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R.A.F. NARRATIVE

(FIRST DRAFT)

THE R.A.F. IN THE BOMBING OFFENSIVE

AGAINST GERMANY

VOLUME VI

THE FINAL PHASE

MARCH 1944 - MAY 1945

AIR HISTORICAL BRANCH (1)

AIR MINISTRY

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PREFACE

This volume reviews the final stage in the bombing offensive against Germany. It is a period of particular importance for the student of air power for the reason that in 1944 Bomber Command reached the peak of expansion, when the Lancaster and Halifax heavy bombers had taken the place of the Stirling and the Wellington, when an efficient organization for the support of the night bombers was being built up and when swarms of long range fighters were able to escort the U.S. day bombers deep into Germany. Those responsible for directing the heavy bomber offensive had to a large extent discovered the target most damaging to the German war economy and navigational and bombing aids had reached a stage at which the bombers were able to strike with greater certainty of hitting their target. Air Superiority in the West had passed to the Allied Air Forces although the night bombers continued to experience heavy losses up to the summer of 1944. At the same time this year had been chosen for the greatest combined operation in history, the landings in Normandy, yet it took place at the moment when the Strategic Air Force commanders believed that they were at last in a position to force a conclusion with Germany by means of an independent bombing offensive.

The narrative falls naturally into two parts. The first deals with the period in which the Strategic Air Forces were subordinated to the land battle and when, apart from number of very important attacks on the enemy's oil and aircraft industries, Germany's economic system was virtually untouched for five months. The Strategic Air Forces were, during this period, engaged in bombing transportation targets in France and the other occupied territories, supporting the Armies and attacking the flying bomb sites. It will be seen how Bomber Command benefited from the operations against these precision targets later in the year.

That phase ended on 15 September 1944 when the heavy bombers reverted to the control of the Combined Chiefs of Staff, who subsequently decided to vest executive powers in the Chief of Air Staff and the Commanding General U.S.A.A.F. The second part of the narrative is entitled, therefore, 'The Return to the Strategic Bombing Offensive', although calls for support to land operations continued to be many and varied. After an opening period of indecisive effort the Strategic Air Forces, by the beginning of November 1944, were committed to two major target systems, oil and communications, to which they adhered until the end of the war in Europe and were only diverted from these objectives during the Battle of the Ardennes in December 1944. It is significant that it was not until the latter half of 1944 that the real decline of the German war economy set in.

The following system has been adopted in describing any phase in the period under consideration. First there is a chapter which deals entirely with policy, which covers the strategic field as a whole and deals with individual target systems. The succeeding chapter shows how policy was implemented, it deals with the tactical implications, bomber support and brief accounts of important operations. The reader will find a diary of operations in the appendices which records every sortie flown by the Command and also the major operations of the Eighth U.S. Air Force. The final chapter sums up the bombing offensive in 1944/45 and its effectiveness is examined in the face of evidence of the documents captured from the Minister for War Production, Albert Speer, and other prominent German military and civilian officials. References to Speer's periodic reports to Hitler on the oil situation and air raid damage reports compiled by German authorities in the possession of A.H.B.6 will be encountered throughout the text.

The emphasis of the Narrative falls, of course, upon operations in Germany proper, but reference to the important part played by Bomber Command in Operation Overlord is unavoidable and its interventions in support of the land battle are summarised briefly. To gain a more

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adequate knowledge of air-ground operations the reader should study the R.A.F. Narratives 'The Campaign in Northwest Europe', Volumes III to V and Air Defence of Great Britain Volume VII 'The Flying Bomb and Rocket Campaign'. Annexes at the end of the volume briefly review the development of the armament of Bomber Command and the final stages of expansion in aircraft and the training organization. A true idea of the effort and ramifications behind the bombing offensive would not be gained without consulting the R.A.F. Signals History Volume VII 'Radio Counter Measures' and R.A.F. Monograph, Armament, Volume I 'Bombs and Bombing Equipment'. A list of the documents upon which the narrative has been built, ranging from the confidential files of the Chief of Air Staff and the Deputy Supreme Allied Commander to Air Ministry files and Command, Group and Squadron Operational Record Books together with German material, is also included.

THE R.A.F. IN THE BOMBING OFFENSIVE AGAINST GERMANY

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3. U.S.ST.A.F. Plan for the Completion of the Combined Bomber Offensive (Extract).
4. A.E.A.F. Transportation Plan (Final Draft).
5. Employment of the Allied Air Forces in support of Operation Overlord by Air Chief Marshal Tedder.
6. Directive by the Supreme Allied Commander to U.S.ST.A.F. and Bomber Command for support of Overlord during the preparatory period.
7. Directive for the control of the Strategic Bombers in Europe, 25 September 1944.
8. Notes on Air Policy to be adopted with a view to the rapid defeat of Germany by Air Chief Marshal Tedder.
9. Letter from Albert Speer to Hitler on oil situation dated 5 October 1944.
10. Diary of Operations, Bomber Command, March 1944 to May 1945.
11. Diary of Operations, Eighth U.S. Air Force, March 1944 to May 1945.
12. Bomber Command. Aircraft Despatched, Aircraft Missing, Tonnage Dropped and Number of Mines laid monthly (all operations).
13. Bomber Command. Total and Monthly Sorties Despatched, Aircraft Lost, Tons Dropped and Number of Mines Laid by type of operation, 1 March 1944 - 8 May 1945.
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- 4 March 1944 Eighth Air Force opened series of attacks on Berlin in force. Heavy air battles thus precipitated.
- 6/7 March 1944 R.A.F. Bomber Command opened campaign against French rail targets.
- 24/25 March 1944 R.A.F. Bomber Command raid on Berlin, 72 aircraft lost. Last heavy night attack on German capital. Berlin air defences not penetrated again until 14/15 April 1945.
- 30/31 March 1944 R.A.F. Bomber Command heaviest loss in one attack, 94 aircraft lost out of 795 despatched to Nurnburg. Heavy night penetration temporarily suspended.
- 14 April 1944 Supreme Allied Commander assumed control of R.A.F. Bomber Command and the U.S.St.A.F.
- 15 April 1944 Overall Air Plan for Operation Neptune (the landings in Normandy) issued by Air Commander-in-Chief.
- 17 April 1944 The Supreme Allied Commander issued first directive to R.A.F. Bomber Command and U.S.St.A.F.
- 27/28 April 1944 Highly successful attack on Friedrichshafen by R.A.F. Bomber Command.
- 3/4 May 1944 First attack on airfields within fighter range of Caen by R.A.F. Bomber Command.
- 7/8 May 1944 First attacks on coastal batteries by R.A.F. Bomber Command in connection with Operation Overlord.
- 5/6 June 1944 Force of 1136 aircraft of R.A.F. Bomber Command support the landings in Normandy dropping 5268 tons of bombs.
- 8/9 June 1944 First Tallboy bomb (12,000 lb.D.P.) dropped by R.A.F. Bomber Command in attack on Saumur railway tunnel.
- 12/13 June 1944 R.A.F. Bomber Command recommenced attacks against oil targets with raid on Gelsenkirchen.  
First flying bombs launched against England.
- 14 June 1944 First of new series of heavy daylight raids by R.A.F. Bomber Command - against Le Havre.
- 15/16 June 1944 Flying bomb offensive began in earnest.
- 16/17 June 1944 R.A.F. Bomber Command recommenced attacks against Crossbow targets. Period of intensive effort until 1 September.
- 7 July 1944 First time R.A.F. Bomber Command used in area bombing of enemy ground forces - at Caen (Operation Charnwood).
- 13 July 1944 German night fighter equipped with latest defensive radar equipment landed in England intact.

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18 July 1944 R.A.F. Bomber Command and Eighth Air Force supported British Offensive south of Caen (Operation Goodwood) Bomber Command dropped 5008 tons of bombs.

20 July 1944 Attempted assassination of Hitler.

25 July 1944 Eighth U.S. Air Force supported First U.S. Army offensive at St. Lo and drop 3430 tons.

27 July 1944 U.S. forces break through at St. Lo.

7/8 August 1944 R.A.F. Bomber Command dropped 3461 tons of bombs in support of First Canadian Army offensive south of Caen (Operation Totalise).

14 August 1944 R.A.F. Bomber Command drop 3669 tons of bombs in support of First Canadian Army near Falaise (Operation Tractable).

18/19 August 1944 Last attack on French rail target by R.A.F. Bomber Command.

25 August 1944 British troops crossed the River Seine.

27 August 1944 First daylight attack by R.A.F. Bomber Command on Ruhr oil plants (Homberg).

30 August 1944 Floesti oilfields captured by Red Army.

1 September 1944 Last flying bomb launched from French ground sites against England.

3 September 1944 British forces entered Brussels.

8 September 1944 First rocket (V2) fell on England.

11-16 September 1944 Combined Chiefs of Staff Conference at Quebec with Prime Minister and President (Octagon).

12/13 September 1944 First operational use of 'S.S. Loran' by R.A.F. Bomber Command - used against Frankfurt as an operational trial.

16 September 1944 Strategic Air Forces in Europe revert to control of the Combined Chiefs of Staff.

17 September 1944 Airborne landings at Arnhem (Operation Market Garden).

23/24 September 1944 R.A.F. Bomber Command breached the Dortmund-Ems Canal with 12,000 lb. bombs.

25 September 1944 First directive issued to Strategic Air Forces by General Spaatz and Deputy Chief of Air Staff, Air Marshal Sir Norman Bottomley.

3 October 1944 Sea wall at Walcheren breached by R.A.F. Bomber Command.

4/5 October 1944 Second attack on Dortmund-Ems Canal by R.A.F. Bomber Command.

6/7 October 1944 R.A.F. Bomber Command recommenced heavy attacks on Ruhr.

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- 7 October 1944 Kembs Dam between Mulhouse and Basle breached by R.A.F. Bomber Command.
- 14/15 October 1944 Largest raid by Bomber Command. 1576 aircraft despatched which dropped 5453 tons of bombs. Greatest tonnage dropped on Germany by R.A.F. Also largest tonnage on a single target, 4547 tons on Duisburg at night.
- 15 October 1944 A.E.A.F. disbanded, Air Staff S.H.A.E.F. formed.
- 18 October 1944 First G.H. attack by No. 3 Group - on Bonn.
- 1 November 1944 Second Directive to the Strategic Air Forces issued by General paatz and D.C.A.S. Oil and communications top priorities.
- 12 November 1944 Tirpitz sunk by R.A.F. Bomber Command at Tromso.
- 16 November 1944 R.A.F. Bomber Command support U.S. Army attack at Duren and Julich on central sector of Western Front. First occasion on which this Command gave close support to U.S. forces. 5689 tons of bombs dropped.
- 27 November 1944 Heavy air battles between fighters of Eighth Air Force and G.A.F.
- 28 November 1944 Port of Antwerp reopened to traffic.
- 6/7 December 1944 R.A.F. Bomber command's first raid on Merseburg/Leuna.
- 16 December 1944 German counter offensive began in Ardennes.
- 26 December 1944 Deepest penetration by German forces in Ardennes. R.A.F. Bomber Command attacked St. Vith.
- 1/2 January 1945 R.A.F. Bomber Command attacked Mittelland Canal at Gravenhorst.
- 19 January 1945 Third Directive to Strategic Air Forces. G.A.F. targets reintroduced.
- 4-11 February 1945 Yalta Conference between Prime Minister, President Roosevelt and Marshal Stalin and Combined Chiefs of Staff.
- 13/14-15 February 1945 Heavy attacks by R.A.F. Bomber Command and Eighth Air Force on Dresden and Chemnitz.
- 19 February 1945 Interdiction of Ruhr industrial area began.
- 22-23 February 1945 Over 8000 Allied aircraft attack transportation targets all over Germany. Continued by Eighth Air Force on 23 February (Operation Clarion).
- 7 March 1945 U.S. Forces crossed Rhine at Remagen.
- 12 March 1945 R.A.F. Bomber Command attacked Dortmund with 4851 tons of H.E. Heaviest tonnage dropped on one target in one day.

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14 March 1945 R.A.F. Bomber Command destroyed Bielefeld Viaduct with 22,000 lb. D.P. bomb (Grand Slam). First time used.

18 March 1945 Biggest daylight raid on Berlin. Eighth Air Force flew 1,444 effective sorties, dropped 2934 (short) tons.

23/24 March 1945 Field Marshal Montgomery's forces cross the Lower Rhine at Wesel, assisted by R.A.F. Bomber Command.

27 March 1945 Last V.2 fell on England (Orpington).

29/30 March 1945 Last long range V.1 launched against England from Holland.

6 April 1945 Area bombing prohibited except in special circumstances.

9/10 April 1945 Admiral Scheer, Emden, Admiral Hipper sunk or severely damaged in R.A.F. Bomber Command attack on Kiel.

13 April 1945 Strategic bombing offensive ended. Main task of Strategic Air Force henceforward to give direct support to land operations. Formal approval not given by C.C.S. until 4 May.

18 April 1945 R.A.F. Bomber Command attacked Heligoland with 978 aircraft.

20 April 1945 Ground battle of Ruhr considered ended.

25 April 1945 R.A.F. Bomber Command attacked Berchtesgaden.

25/26 April 1945 Last British heavy bomber attack of the war in Europe - on Vallo oil storage depot - Tonsberg Norway.

