriously affected by fire and H[igh] E[xplosive].³⁰ Closer analysis revealed six hundred acres of nearly complete devastation, half in the city centre which bore the brunt of the attack. Some 250 factory buildings or railway workshops had been damaged, and it was believed that 100,000 people had been evacuated. Moreover, there was an uncorroborated report that there had been a complete breakdown of order, with Nazi officials (including members of the SA and the SS) among those fleeing the city. If the morale of Party members broke, it was felt, the resolve of the civilian population as a whole was surely close to collapse.³¹

The German victims were, indeed, impressed. Contrary to British estimates placing the number of civilians killed in the tens of thousands, the death toll was relatively small – about five hundred – but with 3300 buildings destroyed, and more than 2500 separate fires started, there was a manifest sense of doom. One resident recalled that ‘when at last that Sunday morning dawned, a tremendous fire-cloud hung over the city.’ ‘The sun was dimmed and all we could see of it was a purple disc behind the writhing smoke, a circle which at its edges broke up into the colours of the rainbow, then into deepest black. Suffering and death, fire and destruction raged in the streets in the ghostly twilight of a total eclipse. For many hours the glare of the flames was brighter than day-light.’³² The official German communiqué complained how ‘British bombers [had] carried out terrorist raids on the inner city of Cologne.’ ‘Great damage was done by the effect of explosives and fires, particularly in residential quarters. Several public buildings were hit, among them three churches and two hospitals. In this attack directed exclusively against the civilian population, the RAF suffered severe losses. Night fighters and AA artillery shot down 36 of the attacking aircraft. In addition one bomber was shot down in the coastal area by naval artillery.’³³ The first issue of the *Kölnische Zeitung* to be published after the raid noted: ‘Those who survived were fully aware that they had bade farewell to their Cologne, because the damage is enormous and because the integral part of the character, and even the traditions, of the city is gone forever.’ Yet within two weeks life in the city had more or less returned to normal. The citizens’ moral fibre held and, since the main industrial centres on the outskirts were not seriously damaged, the loss of war production caused by this massive assault was probably no more than one to two months.³⁴

The AOC-in-C immediately laid on another ‘thousand raid’ for Hamburg the very next night, but bad weather forced its postponement. After a twenty-four-hour pause, the second raid was mounted against Essen, on 1/2 June. This time 956 aircraft were involved, all but two from Bomber Command, and twenty Gee-equipped Wellingtons acted as target-finders, dropping flares to mark it for the rest. The four Canadian squadrons committed sixty-three aircraft, losing only two, but a heavy and persistent haze prevented accurate bombing and only one in ten bombing photographs were plotted within three miles of the aiming point. Very few of the crews reaching Essen claimed that

their bombs had fallen on, or even near, their objective, reporting instead that the fires they saw were scattered all over the Ruhr. One pilot from No 419 Squadron, who had 'bombed near [an] enormous fire,' was not sure he had identified Essen at all.³⁵

The Germans were equally mystified as to Bomber Command's objective. Recording just 106 casualties and only eleven houses destroyed in the city, they never realized that Essen had been the sole target. Nevertheless, Harris remained convinced of the validity of his enterprise. Believing that the first two raids had solidified support both for the concept of an area offensive and for the four thousand-bomber expansion program adopted in October 1941, he launched a third very large attack (involving 1067 aircraft, including 102 from Coastal Command) on 25/26 June. In part because Bremen, another port, was usually easy to find, and in part because of pressure from the navy, High Wycombe added a new tactical wrinkle to this operation. While most of Bomber Command carried out a standard area attack, No 5 Group (including 408 Squadron) and crews from Coastal Command were detailed for precision bombing of the Deutsche Schiffwerke shipyards and the Focke Wulf factory producing the long-range FW 200 Condor aircraft used against Allied convoys.³⁶