29 April 1945 R.A.F. Bomber Command began to drop food supplies over Western Holland. Continued until 8 May.

2 May 1945 Surrender of Berlin.

3 May 1945 Capture of Hamburg.

7 May 1945 Unconditional surrender of all German fighting forces.

8 May 1945 V.E. Day.

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LIST OF SOURCES

Air C.-in-C.	Air Chief Marshal Sir Trafford Leigh Mallory's files and folders referred to under A.H.B. Shelf List.
A.D.I. (X) Reports	Assistant Director of Intelligence Reports from German prisoners of war etc.
Admiralty T.S.D./F.D.S.	Translations Foreign Document Section.
A.E.A.F.	Allied Expeditionary Air Force files, minutes of Air Commanders Meetings, Bombing Committee Meetings, etc.
A.H.B.	Air Ministry Air Historical Branch folders, narratives, monographs, library files etc.
A.H.B.6	Air Ministry Air Historical Branch Translations of German documents.
A.T.H. D/O	Personal files of the Air Officer Commanding-in-Chief, Bomber Command, (Air Chief Marshal Sir Arthur Harris). Yalta Conference, February 1945.
Argonaut B.B.S.U.	Minutes of C.C.S. Meetings British Bombing Survey Unit Reports.
B.C./M.S.) B.C./S )	Bomber Command Most Secret and Secret files referred to under A.H.B. Shelf list.
B.C./Q.R.B. B.C./O.R.B. Apps.	Bomber Command Operations Record Book. Bomber Command Operations Record Book Appendices.
B.C.O.O. B.C.O.I. :	Bomber Command Operational Orders. Bomber Command Operational Instructions.
C.A.S. V/C.A.S.	Chief of the Air Staff folders. Vice Chief of the Air Staff folders, both referred to under A.H.B. Shelf list.
D/C.A.S.	Deputy Chief of the Air Staff folders, referred to under A.H.B. Shelf list.
A/C.A.S. (Ops.)	Assistant Chief of Air Staff (Operations) folders.
C.M.S./C.S.S.	Air Ministry Most Secret and Secret Files.
C.C.S. C.O.S. C.O.S. Technical Sub Committee on Axis Oil C.S.T.C.	Combined Chiefs of Staff Papers. Chiefs of Staff Papers. Report on Oil, referred to under A.H.B. Shelf List. Combined Strategic Targets Committee. Minutes of Meetings and Working Committee papers referred to under A.H.B. Shelf list.
D.S.A.C.	Deputy Supreme Allied Commander's files and folders referred to under A.H.B. Shelf list.
D.B. (Ops)	Directorate of Bomb Operations folder referred to under A.H.B. Shelf list.
E.R.P.	Expansion and Re-equipment Policy Committee.

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Effect of Air Power on Military Operations in Europe Flensburg Documents	By General Omar Bradley and Air Effects Committee 12th Army Group.
Harris Despatch	Reichs Minister Speer Papers. Foreign Office Translations.
Hamburg Documents	Despatch on War Operations 23 February 1942, to 8 May 1945, by Air Chief Marshal Sir Arthur Harris, Air Officer Commanding-in-Chief, Bomber Command.
J.S.M. J.I.C.	Reichs Minister Speer Papers. Foreign Office Translations. Joint Staff Meetings. Joint Intelligence Sub Committee Reports and Papers.
M.E.W.	Ministry of Economic Warfare; folders, papers, etc.
O.R.S.	Operational Research Section, Bomber Command.
Octagon	C.C.S. Conference Ottawa September 1944 Minutes of Meetings.
Speer Reports	Interrogations of Albert Speer, Reichminister for War Production.
S.H.A.E.F.	Supreme Headquarters, Allied Expeditionary Force, Bombing Analysis Unit Reports, S.H.A.E.F. (Air) Historical Record and Diary (formerly A.E.A.F. Historical Record and Diary). See A.E.B. Shelf list.
S.H.A.E.F. Enemy Communications Summaries	Compiled by S.H.A.E.F. G.2.
Thunderbolt	Report on Air Ministry Exercise Thunderbolt; August 1947.
U.S.S.B.S.	United States Strategic Bombing Survey Reports.
W.M.) W.P.)	War Cabinet Minutes and Papers.
War Room (A.M.)	Air Ministry War Room Summary of Bomber Command Operations.
Wagenfuehr	Rise and Fall of the German War Economy.

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NOTE

The British 'Long' Ton (2,240 lbs.) has been used throughout the text with the exception that in certain tables where the efforts of R.A.F. Bomber Command and U.S.ST.A.F. are compared, the American 'Short' Ton (2,000 lbs.) has been used. The tonnages in the Eighth Air Force Diary of Operations in Appendix 11 are also in Short tons.

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PART I

THE PERIOD OF CONTROL BY S.H.A.E.F.

CHAPTER 1

THE IMPACT OF OPERATION OVERLORD ON THE  
INDEPENDENT BOMBING OFFENSIVE.

CHAPTER 2

THE ROLE OF BOMBER COMMAND IN THE PREPARATIONS  
FOR OPERATION OVERLORD, 6 MARCH TO 5 JUNE 1944.

CHAPTER 3

BOMBING POLICY DURING THE PERIOD OF CONTROL  
BY S.H.A.E.F., 14 APRIL TO 15 SEPTEMBER 1944.

CHAPTER 4

BOMBING OPERATIONS FROM 6 JUNE TO 15 SEPTEMBER 1944.

CHAPTER 1

THE IMPACT OF OPERATION OVERLORD ON THE INDEPENDENT

BOMBING OFFENSIVE

The landings in Normandy

In the early hours of the morning of 6 June 1944 the long awaited return to the continent began when the first Allied troops landed on the coast of Normandy. This was the supreme moment in Anglo-American strategy for which the Western Allies had been preparing more or less continuously since the beginning of 1942 and the British since the evacuation from Dunkirk in 1940. The liberation of north west Europe and the defeat of Germany by means of a cross-channel amphibious operation had been a cardinal factor in the Allied programme for victory since the Washington conference in December 1941/January 1942. A full account of the growth and development of plans for the liberation of Europe, and of their ultimate implementation and success has been described elsewhere. (1) It is sufficient for the purpose of this volume to recapitulate only those salient features in Allied strategic planning which are necessary to an understanding of the decision which led in 1944 to the diversion of the strategic bomber effort over a period of six months from its primary function of destroying Germany's will and capacity to make war, to operations in preparation for and in support of the campaign in Normandy.

It is intended to show in this chapter how the conception of the strategic bomber offensive as an independent weapon was modified as a result of the decision to land in Normandy. This conception which was firmly held by the British Air Staff in 1941 and 1942 gave way to the demands of the military strategists until in April 1944, the direction of the independent force was placed unreservedly in the hands of the Supreme Allied Commander, and for a period of six months it was to answer the requirements of the land campaign.

The appointment of Commanders for Operation Overlord

The broad lines of Allied strategy during the remaining war years were established at Casablanca in January 1943. In April of that year planning and preparations for full scale military operations on the continent known by the code name of Overlord had been placed under the direction of Lieutenant General F. E. Morgan who, in accordance with decisions made at Casablanca, had been appointed Chief of Staff to the Supreme Allied Commander (COSSAC) although it was agreed that the appointment of the latter at that stage would be premature. At the Quebec Conference in August 1943, COSSAC's outline plan for Operation Overlord had been approved by the Combined Chiefs of Staff and three months later at the conferences at Cairo and Teheran in November/December 1943, the Prime Minister and the President in consultation with Marshal Stalin and Generalissimo Chiang Kai Shek agreed upon the main lines of strategy for 1944. Marshal Stalin, in particular, had expressed his

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(1) See A.H.B. Narrative 'The Liberation of North-West Europe' Vols. I-V.

satisfaction with the outline plan and promised that, when the time came, the Russians would launch a simultaneous offensive from the east.

Overlord had thus become an inescapable commitment to which the Western Allies were pledged to devote the full power of their joint resources in 1944. By the end of the year General Eisenhower had been named Supreme Commander, Allied Expeditionary Force with Air Chief Marshal Sir Arthur Tedder as his Deputy. Under these two leaders, Admiral Sir Bertram Ramsay as Allied Naval Commander Expeditionary Force, General Sir Bernard Montgomery as Commander-in-Chief Twenty First Army Group and Air Chief Marshal Sir Trafford Leigh Mallory as Air Commander-in-Chief Allied Expeditionary Air Force (AEAF) were charged jointly with the preparation and execution of plans for the first phase of the operation, the landings in Normandy.<sup>(1)</sup>

1943: an Opportunity Lost

The significance of the Overlord decisions, so far as the strategic bomber offensive was concerned, lay in the shifting of emphasis from the air to the ground. For three years the R.A.F. and later the combined Anglo-American bomber force had enjoyed the unique position of being the only weapon available with which the Allies could strike directly at the heart of Germany. Even in 1943 there were still many who believed that Germany would collapse under the growing weight of aerial bombardment and although the military strategists were not prepared to see in the bombing offensive more than a vital preliminary to a successful land campaign, it is significant that in parallel with their long term plans for invasion they never failed to prepare for a speedy return to the Continent to take advantage of a sudden German collapse. In such plans may be seen an acknowledgement that the bombing offensive might well prove to be the decisive factor in German demoralisation following reverses in Russia and in the Mediterranean.

But in 1943 when the offensive against German industrial economy was to have reached its peak, the enormous potential effort of the combined forces was dissipated by the need for defensive operations against the enemy's U-boat organisation and the German Air Force. While the primary aim was to be 'the progressive destruction and dislocation of the German military, industrial and economic system and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened,' in the Casablanca Directive<sup>(2)</sup> those two target systems (U-Boat industry and G.A.F.) were allotted first and second priority for attack respectively and 1943, the year of the great offensive, opened on a defensive note.

Certainly in March 1943, Bomber Command began its famous 'Battle of the Ruhr' but already the growing scale of damage inflicted by the night bombers and the gradual development of the American daylight offensive was forcing the enemy to deploy his fighters in increasing strength in defence of the Reich. Allied losses were rising and it was clear that immediate steps must be taken to check the growth and reduce the strength of the enemy's day and night fighter force if the bombers were to

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(1) Code name Neptune.

(2) See Vol.V Appendix 1.

be free to continue their offensive without incurring prohibitive casualties. But there was a second and even more urgent consideration. Any threat to Allied air superiority was a threat to the success of Overlord, plans for which were even then being formulated.

To counteract this threat, the Combined Bomber Offensive Plan in April<sup>(2)</sup> and its offspring the Pointblank Directive in June 1942<sup>(3)</sup> while in no way altering the primary aim laid down at Casablanca, superimposed as an 'intermediate' task for the Eighth Air Force, the attack of the German fighter forces and the industries on which they depended. The R.A.F. night bombers, because of their tactical limitations were instructed to continue to operate in accordance with their primary aim of disorganizing German industry but to select their objectives 'so far as practicable' to be complementary to the operations of the Americans.

In other words, when the American bombed a factory by day, the R.A.F. would attack the surrounding industrial area by night. This was the ideal underlying the Combined Bomber Offensive Plan. In practice a certain looseness in the wording of the directive enabled Air Chief Marshal Sir Arthur Harris the Commander-in-Chief Bomber Command to enjoy the same degree of tactical freedom in the selection of targets as hitherto and, broadly speaking, the two Commands continued to exercise a sort of mutual policy of laissez-faire.

So it was that less than six months after the decisions at Casablanca the might of the Allied bomber forces was divided. While the R.A.F. continued to wage alone their 'war-winning' campaign against German morale and industrial economy, the might of the American day offensive, long awaited by the advocates of independent bombing as the perfect complement to the night offensive, was diverted to the preliminary task of winning air superiority - belatedly acknowledged to be the essential preliminary for the prosecution of a successful bombing offensive against the German war machine.

The significance of these events lies in the fact that while the vital importance of first establishing air superiority had at last been recognized, it was still regarded more from a military than from an air standpoint. It was not only necessary to clear the air for the bombing of Germany but, even more important, a favourable air situation was absolutely essential to the success of Overlord. Only when that had been done could the heavy bombers return, if there was still time to their primary offensive. But time was the one element which was unfortunately lacking.

Bomber Command committed to the support of Overlord

On the air side it was apparent, as 1943 drew to a close, that the Anglo-American planners were thinking more and more in terms of the employment of the strategic bomber forces on tasks distinct from their overall aim under Pointblank and more closely related to the preparation for and support of land operations on the Continent. This was inevitable once the decision to land in Normandy had been taken. These

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(1) See Volume V, Appendix 3.  
(2) See Volume V, Appendix 6.

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landings were not a single tactical battle to be fought and won but part of a grand strategic plan to defeat Germany by concerted action from the United Kingdom, Russia and the Mediterranean. Everything would be thrown into this final offensive upon the success of which the Allied cause in 1944 and 1945 must stand or fall. The failure of Overlord would at best defer final victory indefinitely; at the worst it might lose the Allies the war.

At Teheran in November/December 1943 the Combined Chiefs of Staff indicated that while air superiority remained the first and essential prerequisite to the landings in Normandy, the time was fast approaching when the strategic bomber forces would be required to make a more direct contribution so that:

CCS/398  
18 Nov. 1943

'In the preparatory stage immediately preceeding the invasion, the whole of the available air power in the United Kingdom, tactical and strategic, will be employed in a concerted effort to create the conditions essential to assault'.

So far the date at which the preparatory phase might be considered to have begun and the role which the strategic bombers would then be required to play remained undecided. Nonetheless, it was clear that it was only a matter of time before the bombing offensive against Germany would be halted and the effort diverted to tasks more directly related to military requirements. This being the case Air Chief Marshal Sir Charles Portal Chief of the Air Staff wrote to the Commander-in-Chief Bomber Command and to General Carl Spaatz Commanding General U.S. Eighth Air Force suggesting that since the Allies were, for good or ill, irrevocably committed to Overlord it would be advisable to consider plans for the employment of the heavy bomber forces in that connection. He urged them to consult with each other and the Air Commander-in-Chief for that purpose.

BC/S.31156  
1A  
23 Dec. 1943

On receipt of this letter Sir Arthur Harris immediately sought assurance that the general principles governing the Combined Bomber Offensive still held good, in other words, that the destruction of German industry and morale remained the primary aim. The Chief of the Air Staff's reply to this left no possible room for doubt as to the ultimate intention. After reminding the Commander-in-Chief Bomber Command of the short but significant clause in the Casablanca Directive which stated that 'when the Allied armies re-enter the Continent, you will afford them all possible support in the manner most effective', he made it clear, that while Pointblank was so far still operative, from a date yet to be determined by the Combined Chiefs of Staff the primary object of the bomber offensive would become the support - although not necessarily the direct support - of military operations. While this would not necessarily entail the cessation of offensive operations against Germany, it would certainly mean that:

BC/S.31156  
2A 27 Dec. 1943

Ibid  
3A  
3 Jan. 1944

'the criterion by which they are judged will then be the extent to which they assist "Overlord" and not as at present the extent to which they weaken Germany's general power to make war'.

The significance of this letter requires no emphasis. Support for Overlord was a commitment from which there could be no turning aside. It remained to decide what was in fact 'the manner most effective'. On this score, the Commander-in-Chief

Ibid 5A.  
13 Jan. 1944

Bomber Command took a strong line. On 13 January 1944 he circulated<sup>(1)</sup> a paper entitled 'The employment of the night bomber force in connection with the invasion of the Continent from the United Kingdom'.<sup>(2)</sup> in which he examined the potentialities and limitations of the force under his command in the light of possible commitments. In effect, he attempted to prove to his own and everyone else's satisfaction that the night bomber force which had been developed and its crews trained for the attack of large, closely built-up industrial areas, was totally unsuited by character, equipment or training, as well as for tactical reasons, to undertake the precise attack of small isolated targets such as batteries, rail centres, troop concentrations and other objectives of a similar nature. Nor, bearing in mind the inevitable restrictions imposed by weather and tactical considerations, was it capable of any form of 'programme' bombing such as would require the attack of a certain number of specific targets within a given time. Finally, day operations were 'absolutely out of the question and could in no circumstances be undertaken'. Not only would it require at least six weeks of favourable weather to convert crews but existing aircraft were totally unsuited to operating in daylight since armament had to a great extent been sacrificed to range and bomb load. Moreover the height at which existing types could fly in formation was so low that flak opposition alone would be 'positively lethal'.

These and other limitations must be taken into account, the Commander-in-Chief argued, when considering the employment of the heavy bombers during Overlord. Moreover, it must be remembered that a change of policy at that stage would not only give the Germans a much needed breathing space in which to recoup both morally and industrially but it would permit the release to the Western as well as to the Russian front of manpower and equipment hitherto screened for the defence of the Homeland. Air Chief Marshal Harris therefore concluded that 'the best and indeed the only efficient support which Bomber Command can give to Overlord is the intensification of attacks on suitable industrial centres in Germany'. To substitute for this attacks on gun emplacements, transportation, beach defences and similar tactical targets in occupied Europe would be, he maintained, to divert the force from the military function for which it had been trained and equipped to tasks which it could not effectively carry out. This, in the long run, would be a grave disservice to the army.

CMS. 342  
Mins. 11  
26 Jan. 1944  
Min. 12  
28 Jan. 1944

Subsequent events were to prove the Commander-in-Chief almost entirely wrong in his assumptions but in considering this paper it must be remembered that it was undoubtedly written under pressure of his anxiety to ensure the continuation of a policy in which he himself whole-heartedly believed. Certainly he spoilt his case by exaggeration and overstatement and the paper created a most unfortunate impression on its recipients who saw in it the effects of an unwelcome rigidity of mind and unsympathetic attitude to the invasion project generally.

Indeed, it was soon to become only too obvious that neither the Commander-in-Chief Bomber Command nor the Commanding General U.S.St. A.F.E. were prepared to accept

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- (1) Recipients included General Montgomery, C.A.S. and the Air Commander-in-Chief A.E.A.F.
  - (2) This Paper will be found at Appendix No.5.

any diversion of their forces from the offensive against Germany without a stiff fight. That they fought a losing battle was inevitable since, as the Air Commander-in-Chief reminded the Chief of Air Staff, whatever plan was eventually evolved the strategic bombers were essential to its success and without their co-operation Overlord could not take place.

The Beginnings of Air Planning

So far no statement had been drafted regarding the role which the air forces in general and the heavy bombers in particular would be required to fulfill. For some time past Sir Trafford Leigh Mallory and his integrated United States/British planning staffs - and latterly the A.E.A.F. Bombing Committee(1) - at Norfolk House had been engaged in hammering out a policy for the employment of the air forces in relation to the outline plan. Their task was not made any easier by the general uncertainty as to the extent to which the strategic bombers could be relied upon for participation. The Combined Chiefs of Staff had, it was true, indicated that during the preparatory phase the whole of the available effort would be directed to tasks more closely related to military requirements but so far they had shown themselves extremely reluctant to give any clear direction as to when that phase would begin. In the meantime they had allotted the highest priority to the Pointblank offensive and it was evident from the Directives issued in January and February 1944 that for the time being Overlord was to play second fiddle, at least so far as the strategic bomber forces were concerned.

A.M. File  
S.46368/  
Vol. IV.

Meanwhile planning was continued both at the Joint Staff level and by the A.E.A.F. Bombing Committee. On 1 February 1944 the three Force Commanders forwarded their Initial Joint Plan to the Supreme Commander. This rated the securing and maintaining of a favourable air situation as the first and over-riding task of the Air in Overlord to which Pointblank, having as its primary aim the reduction of the G.A.F. and particularly its fighter element, was already making a vital contribution. Within this general aim, there were two main requirements, the one for action to delay and disorganize the movement of enemy reinforcement to northern France in general and the assault area in particular and the other for direct support of the assault and subsequent

N.J.S.  
1004  
1 Feb. 1944

- (1) This Committee was constituted on 12 January 1944 to assist the Air Commander-in-Chief in formulating a policy for the employment of bomber forces in Overlord. It became in effect the Operations Planning Section of A.E.A.F. Headquarters. Under the Chairmanship of Air Commodore Kingston-McCloughry (Deputy Chief of Operations) it comprised Professor S. Z. Zuckerman (Scientific Advisor to the Air Commander-in-Chief), Mr. E. D. Brant (Railway Research Service) and representatives of Air Staff Plans. The Committee also had power to co-opt representatives from SHAEF, ANCXF, U.S.St.A.F., Air Ministry (A.C.A.S. (Operations) and D.B.Operations) Bomber Command and VIIIth United States Bomber Command as necessary. Its main functions were to advise the Air Commander-in-Chief on such relevant matters as the suitability of targets for bombing; the relationship between bombing commitments and the effort available; the allocation of priorities; and the apportioning of the available effort to meet the various commitments. A.E.A.F./M.S. 13390  
12 January 1944.

land operations. Other commitments would include the Cover Plan (Operation Fortitude), sea-mining and the attack of enemy E-boat and U-boat bases and radar installations.

D/SAC/H.20  
Part 1  
16A  
3 March 1944

Beyond this it was difficult for the planners to see, for once the assault had begun, direct support operations would mainly depend on the military situation at the time. It was generally accepted however that the success or failure of Neptune<sup>(1)</sup> would depend on the outcome of the battle once enemy reinforcements had arrived and not on what happened on the beaches. The securing of air ascendancy in this phase to enable the Allied forces to build-up as rapidly as possible and the delaying of enemy troop movements was consequently of vital importance.

Ibid

It was clear to the A.E.A.F. planners that, in the event, the Air might be faced with a multiplicity of tasks which would be beyond its available capacity to meet if all were left until on and about D-Day itself. If this congestion were to be avoided the known commitments must be spread over a longer period to leave the Air Forces free to deal with any emergency which might arise once the land battle had been joined. Thus time was a major factor in Air Planning. Certain commitments such as the attack of airfields, roads and bridges in the assault area must be left as late as possible in order not to jeopardise surprise. Similarly the neutralisation of coastal batteries and beach defences which both the Navy and Army regarded as indispensable to the assault could not take place until two or three hours before the actual landings.

Ibid

Taking all these factors into consideration the A.E.A.F. planners in consultation with Twenty-first Army Group planning Staffs reached the conclusion that if the available capacity was not to be overloaded during the vital phases of the assault and build-up, such major tasks as the battle for air supremacy and the dislocation of enemy communications must be regarded as a series of preparatory strategic and later tactical commitments, of which the strategic phase at least must be substantially completed by D-Day. Unless this were done the Air might be unable to give the necessary support to the land battle and the military and naval forces would be faced with an extremely unfavourable situation which might place the whole project in jeopardy.

The A.E.A.F. Transportation Plan<sup>(2)</sup>

Ibid

Less easy to determine was the best and most economical method of dislocating enemy rail communications in order to delay the movement of major reinforcements into France and the assault area and to impede the supply and maintenance of enemy forces generally. Two main approaches to this problem had been considered by the A.E.A.F. Bombing Committee; the first involving a purely tactical scheme for cutting communications by blocking a large number of points on tracks leading to the assault area, the second a long-term strategic plan for reducing the whole rail potential by attacks on the major servicing and repair

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- (1) Code name given to the assault and follow up phase.  
(2) The Summary given here is of the Plan as it finally emerged on 3 March 1944.

centres between Normandy and the German frontier, extending possibly as far east as the Rhine and even beyond.

Ibid

The tactical plan had a number of obvious disadvantages. The attacks could not begin until on or about D-Day so as not to jeopardize surprise while to block and keep blocked over a matter of days or even weeks a large number of points in a previously unimpaired railway system presupposed the availability of a large and adequate bomber force and favourable weather throughout the period of operations. Neither of these conditions could be relied upon and it was clearly impossible for the air forces to guarantee the necessary effort at a time when the total available resources might be absorbed in direct support of the land battle and in maintaining air supremacy.

Ibid

On the other hand, it was thought that the production of effective blocks once enemy movement to the battle area had begun on an appreciable scale would be quite feasible if the system as a whole had previously been subjected to a process of widespread attrition by heavy attacks on the most vital servicing, maintenance and repair centres. What was primarily aimed at in this plan was not the direct cutting of lines of communication but the widespread destruction of the very means of communication and of maintaining a railway system in operation. It was not suggested that this in itself would put a stop to all traffic through the centres for any considerable time since the enemy could probably reinstate one or two lines sufficient for their immediate tactical needs. But it was claimed by the Air-Commander-in-Chief and his technical advisors that the elimination of the facilities at the main centres would progressively cripple the system throughout the area of attacks, reducing its capacity to a dangerous level. Given this overall reduction of the enemy's rail potential, it should be possible round about D-Day to halt such movement as remained almost, if not completely, by creating blocks on a few vital points in the devastated zones and by attacking such trains as might still be moving through the area.

Ibid

Quite apart from its immediate effect on the battle, the plan had other advantages. From the first the enemy would be increasingly forced onto the roads thereby using up his petrol and motor transport and at the same time creating many more road targets of opportunity for air attack during the tactical phase. The consequent disorganisation of road and rail communications would further hamper the strategic movement of reserve and reinforcement material.

Ibid

This, then, was the basis of the Transportation Plan as finally evolved by the A.E.A.F. Bombing Committee in consultation with the railway experts.<sup>(1)</sup> While the choice of targets for attack was determined by the object of bringing movement to a standstill throughout north western France and Belgium, it was also borne in mind that, if western Germany were attacked, a considerable strain would be imposed on such industry as remained in the Ruhr and Rhineland while the further east attacks were pressed the greater would be the effect both on the German home front and German war production as a whole.

Ibid

Two lists of possible railway targets were prepared, the one (Plan 'A') comprising seventy-six rail centres between Normandy and the Rhine of which 32 were in Western Germany and 44 in north-west France and Belgium; the other (Plan 'B')

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(1) Notably Mr. V. M. Barrington-Ward (Railway Executive Committee) Mr. E. D. Brant and Captain C. E. Sherrington (Railway Research Service)

comprising 78 centres of which only six were in Germany itself. It was held that Plan 'B' would have the greater effect on the land campaign in Normandy which was the main consideration but against this must be placed the fact that Plan 'A' would contribute generally to the offensive against Germany which was already in progress.

In both cases the centres had been selected because they contained the greatest number of servicing and maintenance facilities and other essential installations and also because of their geographical location. At least 50 per cent of the targets named were within Oboe range. The scale of effort required to do the necessary damage had been estimated on a basis of four 500 lb. bomb strikes per acre and the expected accuracy of American visual day bombing and R.A.F. night bombing using navigational and bombing aids as indicated by past experience. On this basis the effective bomb lift required for Plan 'B' was reckoned at about 40,000 tons if only 500 lb. bombs were used.