Despite thin cloud cover, and in contrast to the Essen raid, Gee brought the first bombers right to the target, and they set fires large enough to attract the rest of the stream. Dockyards, railways, and shipworkers' houses were all damaged. Finding a pinpoint target was rather more difficult. No 408 Squadron crews flying as low as 3000 feet could not locate their aiming points through the haze, and simply bombed an area they assumed to be Bremen. Yet someone from No 5 Group managed to flatten one whole assembly shop with a single 4000-lb bomb. The Germans registered 572 houses destroyed, 6108 damaged, and eighty-five civilian deaths, but air-raid officials estimated the size of the raid at only eighty machines.³⁷

The 'thousand bomber force' was now dispersed. In retrospect, apart from the initial powerful impact of the attack on Cologne, its operations were by and large a disappointment. The bombing had not been accurate, and altogether 125 crews had been lost, 4 per cent of sorties. Almost a third of these had come from the OTUs,^{*} imposing a lien on Bomber Command's future and ensuring that the question of employing training crews or instructors on operations would be looked at very closely if it were ever raised again.

On a broader level, by the end of June 1942 there was reason to doubt whether Harris had, in fact, solved the strategic, operational, and tactical puzzle that was now two years old: Could Bomber Command obtain worthwhile results against important targets often enough, and with acceptable losses? At the same time, the psychological element of the Millennium plan had also backfired. Despite unequivocal statements by the prime minister that such a

* That the loss rate among OTU crews (5.1 per cent) was considerably higher than the 3.4 per cent suffered by operational groups strengthened the case of those who objected to their further employment and argued that lack of experience was a major cause of casualties.

massive effort could not be routinely repeated, public and private reaction to the more customary raids involving two or three hundred sorties to which Harris returned between Essen and Bremen and thereafter was one of frustration and letdown – as if Bomber Command was actually failing in its task when it could not find one thousand. The navy in particular was dissatisfied. Less than helpful when he refused to provide Coastal Command aircraft for the first two ‘thousand’ raids, the First Sea Lord now asked that Harris’s squadrons play a greater, and more direct, role in the Battle of the Atlantic. Portal rushed to Bomber Command’s defence, noting that the ‘echoes of Cologne’ were already spreading around the world, but his intervention could not prevent the transfer of about a tenth of High Wycombe’s front-line strength to Coastal and Army Co-operation Commands.³⁸

Bitterly opposed to what was happening, on 17 June Harris complained directly to the prime minister, simplistically dismissing Coastal Command’s incessant search ‘for the needle in the haystack’ – U-boats in the immensity of North Atlantic waters – as ‘an obstacle to victory.’ He was even more virulent in his comments on what he viewed – perhaps more correctly – as the mad decision to employ bomber aircraft with Army Co-operation Command to transport parachute troops, with all that that implied.

Involvement in land campaigns, especially Continental campaigns, serves but to reduce us to the level of the Horde. We are not a Horde. We are a highly industrialised, under-populated, physically ... small nation. Our lead is in science, not spawn; in brains, not brawn. To enter upon a continental land campaign, other than on a mopping-up police basis, is to play right into Germany’s hands; to invite her, without need or reason, to take best advantage of the one superior asset remaining to her, a vast and efficient army ... Once we get a footing on the Continent our last bomb will have been dropped on Germany. Thereafter the whole of our Air effort will be required to bolster up our land struggle in France. It will not be enough ... It is imperative, if we hope to win the War, to abandon the disastrous policy of military intervention in the land campaigns of Europe, and to concentrate our air power against the enemy’s weakest spots. But, instead, we are displaying a growing inclination to revert to old and archaic methods of war. Wilfully to reduce ourselves to the level of the Horde by engaging in Continental gladiatorial combat. Such a decision history will show to have been grievously wrong.³⁹

However, when Harris asked for the immediate return of all bomber squadrons serving elsewhere, Churchill responded in his usual fashion, skilfully playing to both sides at the same time. Admitting that strategic bombing was no longer the only way to win the war now that the United States and the Soviet Union were fully involved, he nevertheless declared that it would be a mistake not to increase the intensity of the bombing offensive. But despite expressing his ‘sorrow and alarm [at] the woeful shrinkage of our plans for Bomber Command,’ he did not halt the transfer of squadrons to other commands.⁴⁰