Making an allowance for 30 per cent abortive sorties, the planners reached the conclusion that the effort required for specific Overlord commitments<sup>(1)</sup> in the preparatory phase up to and including the night of D minus one was well within the capacity of the available bomb lift between March and May.<sup>(2)</sup> They were concerned however that the operations against transportation targets should begin as early in March as possible to establish a balance between specific Overlord commitments and the continuation of the offensive against Germany and also to allow for weather and unforeseen eventualities. If they were delayed, the general congestion of commitments as D-Day approached might necessitate the whole effort being switched to short range targets for about six weeks prior to the assault to the exclusion of bombing deep in Germany,

#### Transportation Versus Oil and Pointblank

Early in February 1944 the Air Commander-in-Chief decided that the time had come to enlist the support of the

(1) These were estimated as follows:—

Neutralisation of enemy airfields .....	20,000	short tons
Dislocation of lines of communication .....	40,000	" "
(Plan 'B' only)		
Coast Defences .....	7,500	" "
Other targets (e.g. Cover Plan, ports mining etc., etc.) .....	10,000	" "
	<u>APPROXIMATE TOTAL</u>	<u>77,500</u> " "

(2) This was estimated as follows:—

Total Potential Bomb Lift in Short Tons (= 2000 lbs)

	Jan: (Actual)	Feb: (Actual)	March	April	May	June	July
Bomber Command	20,720	14,430	28,900	28,600	34,800	34,400	34,700
VIIIth USAAF	11,500	18,340	17,500	20,500	21,000	21,000	21,000
IXth USAF	1,500	3,400	6,100	5,700	12,150	12,150	12,150
XVth USAAF	9,500	11,200	"	"	"	"	"
No. 2 Group	1,680	1,200	3,600	3,900	3,900	3,900	3,900
Total (excluding XVth USAAF)	35,400	37,370	56,100	58,700	71,850	71,450	71,750
	Total = 186,650 short tons						

Deputy Supreme Commander and the Strategic Air Commanders for his transportation plan. It was still only in its third draft<sup>(1)</sup> when it was incorporated in a Paper on 'The Employment of Bombers in Relation to the Outline Plan' and circulated prior to the 11th Meeting of the A.E.A.F. Bombing Committee on 15 February which was attended by the Deputy Supreme Commander, the Chief of Air Staff, the Commander-in-Chief Bomber Command and the Commanding General U.S.St.A.F.

BC/S.31156

11A

12 February 1944

TIM/MS.136/15/1

E.3.

This was the first definite statement issued by A.E.A.F. on the proposed employment of the strategic bombers in Overlord and it aroused a storm of protest. General Spaatz complained that it completely disregarded his existing Directive the primary object of which was the reduction of the G.A.F. Nor did he consider that the blind bombing technique developed by his daylight bombers was suited to the attack of railway targets. He maintained that his first concern was to secure air superiority and he did not agree with A.E.A.F. that the attack of railway centres would bring on the air battles which were an essential contribution to this end. In his view, the G.A.F. would fight only to defend Berlin and targets in Eastern Germany.

Ibid

The Commander-in-Chief Bomber Command was scarcely less uncompromising in his attitude.<sup>(2)</sup> After stating his general agreement with the views expressed by General Spaatz, he reiterated his conviction that railway targets were, for reasons already given, quite unsuitable for night bombers. More specifically, he argued that the paper was based on a fallacious estimate of the bomb lift which would be available and of the extent of the damage which the night bombers could inflict. It postulated a degree of accuracy with Oboe which was unlikely to be achieved in practice. It was only after some argument on this subject that Dr. Dickens of the Operational Research Section at Bomber Command finally admitted that the Command could, if necessary, destroy the majority of the centres listed in the Paper using Oboe.

Ibid

Nevertheless, it was evident from this Meeting that neither Sir Arthur Harris nor General Spaatz were prepared to accept what amounted to a complete reversal of existing policy although their criticism was concerned less with the merits of the plan as such than with the whole policy for the employment of the strategic bombers in Overlord. The Commander-in-Chief Bomber Command was to modify his views before many weeks passed but it was to be nearly three months before the Americans began to take their share in the transportation offensive.

At that stage neither Sir Arthur Tedder nor the Chief of Air Staff were entirely convinced that the plan (i.e. Plan A) would confer any immediate benefit during the critical stages of Overlord or that the bomber effort could not be more profitably directed into other channels. The opinion of the experts was again sought at a meeting convened by the

TIM.136/15/1

E.9 & 10.

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- (1) This excluded Plan 'B' and made considerably more extravagant claims for the scheme than appeared in the final Paper.
  - (2) His detailed objections to the Plan in this early form will be found at Encl.13A of File BC/S.31156.

Air Commander-in-Chief on 25 February 1944.<sup>(1)</sup> After prolonged discussion, the consensus of opinion was that, while the plan would not in itself bring all traffic to a standstill, the proposed attrition of the railway network was an indispensable preliminary to the success of any tactical programme for blocking lines of communication with the assault area. In particular the destruction of major centres in France and Belgium was likely to have a more immediate effect on the land battle than those in Germany.

D/SAC/H.20 Pt.1  
16A.  
3 March 1944

The plan was then modified to increase the number of attacks on French and Belgian rail centres (Plan 'B' above) while at the same time giving scope within the limits of the effort available for attritional attacks on German centres although the latter could not be expected to make any direct contribution to Overlord. In its modified form it was more acceptable to Bomber Command since shallow penetration targets could conveniently be attacked by Stirlings and Halifax II's and V's which were normally incapable of operating over Germany or by the main force when weather and other considerations precluded deep penetration. The Commander-in-Chief Bomber Command accordingly agreed to take on 12 French and Belgian rail targets during the March moon period, provided he received the necessary authority from the Air Ministry. The first attack took place on the marshalling yards at Trappes on 6/7 March.

C.39454/49  
18A  
2 March 1944

S.C.A.E.F.  
7th Mtg.  
10 March 1944

Such was the success of these early experimental operations against transportation targets that by 10 March both General Eisenhower and Air Chief Marshal Tedder were in no doubt of the value of the Transportation Plan and at a meeting at S.H.A.E.F. on that date it was agreed that the proposed destruction of communications was the best means of meeting the military requirement for delaying reinforcements. Thereafter the Supreme Commander and his Deputy assumed full responsibility for the plan but despite this, the subject remained highly controversial. Ranged against them were the U.S.St.A.F., the United States Economic Warfare Department, members of the Air Ministry - particularly the Directorate of Bomber Operations - the Ministry of Economic Warfare (M.E.W.) and the War Office who were not as yet convinced that the plan would meet their needs.<sup>(2)</sup> In addition, the Prime Minister and the War

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- (1) This meeting was attended by representatives from the Railway Research Service, the Railway Executive Committee, A.E.A.F., S.H.A.E.F., USSTAF, Air Ministry (D.B.Ops.) Twenty-first Army Group, the Eighth U.S.A.A.F. and M.E.W. It included Professor S. Zuckerman (Scientific Advisor, A.E.A.F.), Professor G. P. Thompson (Scientific Advisor to the Air Ministry) Mr. O. Lawrence (M.E.W.) and Major General C. E. Napier (Chief of Mov. and Tpn. Branch S.H.A.E.F.).
- (2) These agencies held in common the principle of attack against highly specialised targets only as opposed to the A.E.A.F. and later SHAEF (Air) policy of attrition. The difference of opinion was to become a dominant feature in discussions between SHAEF on the one hand and the combined Strategic Targets Committee and the Staffs of the British and United States Strategic Air Forces on the other.

B.B.S.U. Rept.  
Strategic Air War v.  
Germany p.16

Cabinet, although not yet officially consulted, were in the main strongly opposed to it on the grounds of the political odium which must result from the high casualties which would be inflicted on the French population. This was to be the greatest stumbling block of all to its full prosecution,

Before the plan could be referred for Cabinet sanction, however, agreement on it had to be reached at a lower level. It was the intention of the Chief of the Air Staff who was attempting to keep what he termed 'an open mind' on the subject, to allow the various dissentients to air their views fully before calling a meeting for the purpose of reaching a final agreement. In common with the Deputy Supreme Commander, he was fully alive to the necessity for reaching an early decision and sticking to it in order to avoid the temptation to chop and change between alternative plans and so doing none effectively.

The U.S.St.A.F. Oil Plan

So far, however, the only alternative to the Transportation Plan of any significance was the U.S.St.A.F. proposal for the attack on oil. On 5 March General Spaatz had forwarded to the Supreme Commander and the Chief of Air Staff his recommendations for the completion of the combined bomber offensive which had as their corollary, the extension of the offensive to include oil as a primary objective. Claiming that the 'intermediate' object of Pointblank, namely the destruction of German fighter and ballbearing production, was nearing a satisfactory conclusion and that the Strategic Air Forces were quite capable of continuing attacks against those two industries ancillary to other operations, General Spaatz argued that what was now necessary was the adoption of a system of objectives which, while making the maximum contribution to Overlord, would also force the G.A.F. to combat and thereby provide the means of attrition of the German fighter Force in being which was a prime essential. After a re-examination of all target systems in the light of these findings, those which had been selected in order of priority were:-

- (a) Petroleum industry with special emphasis on petrol as opposed to oil.
- (b) German fighter and ball bearing industry.
- (c) Rubber production, tyres and stocks.
- (d) Bomber production.

This programme it was urged should be initiated immediately and should continue until the time required to begin the tactical support of Overlord, when the selected systems for attacks should be 'transportation and other tactical targets in accordance with an agreed plan for the direct tactical support of Overlord.' At the same time sufficient operations should be maintained over Germany to ensure the retention away from the tactical area of large portions of the remaining German Fighter force. If this plan were adopted, General Spaatz claimed that maximum assistance would be given to Overlord by:-

- (a) Assuring air supremacy at the time of the assault.
- (b) Confronting the German Army with a progressively tightening fuel supply on all fronts so that re-distribution of strategic ground reserves and other military operations would be adversely affected by the time of the assault and thereafter.

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A.H.B./ILJ1/90/  
9 (B)

5 March 1944

(c) Further restricting the essential military industrial production on which the German armed forces depended.

(d) Providing in the tactical stages, the required direct support.

Ibid

The really significant aspect of this American counterblast to the much disputed Transportation Plan was the re-introduction of oil as a target equal in value to the aircraft industry. In view of the important part played by the oil offensive in the culminating stages of the war, it is proposed to examine the arguments put forward in a little more detail<sup>(1)</sup> although the plan was not adopted at this point. Twenty-seven major targets, comprising 14 synthetic plants in the Ruhr and central and eastern Germany and 13 refineries in north Germany and Rumania had been selected as suitable for immediate attack. It was estimated that between them they accounted for more than 80 per cent of the total synthetic production and 60 per cent of the usable refinery capacity. It was claimed that their successful attack would reduce current supplies by about 50 per cent over the six months beginning with the assault on the system. The Germans would probably meet this loss by the denial to their military forces of about one third of their requirements and a reduction of about one half in essential industrial consumption. To do this they would have to put into action existing idle refineries in western Europe which would be easily accessible from the air. Thus the adoption of such a target system and its successful attack would directly and materially affect German military capabilities by reducing tactical and strategical mobility, front-line delivery of supplies and industrial ability to produce those supplies. The extension of attacks to storage facilities in Western Europe would directly affect German mobility in deploying to meet Overlord.

Pointblank as an Alternative.

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This was certainly a tempting proposition but while agreeing in principle with the American proposals for the continuation and extension of Pointblank the Director of Bomber Operations, whose views had been requested by the Chief of Air Staff, strongly opposed the selection of oil as a primary target system. He maintained that nothing should be allowed to divert the Combined Bomber Offensive from completing the destruction of the G.A.F. and achieving overwhelming superiority by D-Day. On the other hand he admitted that it was essential to provide a secondary target system which would not only make the maximum contribution to Overlord but which would also continue the war of attrition against the G.A.F. At this point he joined forces with the U.S. St. A. F. in arguing that oil, rather than transportation was best suited to the purpose since the effort available could only maintain a very limited reduction in the vast continental railway network and would make no material contribution to Overlord during the first critical weeks. On the other hand, the strategic bombers were capable of destroying the required number of oil targets within a few weeks and they would take six months to repair. So

Ibid  
Minute 25

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(1) See Appendix 3 for a full account.

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far as Bomber Command was concerned, he recommended that it should be employed:-

- (a) In accordance with its existing Directive to which should be added oil targets in the Ruhr for attack under clear conditions with Oboe plus certain other targets such as Leuna and Poelitz which could be attacked using H2S/H2X.
- (b) In the attack of G.A.F. depots, parks and repair facilities in France and the Low Countries, using No. 617 Squadron and other small forces.
- (c) In main force attacks with Oboe on airfields and other G.A.F. targets when conditions prevented operations over Germany.

Finally, in the neighbourhood of D-Day, the whole strategic effort should be directed as far as practicable to close support of the land battle until the landings were consolidated in conformity with a tactical plan which should be prepared at the earliest possible moment in collaboration with the Air Staffs of the Strategic Bomber Forces who were best able to appreciate the capabilities and potentialities in a tactical role of those forces.

Decision to Accept the Transportation Plan

By this time arguments and counter-arguments were beginning to show signs of going round in circles and still no decision had been reached on the question of the employment of the heavy bombers in preparation for the assault, the date for which was rapidly approaching. On 20 March the Chief of Air Staff decided that no useful purpose would be served by allowing the controversy to drag on any longer. Accordingly he invited the Supreme Commander and his Deputy, the Air Commander-in-Chief, A.E.A.F., the Strategic Air Commanders, the Director of Bomber Operations, Air Ministry and representatives from the War Office, M.E.W. and the Joint Intelligence Sub-Committee to a small meeting in his office on 25 March to attempt to bring matters to a conclusion.

D/SAC.H.20 Pt.1  
39A.  
24 March 1944

Meanwhile, the real issues at stake had been summed up in a Paper by Air Chief Marshal Tedder on 'The Employment of Allied Air Forces in support of Overlord'<sup>(1)</sup> which he circulated on the day before the Meeting. His main points were that Pointblank in its existing form was essential to Overlord and must continue and that what was wanted at that juncture was an adjustment which, while maintaining the G.A.F. as the primary objective and continuing deep penetration into Germany with its consequent effects on enemy military and industrial strength, would directly prepare the way for the assault and subsequent land campaign.

If the full value were to be derived from the immense air power available, the target system selected for this purpose must fulfil three conditions:-

- (a) It must be based on a common object towards which all the available air forces could be directed and concentrated both by day and by night. This was essential in order to avoid waste or dispersion of effort.

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(1) Appendix 5.

(b) It must ensure economical and effective use of the forces involved by providing targets on which the proportion of effective hits was likely to be the maximum.

(c) It must ensure the maximum use of the force by flexibility, by providing as wide a choice of targets as possible and so avoiding cancelled and abortive sorties.

Ibid

Of the two plans formulated, the Deputy Supreme Commander argued that the Transportation Plan most nearly fulfilled these conditions. He could not see any evidence that the Oil Plan would, in the time, have any effect on Overlord nor was it a plan in which Bomber Command or A.E.A.F. could play any really effective part. The Transportation Plan was in fact the only one offering any prospect of disorganising enemy movement and supply in the time available. It was also consistent with Pointblank since attacks on strategic rail centres would have repercussions far beyond the immediate objective. Finally, the railway system was the one common denominator of the enemy's whole war effort and its attack might prove to be the final straw. On these grounds Air Chief Marshal Tedder recommended that:-

(a) the existing Pointblank Directive be replaced by a new Pointblank/Overlord Directive.

(b) that when it had been agreed between the Supreme Commander and the Chief of Air Staff, it be issued by the former under whose direction all Allied Air Forces would operate.

(c) that the new directive should indicate the G.A.F. and selected rail centres in the Reich and western Europe as the principal objectives for attack by U.S.St.A.F. and Bomber Command.

(d) that supervision and co-ordination of the working of the transportation plan be effected at SHAEF by himself as Deputy Supreme Commander assisted by representatives of the Chief of Air Staff, Commanding General U.S.St.A.F., the Commander-in-Chief Bomber Command and the Air Commander-in-Chief A.E.A.F;

Ibid

42A

25 March 1944

As will appear in the due course, all these recommendations were ultimately accepted and implemented. Meanwhile, at the Chief of Air Staff's meeting on 25 March, the Transportation Plan was accepted, if a trifle unwillingly. General Eisenhower summed the matter up by saying that from all he had read he was convinced that, apart from the attack on the G.A.F., the Transportation Plan was the only one offering a reasonable chance of the air force making an important contribution to the land battle during the early vital weeks of Overlord; in fact, he did not believe there was any real alternative. He entirely agreed with the expressed views of the Chief of Air Staff, on the other hand, that the Oil Plan had great attractions and that serious consideration should be given to its adoption as soon as the first critical situation in Overlord was passed.

Ibid

In the face of this strong support from the Supreme Commander there was nothing for those who had opposed the plan to do but submit as gracefully as possible. For the Commander-in-Chief Bomber Command it was, in any case, the

lesser of two evils. Although far from convinced of its value, he was even more opposed to the oil plan on the grounds that it would require the attack of large numbers of precise targets and present him with a task quite beyond the capacity of his command. He could contribute to the Transportation Plan on the other hand in two ways: by attacks on rail centres within Oboe range during moon periods (i.e. when deep penetration was in any event undesirable) and by continuing attacks on industrial cities in Germany - particularly Eastern Germany - as long as hours of darkness permitted, although he warned the meeting that in the latter case the effects on transportation would be 'fortuitous rather than intentional'. His main concern was that he might be unable to complete his part of the programme in the time remaining owing to limitations imposed by the requirements of adequate target marking and good weather in the particular areas.

Ibid  
General Spaatz on the other hand continued to press the case for oil on the grounds that he did not believe that rail centres would form a secondary target system which would provoke the G.A.F. to fight. In any event he would have to continue to devote half of his visual bombing effort to attacking G.A.F. targets while to bring on air battles it was necessary to penetrate well into Germany. He added that, for tactical reasons, some at least of the transportation targets selected would have to be in the same area as G.A.F. targets.

Ibid  
In the face of the general acceptance of the Transportation Plan, however, these arguments were only begging the question. The real point at issue, as the Chief of Air Staff explained, was whether or not the Americans could complete their share of the plan in time. It emerged in discussion that this had not yet been worked out and it was agreed that the matter should be examined by General Spaatz in consultation with the Deputy Supreme Commander and the result reported to General Eisenhower. At the same time, Air Chief Marshal Tedder would produce a draft directive which would be referred to General Eisenhower after it had been discussed with those concerned. It would then be examined by him in consultation with the Chief of the Air Staff and a final decision reached.

#### Political Objections to the Transportation Plan

It was evident from the tone of the above Meeting that the Transportation Plan was to be adopted for lack of a better, but a major stumbling block lay ahead. The Chief of Air Staff had mentioned in discussion that its full execution must involve attacking a number of targets in built-up areas which would inevitably result in heavy casualties among the French civilian population. This was a source of concern to His Majesty's Government and he thought that they should be given the opportunity to study the implications of adopting the plan.

This was of course a perennial problem. The Prime Minister and the Cabinet had always been extremely chary of authorising any operations against French targets which would be likely to involve heavy civilian casualties on the grounds of the political considerations involved. On the other hand, it could be argued that the Transportation Plan, as an essential preliminary to a successful assault and final victory was in a somewhat different case and this was in fact the attitude adopted by the Supreme Commander in the controversy which followed.

DO/44/5th Mtg.  
6 April 1944

The implications of the plan were considered by the Defence Committee at a Meeting on 5 April when it was strongly opposed - mainly on the grounds of the casualties which would result - by the Prime Minister, the Chief of the Imperial General Staff and the Secretaries of State for War, Foreign Affairs and Supply respectively. The Deputy Supreme Commander was accordingly invited to reconsider the plan in consultation with the Chief of Air Staff with a view to eliminating those targets likely to entail the heaviest casualties. In the meantime attacks were to continue but only against those railway targets where no great loss of life would be incurred.

DO/44/7  
3 April 1944  
and  
DO/44/6th Mtg.  
13 April 1944

A revised list of railway centres was presented to the Defence Committee on 13 April but met with much the same reaction although the new casualty estimate of 16,000 civilians killed and severely wounded showed a marked decrease on the original figure of between 80/160,000 killed and seriously or slightly injured. Moreover, as was pointed out by the Chief of Air Staff the new figure made no allowance for any scale of evacuation which might be greatly increased by the general warnings it was proposed to issue. After considerable discussion somewhat grudging approval was given to the continuation of attacks and on 15 April a SHAEF Memorandum informed all concerned that, with the exception of certain targets in thickly populated areas, the Transportation Plan had been approved.

D/SAC/H. 20 Pt. II  
10A  
15 April 1944

Nevertheless it was evident that Mr. Churchill who may be regarded as the prime mover in this disagreement, was far from satisfied that the results of the new offensive would justify the suffering which would be inflicted on the French population. His distrust of the situation was in no way lessened when, towards the end of April it emerged that so far the Eighth Air Force had attacked only one and the Fifteenth Air Force none at all of their allotted targets while Bomber Command had already completed 40 per cent of their programme. At a Meeting on 26 April, the Defence Committee expressed serious concern at the failure of the Americans to take their share of the transportation bombing thus allowing the whole political odium for killing friendly nationals to rest on British shoulders.

DO(44) 8th Mtg.  
26 April 44 and  
D/SAC/H. 20/Pt. II  
28A

Ibid  
31A  
29 April 1944

The following day Mr. Churchill, who was increasingly perturbed at the situation, called a Meeting of the War Cabinet. After discussion it was agreed that the plan for bombing targets in occupied territory should be revised to include only those railway centres where the estimated casualty rate did not exceed 100/150 and that at the same time consideration be given to the addition of such objectives as dumps, military camps and vehicle parks as targets for the strategic as well as tactical bombers.

Ibid

These conclusions were forwarded to General Eisenhower on 29 April. The Supreme Commander was now under strong pressure from the Prime Minister to abandon the plan altogether or at least so to restrict it as virtually to emasculate it. Already after a conversation with Mr. Churchill on 28 April, General Eisenhower had postponed the attack of certain targets in heavily built-up areas until nearer D-Day. Following receipt of the War Cabinet Conclusions mentioned above, he discussed with the Air Commander-in-Chief the implications of wholly abandoning the project. The latter vigorously protested against such a change of policy, particularly at that late hour, maintaining that while casualties among the French

Ibid  
30A

TLM/136/15A  
1 May 1944

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civilian population must be avoided as far as was compatible with military requirements, where they were unavoidable, they must be accepted as the French contribution to the joint case.

D/SAC/H.20 Pt. II  
36A  
2 May 1944

As a result, of this conversation, the Supreme Commander's reply to Mr. Churchill on 2 May constituted a firm refusal to give up the Transportation Plan on the grounds that it was essential to the success of Overlord. Emphasising that he was fully alive to the gravity of its political implications, General Eisenhower reminded Mr. Churchill that he had already modified the plan as far as he could without vitiating it and that to accept the War Cabinet proposals for restricting casualties to 100/150 would completely emasculate it. He argued that perhaps it was not fully realised that essential operations under the tactical plan would in any event inflict heavy casualties on civilians and that such casualties were inherent in any plan for the full use of air power in preparation for the assault. Alternative plans had been given full and sympathetic consideration but none constituted the means by which the Air could meet the urgent military requirement for effectively delaying and disrupting enemy communications in the final stages. General Eisenhower concluded that the whole Overlord concept had been based on the full use of overwhelming air power to prepare the way for the assault and if its hands were tied 'the perils of an already hazardous undertaking will be greatly enhanced'.

DO/(44)9th Mtg.  
2 May 1944

At a meeting on 3 May, attended by the Deputy Supreme Commander and the Air Commander-in-Chief, A.E.A.F., the whole question of unlimited bombing over Occupied Territory and the proportion of civilian casualties likely to be inflicted in the attack on other targets in relation to the railway plan was examined and it was finally agreed that the President and State Department in Washington should be approached to ensure that the Americans accepted their full share of responsibility for the killing of friendly Nationals. Mr. Churchill asked Air Chief Marshal Tedder whether casualties prior to D-Day could be kept below 10,000 and was told that while it was obviously difficult to give an exact estimate, this should be possible. The Prime Minister then announced his intention of cabling the President that responsible military commanders considered the railway plan essential to the success of Overlord and that it would entail the destruction of some 10,000 French lives before D-Day. This might have a serious effect on European relationships but on the other hand, if Overlord were successful, by shortening the war it might actually save millions of lives. In view of the political consequences of such action he would seek assurances from the President that the United States Government was convinced of the necessity of pursuing such a policy.

TLM/MS.136/15/3  
16 May 1944

BC/S.30716/3  
25A  
5 May 1944

This telegram actually elicited very little response from Mr. Roosevelt who replied that he was content to leave the matter in the hands of 'the responsible military commanders', and there the matter was allowed to rest. In the meantime the Supreme Commander had already, on 5 May, removed the restrictions earlier imposed on the attack of certain railway targets with the single proviso that those with the highest estimated casualty figures be left to the last. There was now no further obstacle to the completion of the plan before D-Day.

Control and Direction of the Strategic Bomber Forces in Overlord. (1)

The controversy over the political aspects of the Transportation Plan was still in progress however when, on 14 April 1944, the direction of the strategic bomber forces in Overlord passed into the hands of the Supreme Commander and on the following day the Air Commander-in-Chief issued his Overall Air Plan. These events marked the official opening of the preparatory phase of Overlord. In practice, of course, it may be said to have started with Bomber Command's attack on Trappes on 6/7 March but at that stage no final decision had been reached on the Air Plan and the Combined Chiefs of Staff were extremely reluctant to authorise any change in direction of the strategic bombers until full agreement on their ultimate employment had been reached between the Commanders concerned.

The question of control had been the subject of much earnest debate since the very early planning days in 1942. It came to a head when in the autumn of 1943, the question of a Directive to Air Chief Marshal Leigh Mallory, Air Commander-in-Chief (designate) A.E.A.F. came up for consideration. It was the view of the Chief of Air Staff which the British Chiefs of Staff upheld, that the co-operation of the heavy bombers in Overlord should be achieved by placing all or part of them at the disposal but not under the control of the Supreme Commander. Thus the first draft of the Directive to the Air Commander-in-Chief prepared under the instruction of the Chief of Air Staff stated that when the time came, the two strategic bomber forces would be detailed by the Combined Chiefs of Staff to operate with all or part of their effort to the requirements of the Supreme Commander. Under him, the Air Commander-in-Chief would be responsible for setting out the objects to be achieved by them but would not exercise direct control of their operations.

The Air Commander-in-Chief's main objections to these proposals was one of divided control. The directive proposed in effect the handling of the strategic bombers by no less than four separate authorities: the Combined Chiefs of Staff who would allocate the proportion of effort to be used by the Supreme Commander; the Supreme Commander himself who, through the agency of his Air Commander-in-Chief, would detail the objective to be achieved; and, respectively, the Strategic Air Commanders who would select the targets and control the operations. Not unreasonably, Air Chief Marshal Leigh Mallory regarded this arrangement as unnecessarily complicated. In his view, when the time came for the preparatory operations it should be for the Supreme Commander not a Committee to decide what proportion of the strategic effort should be devoted to Overlord and for his Air Commander-in-Chief to direct that effort.

This coincided in part at least with the reaction of the American Chiefs of Staff who held that the Supreme Commander should have full command over the forces allotted to him or the principle of unified control would be lost.

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(1) For a detailed account of this lengthy controversy reference should be made to Vol. I of the R.A.F. Narrative 'The Liberation of North West Europe'.

CMS.342

7A

23 December 1943

TLM/MS.136/9/4

On the other hand they were not prepared to see the control of the United States Strategic Air Forces pass to a British Air Commander. Instead they proposed the appointment of two Air Commanders under the Supreme Commander, a British one to command the Allied Tactical Air Forces and an American one to command the Allied Strategic Air Forces.