Meeting the goals of the October 1941 expansion program had always depended on receiving a healthy share of United States production, but on 21 June 1942 the Arnold-Portal-Towers agreement on aircraft allocation confirmed President Roosevelt's wish that American-built machines should, as a rule, be flown by American crews in American units. With that the Air Ministry's ambitions crumbled, and it was compelled to adopt a revised plan that would limit Bomber Command's maximum strength to about 2500 aircraft and 125 squadrons instead of the 4000 machines set down only a few months before. Furthermore, because everything would henceforth depend on the output of British (and perhaps Canadian) factories alone, it would take longer to reach this revised figure. Instead of sixty-two squadrons by the end of the year, there would be only fifty (of which, it turned out, only forty-one would be operational within Bomber Command). Six were RCAF.⁴¹

The reduced rate of growth, coupled with significant shortfalls in production (especially of Wellingtons, in arrears by 245 machines at the end of November 1942) immediately called into question promises made regarding the pace at which new RCAF squadrons would come into being. As far back as January 1941 Canada had asked that fifteen bomber squadrons be established overseas as part of the Article XV complement; and in July Air Minister C.G. Power had been assured that the formation of a Canadian bomber group would follow when there were sufficient RCAF squadrons overseas and when aerodrome facilities were complete. This arrangement was reconfirmed and then strengthened at the Ottawa Air Training Conference of May-June 1942, when it was decided that ten new RCAF squadrons would come on strength by the end of 1942, enough for the creation of a Canadian group early in 1943.⁴²

Ten additional squadrons would have given the RCAF 30 per cent of Bomber Command's revised total of fifty by the end of 1942, just a shade too many given the numbers of Canadians serving under Harris; but they also represented just under 60 per cent of the total number of new squadrons to be established by the end of the year – a demonstrably disproportionate share. For political reasons, however, and in fairness to the RCAF's enormous contribution to the bomber offensive, the Air Ministry decided it could not renege on commitments made to Canada, and Bomber Command was so informed.

Having received enough bad news in the preceding six weeks, and never happy with the idea of forming dominion squadrons, Harris reacted bitterly. 'Canadians make good crews,' he told the vice chief of the air staff, 'but I, for one, should be most perturbed to see almost the entire expansion going into Canadians for the rest of the year.'

It would be quite unacceptable. We are always being accused, as a nation, of fighting with the bodies of Colonial and dominion personnel in preference to British – so far unjustly. But why lend colour to it.

Furthermore because, for political reasons, the Canadians are insisting on forming their own group, the provision of ten Canadian squadrons in addition to the five now in existence would throw both the number of Canadian squadrons in the Command

and the size of the Canadian group out of all proportion to the remainder. What with Canadians, Poles, Rhodesians and Australians, we shall at this rate ... very soon arrive at the stage where most of the operational squadrons are manned by coloured troops.⁴³

Sir Wilfrid Freeman agreed, but, predicting that the politicians would 'give away all we can,' he did not think much could be done to stop them. His instincts were essentially sound. The undersecretary of state for air, Harold Balfour, asked the secretary of state not to abrogate Britain's undertakings to Canada, modifying them only so that the number of RCAF squadrons to be formed by December should be decreased by three to reflect overall reductions. Sir Archibald Sinclair accepted Balfour's advice, and Ottawa was so informed.⁴⁴

Although disappointed by this turn of events, the Canadian government was in no position to contest matters of supply and wisely chose not to do so. Sir Arthur Harris was less obliging, however, and turned on Sinclair. 'Dominion representation is growing out of all proportion. Although I realise that the increase in the Canadian squadrons is a political matter, we shall thereby be jumping out of the frying pan into the fire politically ... I must urgently represent that if we have in fact engaged to form ten more Canadian squadrons by the end of this year, then not more than half of these should be in this command.'⁴⁵ In fact, the number (as Harris should have known) had already fallen to seven, which was as far as the Air Ministry was prepared to go given that Canada was providing a quarter of all bomber aircrew.⁴⁶