These proposals were quite unacceptable to the British Chiefs of Staff who were adamant that since the strategic offensive affected all German fronts, including the Russian, the Combined Chiefs of Staff must retain control of the Strategic air forces, only allocating part or all of them to Overlord as and when they thought fit. Clearly a deadlock had been reached and in order not to delay further the Directive to the Air Commander-in-Chief, it was decided to eliminate from it all controversial matter. Accordingly when it was formally issued to him by COSSAC on 16 November 1943, he was informed that while he was to exercise operational control over the British and American Tactical Air Forces, directives as to the control of the strategic air forces would follow at a later date. It is unlikely that anyone at that time foresaw how very much later that was to be.

In the meantime, the Air Commander-in-Chief was left in the invidious position of being responsible for the production of an air plan for Neptune without any clear indication as to the forces of which he could dispose. Nor could he evaluate the bombing aspect of the plan by experimental attack except by application through the Air Ministry for the necessary strategic effort and even then the Strategic Air Commanders could always refuse on tactical or other grounds. Above all, the principle of unified control of the vast effort which would be involved in the Overlord plan was in serious jeopardy.

By February 1944 the twin questions of the control and employment of the strategic bombers had merged with the general controversy over the Transportation Plan. It was evident that neither of the Strategic Air Commanders, and particularly General Spaatz, were prepared to accept the operational control of the Air Commander-in-Chief. In this attitude they were supported by the Prime Minister. As a way out of this awkward situation, General Eisenhower proposed that he himself should control the Strategic Bomber Forces through the Deputy Supreme Commander whom he would appoint as his executive for the overall co-ordination and supervision of the entire air effort including the tactical effort. While this would not alter the Air Commander-in-Chief's position with regard to the Allied Expeditionary Air Force those forces such as the strategic bombers, which were attached for a definite period or task, would remain under their own Commanders but receive their general directive from the Deputy Supreme Commander and not the Air Commander-in-Chief.

While these proposals offered a loophole, they still assumed that General Eisenhower would have the whole of the Strategic Bomber effort under his control, whereas the Prime Minister had informed the Chief of Air Staff that 'there can be no question of handing over the British Bomber, Fighter or Coastal Commands as a whole to the Supreme Commander or his Deputy'. Deadlock again threatened and it fell to the Chief of Air Staff to evolve a compromise acceptable to all parties. After further consultations with Air Chief Marshals Tedder and Leigh Mallory, he minuted the Prime Minister on 10 March that it was the intention of the Supreme Commander, in which he himself concurred, that co-ordination of operations in execution of the Strategic Air Plan, once it had been approved

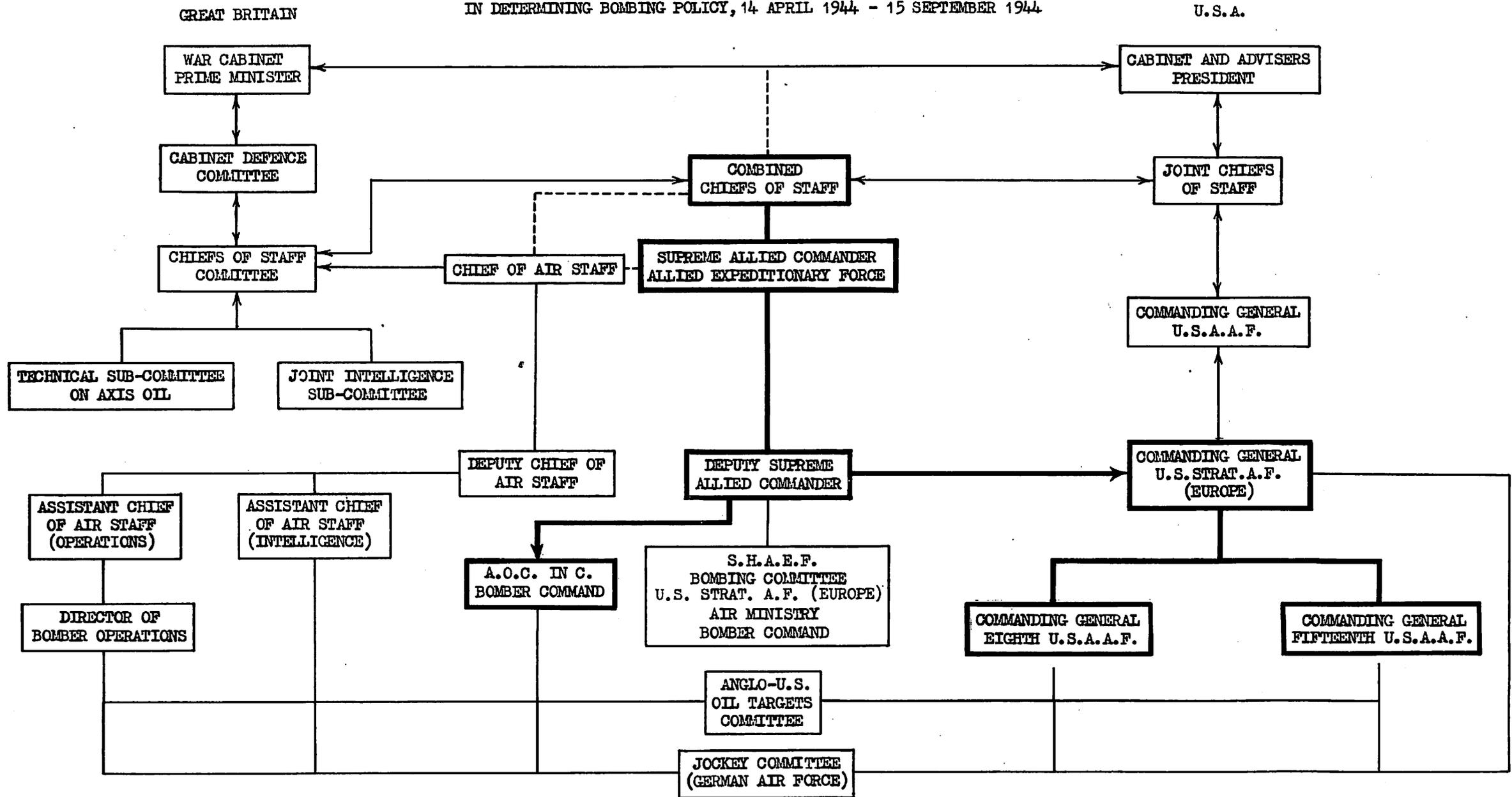
D/SAC/H.20 Pt.I  
14A and 14B  
29 February 1944

Ibid  
18A  
5 March 1944

CMS.342  
20A  
10 March 1944

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SYSTEM OF CONTROL OF STRATEGIC AIR FORCES AND CHANNELS USED  
 IN DETERMINING BOMBING POLICY, 14 APRIL 1944 - 15 SEPTEMBER 1944



by the Supreme Commander and by himself on behalf of the Combined Chiefs of Staff, should be in the hands of Air Chief Marshal Tedder. The Tactical Air Plan for the use of all air forces, including the strategic bombers, in the assault phase would be prepared and co-ordinated in execution by the Air Commander-in-Chief but would also be under the general supervision of the Deputy Supreme Commander.

Ibid

The Chief of Air Staff explained that neither he nor General Eisenhower could accept the assignment of strategic bombers for the execution of either of the above plans on the basis of a proportion of the forces or their effort. To ensure effective co-ordination, the plans must embody the continuation of Pointblank in parallel with other operations in more direct support. Thus under the determining influence of weather, the Plans themselves must regulate the proportion of the total effort absorbed by each class of main task. Consequently, they proposed to recommend to the Combined Chiefs of Staff that they assign to the Supreme Commander such use of the strategic bombers as might be necessary to the execution of Overlord-cum-Pointblank, retaining the right to impose additional tasks that they, in respect of the war as a whole or the British Chiefs of Staff in respect of the security of the United Kingdom, might consider necessary. If these proposals were approved it would mean that between dates yet to be decided by the Combined Chiefs of Staff, both strategic bomber forces would be at the Supreme Commander's disposal for Overlord subject to the reserve powers already indicated.

Ibid

21A

11 March 1944

and

23A/22A

13 March 1944

Mr. Churchill accepted this difficult compromise as being 'very satisfactory' and on 13 March, the Combined Chiefs of Staff were asked to approve the recommendation that when the Chief of the Air Staff as their executive for the execution of Pointblank and the Supreme Commander as their direct agent for the execution of Overlord had jointly approved the air programme in preparation for and support of Overlord:

'the responsibility for the supervision of air operations out of England of all forces engaged in the programme including United States Strategic and British Bomber Command, together with any other Air Forces that might be available, should pass to the Supreme Command.'

The term 'supervision' in this recommendation had been used advisedly. The preparatory bombing for Overlord was not expected to absorb the entire strategic effort and it was intended that the balance should be used in accordance with the current Pointblank Directive, supervision of that effort being shared between General Eisenhower and the Chief of Air Staff. The Combined Chiefs of Staff on the other hand, rejected the word 'supervision' as too indeterminate and attempted to substitute 'command' in its stead. After a further exchange of telegrams, the word 'direction' was eventually accepted by both sides and on 27 March 1944 the Combined Chiefs of Staff issued their long delayed statement on the control of the Strategic Bombers in Overlord in the above terms.

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27 March 1944

On 29 March, the Chief of the Air Staff informed the Chiefs of Staff that the Air Plan had been jointly approved by the Supreme Commander and himself and a fortnight later Bomber Command was advised officially that, with effect from 14 April 1944, the direction of all forces of R.A.F.

BC/S.30716/4  
8A  
13 April 1944

Bomber Command and the U.S.St.A.F. assigned to Overlord and Pointblank would pass into the hands of the Supreme Commander. The Commander-in-Chief was accordingly instructed to look for that direction to the Deputy Supreme Commander to whom the responsibility for all air operations had been delegated by General Eisenhower.

BC/S.30716/4  
12A  
17 April 1944

The following day the Air Commander-in-Chief circulated the A.E.A.F. Overall Air Plan for Operation Neptune and two days later, on 17 April 1944 the Supreme Commander issued his first directive<sup>(1)</sup> to the U.S.St.A.F. and R.A.F. Bomber Command.

The Overall Air Plan

The prolonged controversy over the employment of the Strategic Bomber Forces and over the Transportation Plan must not be allowed to obscure the fact that the latter, however important, was only one of the many tasks to be performed by the Air Forces in General and the heavy bombers in particular in support of Overlord. In the Overall Air Plan those tasks may be summarised as follows:-

- (a) To attain and maintain an air situation whereby the German Air Force is rendered incapable of effective interference with Allied operations.
- (b) To provide continuous reconnaissance of the enemy's disposition and movements.
- (c) To disrupt enemy communications and channels of supply by air attack.
- (d) To support the landing and subsequent advance of the Allied Armies.
- (e) To deliver offensive strikes against enemy naval forces.
- (f) To provide airlift for airborne forces.

They were to be accomplished in four distinct phases: Preliminary, Preparatory, Assault and Follow Up, and Operations Subsequent To The Assault.

The requirements of the Preliminary Phase for the reduction of the German Air Force and particularly its fighter element, the reduction of the German war potential, the weakening of the will of the German people to resist and, in general, the creation of a situation in which an Allied assault on the continent could be contemplated as a practical possibility, had been at least partially met by operations under the Pointblank directive.

The Preparatory Phase was scheduled to begin on D minus 90 and had already started with the attack on the marshalling yards at Trappes on 6/7 March. Commitments in this phase were varied but fell broadly into two categories, strategic and tactical. Strategic operations already in progress, involved the continuation of Pointblank and the attack of enemy rail centres over a wide area. Tactical operations were planned to begin nearer to D Day and to include the intensification of attacks on key points in the enemy rail system more closely

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(1) See Appendix 6.

related to the assault area together with attacks on enemy radar installations, airfields within 130 miles of Caen and selected coastal batteries still under construction.<sup>(1)</sup> Other commitments in this phase included Crossbow, attacks on Naval targets such as E and U-boat bases and concentrations and, for Bomber Command, a special pre-D-Day minelaying commitment. Throughout the preparatory phase, also, the general principle of attack laid down at SHAEF in connection with the Cover Plan (Operation Fortitude) had to be observed. This required that for every target attacked in the Neptune area prior to D-Day two must be attacked outside it in order to induce the enemy to believe that the Pas de Calais was the object of the assault from which the Allies were anxious to distract attention. This elaborate deception plan further increased the number of the pre-D-Day bombing commitments.

During the actual Assault the whole of the available air effort would, of course, be required for the task of protecting and assisting the Allies during the initial stages of Neptune. Tasks included the attack of ten selected coastal batteries before dawn on D-Day by R.A.F. Bomber Command followed when necessary by further attacks at first light on batteries by medium Oboe bombers and on beach defences by the VIIIth Air Force. Other tasks for the bombers in this phase could include radio countermeasures and diversionary operations.

Finally, while Operations Subsequent To The Assault had inevitably to wait upon events, it was anticipated that they would include further attacks on the G.A.F. and transportation targets coupled with direct support operations and attacks on such targets of opportunity as presented themselves at the time.<sup>(2)</sup>

Directive to the Strategic Air Forces

A.H.B./IIH/241/  
3/55D  
17 April 1944

Meanwhile on 17 April 1944, two days after the issue of the Overall Air Plan, the Supreme Commander gave his first directive to the United States Strategic Air Force and R.A.F. Bomber Command for operations during the preparatory period. This document is chiefly remarkable for its failure to come to grips with the problem of the employment of the heavy bombers in Overlord or to take a firm line in the face of the opposition, actual or implied, of the Strategic Air Commanders to the ARAF Air Plan. Leaving the overall aim of the Strategic Air Forces as laid down in the directive (a revision of the Pointblank Directive) approved by the Combined Chiefs of Staff on 17 February 1944<sup>(3)</sup>, it

A.H.B./ID3/601(B)

- (1) These batteries had been included in the Joint Fire Plan for Neptune on 8 April for attack in the preparatory period in an attempt to arrest or delay the provision of protective covering.
- (2) In considering the Air Plan it must be remembered that, at the time it was issued, the allocation of the tasks enumerated above as between the various forces engaged was still in the discussion stage. It is proposed to elaborate on this aspect of planning in succeeding chapters.
- (3) i.e. 'the progressive destruction and dislocation of the German military industrial and economic system and the destruction of vital elements of lines of communication and material reduction of German air combat strength by the successful prosecution of Combined Bomber Offensive from all convenient bases'.

emphasised that the re-entry to the Continent was the supreme operation for 1944 and that 'all possible support' must be given to the Armies to assist them in establishing themselves in the lodgement area. Within this overall aim, their particular mission prior to the Assault would be:-

- (a) to deplete the German Air Force and particularly the fighter forces and to destroy and disorganise the facilities supporting them.
- (b) to destroy and disrupt the enemy's rail communications particularly those affecting the enemy's movements towards the lodgement area.

Within this mission, objectives allotted to the U.S.St.A.F. in order of priority were the G.A.F., particularly the fighter force, which was to be destroyed by all available means, including attrition in the air and on the ground, together with attacks on precision targets and industrial areas and facilities supporting them; and, as a secondary objective, the enemy's rail transportation system. When weather or tactical conditions prohibited the visual attack of either of these objectives, blind bombing raids were to be made on Berlin or other important industrial areas selected so as to make the maximum contribution to the main offensive aims.

Ibid

Bomber Command, on the other hand, in view of the difficulty of destroying precise targets at night, was to continue to be employed in accordance with its main aim of disorganising German industry. Operations were to be designed 'as far as practicable' to be complementary to those of the U.S.St.A.F. and, so far as tactical conditions allowed, targets were to be selected so as to make the maximum contribution to the offensive against the G.A.F. and enemy communications.

Ibid

In addition to their main tasks both U.S.St.A.F. and Bomber Command might be called upon for the attack of objectives of great or fleeting importance such as major enemy naval units at sea or in harbour. More particularly, although the responsibility for neutralising the Crossbow<sup>(1)</sup> threat had been laid on the Air Commander-in-Chief, he could in an emergency apply to the Deputy Supreme Commander for assistance from the Strategic Air Forces.

On the face of it, this directive called for little alteration in the status quo. Bomber Command in particular had been given - under the somewhat threadbare cloak of tactical limitations - the same freedom of operations as it had enjoyed in the past. The extent to which it actually co-operated in the Overlord preparatory phase was left in effect to the goodwill of its Commander-in-Chief. In the following Chapters it will be seen how far the operations under Overall Air Plan actually affected the prosecution of the offensive against Germany.

Finally, the directive stated that those targets best calculated to achieve the primary objective (i.e. the reduction of the G.A.F.) would be passed to the Supreme Commander by the Air Ministry while those chosen to achieve the transportation plan would be issued separately. In practice, it had already been decided at a SHAEF Meeting on 15 April that Pointblank targets should continue to be sent direct to Bomber Command and

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(1) The flying bomb and rocket offensive

Ibid  
10A  
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U.S.St.A.F. by the Air Ministry with a copy to SHAEF while those chosen to implement the secondary aim would be issued by the Deputy Supreme Commander with the assistance of his newly formed Transportation Targets Committee<sup>(1)</sup> which performed much the same service for him as the A.E.A.F. Bombing Committee had done for the Air Commander-in-Chief.

The Problem of Divided Control

In this way the divided control of air operations in Overlord which had been dreaded by those most nearly concerned, had actually come to pass. Under the Supreme Commander, there were now two distinct air planning organisations; Air Chief Marshal Tedder with his Advisory Committee at SHAEF who were responsible for planning and directing strategic operations against transportation targets; and Air Chief Marshal Leigh-Mallory with his planning staff at Headquarters A.E.A.F. who were vitally concerned in the planning and direction of all tactical air operations immediately before, during and after the actual assault. A third body closely involved was the Air Ministry which was responsible for the issue of Pointblank priorities.

On paper this may have seemed a satisfactory compromise between the opposing views on the direction of the Strategic Air Forces. In practice, the tactical and strategic phases of Overlord were only two aspects of one and the same plan demanding close integration at the planning level and the system proved hopelessly cumbersome. It actually lasted only a little over a month. On 23 May the Transportation Targets Committee at SHAEF was disbanded and its members were free to swell the A.E.A.F. Bombing Committee which was resuscitated as a joint Bombing Operations Planning Staff with much the same functions as before. On the same day, the Air Commander-in-Chief held the first of a new series of Air Commanders Conferences<sup>(2)</sup> at Headquarters A.E.A.F. which were destined to continue almost daily until the early autumn. Their main purpose was to enable a mutual understanding to be reached on projected operations and the allotment of tasks between the forces concerned. The presence of the Deputy Supreme Commander at the majority of those meetings ensured that all members were kept informed of General Eisenhower's intentions while any strategic

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- (1) Under the Chairmanship of Air Vice Marshal J. M. Robb, Deputy Chief of Staff (Air) at SHAEF, this Committee comprised representatives from Bomber Command, U.S.St.A.F., A.E.A.F., the Air Ministry, the Railway Research Service, G-2 (Plans) and included Professor Zuckerman as Scientific Advisor. The latter, with Air Commodore E. J. Kingston - McCloughry and Mr. Brant of the Railway Research Service had been transferred from the A.E.A.F. Bombing Committee which was sadly depleted by the loss of some of its leading members. As the 'sole body' responsible for advising the Deputy Supreme Commander on the direction of operations against transportation targets, the new Committee's functions included the preparation of general directives for the implementation of the Transportation Plan, the categorisation of targets according to the degree of damage sustained and the issuing of reports and recommendations regarding future operations.
- (2) These were normally attended by the following:-  
The Air Commander-in-Chief, A.E.A.F.  
The Deputy Supreme Commander  
The A.O.C.-in-Chief Bomber Command  
The A.O.C.-in-Chief Coastal Command  
The Commander Advanced A.E.A.F. and the A.O.C. A.D.G.B.  
The Commanding Generals U.S.St.A.F., VIII and IX Air Forces.

Also by Air Vice Marshal Robb, SHAEF, Air Commodore Kingston-McCloughry, A.E.A.F. and other representatives and liaison officers from the various Headquarters. For Mins. see TLM Folder 34.

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questions which arose affecting operations outside the Air Commander-in-Chief's control could either be settled by him on the spot by the exercise of his executive authority or could be referred by him direct to General Eisenhower for decision.

The system was now at least on a working basis. At the Air Commander's Conferences, the air commander most nearly concerned with any particular task had the opportunity to express his views in discussion at the highest level. But the situation was still far from satisfactory. It was symptomatic of the general lack of co-ordination that while the Commander-in-Chief Bomber Command had been instructed officially to look for his direction to the Deputy Supreme Commander, in practice he was in a position whereby at anytime and possibly at one and the same time he might receive conflicting orders from the Deputy Supreme Commander in respect of transportation targets; from the Chief of Air Staff in respect of Pointblank; and from the Air Commander-in-Chief for tactical support operations, quite apart from the possibility of additional requests, through the Chief of Air Staff, from the Combined Chiefs of Staff in the exercise of their reserve powers already mentioned. That the system worked at all was remarkable; that it worked as well as it did was, in part, due to the co-operation of Air Chief Marshal Harris, in spite of his ambiguous directive and once he had clearly understood what was required of his bombers in preparation for and support of Overlord.<sup>(1)</sup>

#### Conclusion

This change of direction put an end to any possibility of winning the war by independent bombing. For almost three years, the bomber force had been the only offensive weapon in the hands of the Allies. Those years had represented an opportunity to establish air power as a major factor in modern warfare and to vindicate the belief of those who had seen in the bomber force the new weapon to which the older forms of naval and military warfare would be subordinated.

With Overlord the Allies had entered on the last phase in their long struggle for victory to which the heavy bomber offensive would be a contributory, even a deciding factor, but still only a factor in a three dimensional war, in which its results would be judged primarily by the extent to which they assisted the Allied armies in their task of defeating Germany. How great their contribution to that task will emerge in due course. In the next three chapters it is proposed to examine the part played by the Strategic Air Force during the landings in Normandy and the Battle of France and to discover the extent of the tactical and technical innovations which occurred during the period of SHAEF direction when the heavy bombers successfully performed tasks which hitherto had been believed to be beyond their capabilities.

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(1) It should be noted here that Sir Arthur Harris was a regular attendant at the Air Commanders Conferences during the early critical stages of Overlord.

CHAPTER 2

THE ROLE OF BOMBER COMMAND IN THE  
PREPARATIONS FOR OVERLORD, 6 MARCH TO 5 JUNE 1944

Force Available

Throughout March, April and May 1944 the average front line strength of Bomber Command amounted to some 1,360 aircraft, excluding those in special duty squadrons and No. 100 Group, of which there were never less than a thousand aircraft available for operations on any one night. The types of aircraft then most predominant were the Lancasters I and III and the Halifax III which, together with the small but active Mosquito force in No. 8 (Pathfinder) Group, were capable of deep penetration and formed the van of the offensive against Germany. The balance of the Command was made up of Stirlings and Halifaxes II and V. Already obsolescent, these aircraft were giving way to Lancasters and Halifaxes III, but although unsuitable for operations over Germany they could still be used to good effect against targets in occupied territory and for minelaying and diversionary operations. In the latter task they were assisted from March onwards by aircraft from the Operational Training Units and Conversion Units. The possession of this large and flexible force stood the Command in good stead during the preparatory phase of Overlord and enabled it to cope with not only the many and varied commitments which arose but also to execute the tactical manoeuvres, including the bombing of several different targets on one night, without loss of the minimum effort required against individual targets.

A.H.B./VD/72

The Task

The preparatory air tasks for Operation Overlord fell into two phases; in the first the strength of the G.A.F., in particular its fighter element, was to be reduced so as to create a favourable air situation during the period of surface operations; in the second, the enemy's rail transportation system from western Germany to northern France was to be attacked to prevent the enemy moving reinforcements to or supplying the battle area. In effect this meant that the Eighth Air Force would continue its daylight precision attacks on the German aircraft industry and associated targets and the destruction of enemy aircraft in the air and on the ground, while the same time attacking rail centres in Germany and occupied territory. R.A.F. Bomber Command was to attack industrial areas in Germany associated with aircraft production and was to make precision raids on similar targets in occupied territory. The bulk of its effort was to be expended against a specified number of railway targets.

As D-Day approached, at a date which would be determined by the number of targets requiring attack before the assault, the joint effort of the Strategic Air Forces was to be directed against tactical targets. These were as follows:- keypoints in the rail system leading to the assault area, enemy airfields within range of the beaches, radar installations and coastal batteries. Other more general commitments included operations against Crossbow and naval targets, and in the case of Bomber Command, minelaying operations.

The strategic and the tactical phases over-lapped but it may be taken that strategic operations occupied the first two months and tactical operations the last six weeks before

D-Day 6 June. In the case of Bomber Command strategic operations in support of Overlord began with an attack on the marshalling yards of Trappes on 6/7 March. This was over a month before control of the heavy bomber forces passed to the Supreme Commander. But it was not until May that the demands of Overlord began to have any serious repercussions on the night offensive against Germany. In that month the proportion of effort by sorties against German targets, which had begun to fall in April, was reduced to roughly one third of the total effort. This was partly accounted for by the shortening nights which precluded deep penetration into the Reich, but it was mainly due to the increasing number of targets bombed in preparation for Overlord. Moreover the number of sorties over enemy occupied territory was increased by the necessity to attack two targets outside the assault area for everyone within it in accordance with the elaborate deception plan (Operation Fortitude). This, together with the tactical problems which were arising at the time, was an intensive strain on the heavy night bomber force.

Bombing Operations against Germany

Changes in the enemy defence system and British counter-measures

O.R.S. (Bomber Cnd)  
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104.

During the period from March to May there was a general decrease in the number of aircraft lost, falling from 3.0 per cent in March to 2.4 per cent in May. These figures were the lowest for a year but a closer analysis shows that actual losses varied according to the location of the target. Thus in March, although losses on five of the seven major heavy bomber attacks on German targets were only 2.7 per cent of the sorties despatched, on the remaining two attacks on Berlin they were extremely high, thereby raising the overall figure for heavy bomber losses over Germany to 5.1 per cent. Heavy bomber operations over occupied territory on the other hand, were completed for the negligible cost of 0.4 per cent while of the 946 Mosquito sorties against German and other targets, only one aircraft failed to return. By April, changes in tactics, including the bombing of several different targets simultaneously but above all, the removal of deep penetration targets such as Berlin from the target list caused heavy bomber losses over Germany to fall to 3.5 per cent. At the same time it was clear that the enemy was re-adjusting his fighter defences to enable him to meet the smaller penetrations being made and losses over occupied territory, although still not serious, rose to 1.9 per cent of sorties despatched.

By May, losses over occupied territory rose sharply to 4.6 per cent while heavy bomber losses over Germany were as high as 5.9 per cent. This situation was not eased by the necessity for operating repeatedly in a small area which limited the scope of tactical operations to confuse the enemy. Despite the increased activity of No. 100 Group which attempted to escort the main force, the provision of tail warning devices for most bomber aircraft and the use of radio countermeasures, particularly Window, on an increasing scale, it appeared that the enemy night fighters were a match for the British bombers.