Harris had made his point and lost, and for the moment he did not pursue the matter further. Nor did he attempt to shift the focus of his opposition to the formation of additional RCAF squadrons by raising the issue of operational efficiency, something he was perfectly free to do as a commander-in-chief. The same could not be said of some Canadians, however, whose views were expressed in a *Globe and Mail* editorial of 16 September 1942: 'Setting up a separate Canadian bombing command is working against the whole trend that has been shown reaching fruition – that of unity of command. The RAF has the experienced operational officers who have gone through three years of the sternest fighting. The RAF men and operational officers have proved their ability time and again ... The RCAF has not the trained men to direct these raids ... Canadians will without doubt rise to their places in the operational command, but to have a separate bombing command simply for nationalistic purposes interferes with the effective fighting of the war in the air.'⁴⁷

The *Globe* misunderstood the structure of Bomber Command, believing erroneously that the formation of a Canadian group would somehow give the Canadian component a degree of independent action similar to that enjoyed by the embryonic US Eighth Air Force. Apparently, some feared that 'Canadianization' would lead to a bureaucratic divorce along these lines and Power eventually had to speak out strongly, when given the opportunity by *Maclean's* magazine in November. Asked whether it meant 'tossing overboard' all the help that the RCAF received from the British, he retorted 'not in the slightest. We have absolutely no intention of setting up a separate operational command

in Britain. That might come, perhaps in some other part of the world where Canadians might be doing the greater part of the fighting. But not in Britain today. Right now the United States has its own operational command in Britain, but for Canada it's not necessary or advisable.' Nothing, he added, would be done 'at the expense of fighting efficiency,' even if this meant that RAF officers would command Canadian stations and squadrons until RCAF officers were qualified.⁴⁸

Power was not dissembling. Although the proposed Canadian group would be identified as an RCAF formation, to be manned and administered by Canadians to the maximum extent practicable, it would not act independently, selecting its own targets and planning its own missions outside Bomber Command's control. Rather, like all the other groups, it would remain subordinate to Harris and mount operations according to instructions received from High Wycombe.

With so many RCAF aircrew on their way to (or already in) Britain, it was assumed that Canadianizing the group's squadrons should be a relatively straightforward matter. Problems would arise, however, when it came to providing the experienced technical, administrative, and operational staff officers required at group, base, and station headquarters, whose influence on living and working conditions could be great, but who were simply not to be found in the RCAF Overseas. At the outset, therefore, it was accepted that a number of these specialist and technical billets would also have to be filled by non-Canadians, but this blow to complete Canadianization – if, indeed, it were that – was softened considerably when, during the discussions leading to the decision to form a Canadian group, the RAF readily agreed to post RCAF officers to other headquarters as staff learners, so they would be prepared to take over senior appointments early in the life of their own group.⁴⁹

Canadian acquiescence in British planning and management did not mean that the RCAF had to remain disinterested and passive when it came to such matters as deciding how the group should be formed, where it should be based, what aircraft it would fly, and what RAF group it should be associated with. The problem, for British and Canadian officials alike, was that these were not separate, discrete questions but were inextricably linked together by High Wycombe's policy of homogeneity – the thoroughly sensible view, from the standpoint of rationalizing maintenance and repair as well as aircrew training, that whenever possible bomber groups should operate a single aircraft type, and that groups flying the same types should be neighbours.

Complete homogeneity was impossible so long as Bomber Command was still converting from medium bombers (Wellingtons, Whitleys, and Hampdens) to heavy bombers (Stirlings, Halifaxes, and Lancasters). Until the process was complete, at least two types, the old and the new, would be in service in each group at any one time. Furthermore, there were differences within type: Lancaster IIs and Halifax IIIs shared Bristol Hercules radial engines, while Halifax II/Vs and Lancaster I/IIIs were powered by in-line Merlins, albeit of different marks. The situation was even more muddled in the Canadian case. With No 405 having already switched to Halifax IIs, three different types were