The employment of Window from July 1943 had forced the enemy to alter the tactics of his night fighters. Individual control was abandoned in favour of a new system, in which loose groups of fighters were directed by a minute to minute commentary on the movements of the raiders broadcast from a

A.H.B./IIE/76  
p.11 et seq.

few high powered transmitters. The fighters were assisted by a network of visual beacons, later equipped with M/F transmitters, which were used as assembly points. However the enemy controllers were confused by Mosquito spoofs and dog-leg routing and it was difficult for them to decide which target was the correct one before the bombers arrived. For a period of four months bomber losses were kept below the danger line.

The enemy soon developed new tactics and between December 1943 and February 1944 there was a distinct rise in the bomber loss rate. This was found to be due to fighters which were no longer concentrating on defending the target area but were being vectored into the bomber stream while it was still some distance away from the objective. It was obvious that the enemy was increasing the efficiency of his early warning system which could track the approach of the bomber force before it reached the enemy coastline and in some cases almost as soon as it was airborne. Simple evasion tactics were now no longer of much value in confusing the enemy night fighter controllers.

There were three ways of dealing with this new threat to the night bombers:-

- (a) Radio counter measures against the main links on the enemy's night fighter control system, (1)
- (b) Provision of fighter escort.
- (c) New tactics.

These will be considered in turn.

By March 1944 radio countermeasures (2) had become at best a palliative and were approaching their limits. Since December 1943 No. 100 Group had been responsible for this type of operation. A large number of countermeasures were in use of which Carpet II (3) introduced into three Pathfinder squadrons in March was the latest. The application of countermeasures had, so far, been somewhat haphazard. As each new move of the enemy was discovered, a fresh device, or a modification of an existing one, was produced to counter it. Not until June 1944, after experience gained during the execution of the deception programme in Overlord, was an attempt made by No. 100 Group to apply countermeasures on a tactical basis. The result was the Mandrel screen and the Special Window Force which will be discussed in a later chapter.

See Chap. 4

#### Bomber Support

In the meantime No. 100 Group was building up and training its squadrons for Overlord and operational activities

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- (1) They were:-
    - (i) The early warning system
    - (ii) R/T and W/T night fighter control
    - (iii) A.I. in night fighters.
  - (2) See A.H.B./IIE/76 'Radio Countermeasures in Bomber Command', and A.H.B./IIH1/44 No. 100 Group Review of operations Nov. 1943 - May 1945.
  - (3) A jammer against ground radar - see R.A.F. Signals History, Vol. VII 'Radio Counter-Measures', Chap. 8.

A.H.B./  
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were mainly confined to bomber support and intruder sorties by the night fighters. In March 1944, the composition of No. 100 Group was as follows: three Serrate squadrons for bomber escort duties equipped with Mosquitos and fitted with A.I. Mark IV and a backward looking A.I. aerial and transmitter to give all round cover. No. 515 Squadron took part in low level intruder operations against airfields and for this task was equipped with Mosquitos Mark IV. In June No. 23 Squadron arrived from the Mediterranean theatre equipped for the same purpose. Finally, No. 192 Squadron patrolled the European coastal areas to obtain information about the enemy's forward radar system.

Early Serrate operations were largely experimental as No. 100 Group had little experience on which to base its tactics.(1) Various methods were tested including escort of the bomber stream, patrols in the target area during and after a raid and patrols over the fighter assembly beacons. Pilots soon discovered that escort of the bomber stream was impracticable because the large number of A.I. contacts received from the bombers prevented the Serrate aircraft from discovering the enemy. Attempts were made to overcome this difficulty by flying on a course parallel with, but a few miles distant from the bombers, but this scheme was unsuccessful. Patrols over the enemy assembly beacons were comparatively ineffective and during the early months of 1944 the majority of enemy night fighters were shot down by Mosquitos patrolling the target area after the bombing had taken place. Between March and May 1944 No. 100 Group flew 522 Serrate sorties in support of bomber operations, and claimed to have shot down 36 enemy aircraft and damaged two others for a total loss of ten British fighters.(2) A total of 183 low level intruder sorties was flown during the same period in the course of which three enemy aircraft were claimed to have been destroyed and one probably destroyed for the loss of nine British fighter aircraft.

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Although the Serrate operations were undoubtedly very creditable under the limitations existing at the time, No. 100 Group would have to be considerably increased if it was to subdue the German night fighter organization to any degree. The Air Ministry was unwilling to whittle down A.D.G.B. at this stage and there were also strong security reasons why Mark X A.I. should not fall into enemy hands. In a strongly worded letter to the Air Ministry on 7 April Sir Arthur Harris urged that the number of night fighters for bomber support should be substantially increased and asked that a minimum of ten night fighter squadrons be placed at the disposal of No. 100 Group at once. This was the only remedy against increasingly severe bomber losses. Sir Arthur Harris did not believe that a reversion to daylight operations would solve the problem since even Lancasters could not be expected to fly in formation above a height of 18 to 19,000 feet where they would be vulnerable to flak and thereby offset any advantages to be gained by fighter escort.

A.H.B./ID4/16

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- (1) See also R.A.F. Signals History Vol. VII Radio Counter-Measures, Chap. 14.
  - (2) According to German records 69 night fighters of Luftflotte Reich were destroyed in air combat from March to May inclusive and four were reported missing, Luftflotte 3 lost 11 night fighters destroyed in action (Enemy Doc: A.H.B.6 Trans).

B. Cnd. ORB  
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These proposals were reviewed at a conference called by the Chief of the Air Staff on 20 April and it was agreed that two Mosquito Mark X A.I. squadrons should be turned over to bomber support operations from Air Defence Great Britain, and that two intruder squadrons from the same Command should be transferred to Bomber Command as soon as the Allied Armies had been established on the Continent. One intruder squadron from M.A.A.F. was to be transferred to the U.K. at once. It was estimated that it would take nine months for the enemy to make effective use of the Mark X A.I. As soon as supply and modification capacity allowed these squadrons were to be equipped with A.I. Mark X and all A.I. night intruders were ultimately to be fitted with A.I. Mark X, backward looking A.I. and Serrate in that order of priority. As a result of these decisions Nos. 85 and 157 Squadrons arrived in No. 100 Group in May, followed by No. 23 Squadron from M.A.A.F. in June.(1) But none of these squadrons became operational until D-Day and in the meantime Bomber Command continued to attack Germany in the face of the increasing strength of the enemy night fighter defences.

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O.R.S. (B.C.)  
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For the time being, however, tactical evasion continued to be the principal means of defence against the hostile night fighter and a Tactical Planning Committee was set up at Bomber Command Headquarters during February to review past operations and to make recommendations for the future planning. At a meeting held on 20 February it was agreed to cut down the length of the bomber stream by splitting the main force into two parts and by increasing the concentration combined with a dispersion in height. It recommended that a large diversionary effort should be made in one direction while the main force was brought on to the target from another. This suggestion was tried out on three raids beginning on the night of 20 February with the result that fighters were diverted to a distant area allowing the main target to be bombed without undue interference. It was decided that diversionary operations should be allocated to aircraft from the Operational Training and Conversion Units.(2) In practice they did not carry out any major diversionary activities until the end of March by which time, as will be seen, the enemy had evolved new defensive tactics.

#### Operations against Germany

B. Cnd.  
Night Raid  
Reports  
Nos. 540 - 567.

During March the Strategic Air Force was still engaged in bombing the industrial areas of the Reich with determination. Until 14 April, when direction of the force passed to the Supreme Commander, the night bombers had made seven major attacks on German industrial centres including Stuttgart (two attacks) Frankfurt (two attacks), Berlin, Nuremberg and Essen.(3) Although a large amount of fresh damage was inflicted on top priority objectives such as the marshalling yards and goods stations at Frankfurt, Stuttgart and Essen, the main interest of these and subsequent operations in the preparatory period to Overlord lies in the tactical struggle between the British night bombers and the German night fighter defences, a struggle which since the beginning of the year had begun to go seriously against the night bombers.

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- (1) Permission had to be obtained from C.C.S. to transfer this squadron.
  - (2) See R.A.F. Signals History, Vol. VII pp. 194-196.
  - (3) All these attacks were made in March 1944.

Until March, the essence of the enemy's defensive tactics had been to mass his fighters either in the target area, or more latterly, en route to it. So long as the enemy controllers continued to operate them in one group, large scale diversions and split-routeing might be expected to have some effect in diverting their attention from the main bomber stream until it was too late for them to make effective interceptions. But during the second attack on Stuttgart, on 15/16 March, a new development was noticed. On that night the enemy controller split his fighter force into two, sending the first group to harass the bombers en route and holding a second group in readiness in the north and despatching them to the target area where they assembled in large numbers. Bombing tactics which included a diversionary raid on Munich by Mosquitos and the use by the main force of an unusual southern route through France entirely failed to deceive them. Losses were comparatively heavy and at least 17 of the 36 aircraft (4.2 per cent of the force) which failed to return were shot down by fighters.

B.Cmd. Night  
Raid Report  
No. 553

The significance of this development lay in the fact that while diversions and careful routeing could mislead one group of enemy fighters, the other could always be held in readiness to intercept the bombers over the target or on the way home. Thus in a raid on Frankfurt on 18/19 March, although a large minelaying diversion in the Heligoland Bight succeeded in distracting fighters held in north Germany and Belgium until it was too late to make interceptions en route, a second large fighter force was waiting in the target area and followed the bombers some way out. Nearer home they were again intercepted, this time by the northern force which had recovered from its initial set back. But the enemy did not always meet with success. During a second attack on Frankfurt on 22/23 March, diversionary raids on Berlin and Hanover by small forces of Mosquitos and the use of an unusual northerly route all combined to confuse the enemy controller and after a series of false starts the fighters were ordered to rendezvous over Hanover as the main target for the night. They recovered from this error too late to develop any concentrated attacks on the bomber streams.

Ibid  
Report  
No. 560

The attacks against Berlin and Nuremberg

Nevertheless the tactical variations were becoming stale and the time was approaching when the policy of attacking one major target per night would become untenable. The climax came with raids on Berlin on 24/25 and Nuremberg on 30/31 March. The attack on Berlin was marred by a very strong following wind which caused the bombers to overshoot their aiming point and spread the raid outside the southern suburbs. The high winds also resulted in a very heavy casualty rate for 72 aircraft (8.9 per cent of the force despatched) failed to return and a further 89 were damaged. At least 45 of the missing aircraft were believed to have been shot down by flak as they were blown off their course over the heavily defended areas. Although fighters were, for once, not the main cause of the casualties, this was not due to diminished activity. A large scale diversion(1) west of Paris by training aircraft, employed on this task for the first time, entirely failed to distract the enemy controller who succeeded in feeding the fighters into the bomber stream all the way to the target and held

Ibid  
Report  
No. 562

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(1) These feint attacks were known by the codename Bulls eye.

others in readiness to attack as they turned homewards. Their comparative failure to intercept seems to have been mainly due to the gale which deflected the bombers from their course. This was the last of the series of night attacks on the German capital known as the Battle of Berlin. Bomber Command did not visit it again in force until April 1945 but American heavy bombers which had made their first major daylight raid against Berlin at the beginning of March continued to attack it with growing intensity. Pathfinder Mosquitos of Bomber Command meanwhile maintained a constant harassing effort against the city at night throughout the remainder of the year.

Ibid  
Report  
No. 567

Four nights after the Berlin debacle, Bomber Command attacked Nuremberg and suffered its heaviest losses of the war; 94 (11.8 per cent) aircraft failed to return, and 71 aircraft suffered varying degrees of damage. It is estimated that out of this total some 62 aircraft were shot down by enemy night fighters, the remainder becoming victims to flak with the exception of two aircraft which collided over the target area and were seen to go down in flames. Apart from these losses seven aircraft were wrecked beyond repair in landing or taxiing accidents, three in combat and one by British incendiary bullets. Once again this severe casualty list was largely due to a strong westerly wind which scattered the aircraft and made a poor attack inevitable. Weather conditions over the North Sea made any large scale diversion impossible. Cloud which had been expected to provide cover for the main force, at least over the first part of the route, dispersed altogether over Belgium leaving the bombers exposed in the light of a half moon. In consequence the enemy controller was able to ignore the likelihood of any serious threat developing from the small diversionary force despatched to lay mines off Heligoland and concentrated his fighters in two groups near Bonn and Frankfurt. A running fight developed over a distance of over 250 miles from Aachen eastwards and southwards to the target and at least 50 aircraft had been destroyed by the time the force reached the turning point to the target near Fulda.

The Nuremberg disaster left no further room for doubt as to the impracticability of operating the whole force against a single target on any one night. The enemy was fully alive to existing bomber tactics and the only hope seemed to be in forcing him to split his fighters into such small groups as to render them comparatively harmless. (1) What was now required, instead of split-routeing and diversions, was a system of multiple objectives which would both divide and confuse the night fighter defences. On 1 April the Commander-in-Chief Bomber Command authorised the attack of two or more targets on the same night together with the most complicated and varied routeing and tactics that could be devised.

The employment of No. 5 Group as a separate force

At this point a fresh problem arose. The attack of multiple targets in Germany and the use of divided routes

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(1) One reason for the German success was that fighters were able to 'home' on the British bombers with their A.I. known as S.N.2 and it was not until the mid-summer of 1944 that the Allies were able to jam this equipment. (See R.A.F. Signals History, Vol. VII p.158).

would inevitably place a heavy strain on the Pathfinder Force which would have to provide the van of each approach route to targets deep in Germany as well as H2S leaders for mine laying operations and Oboe aircraft for French and nearby German targets. As D-Day approached and tasks increased these obligations would be difficult to fulfil in their entirety.

The Commander-in-Chief Bomber Command therefore decided to detach two or more Pathfinder squadrons to a normal operational group intending that it should then be used as a separate force against targets in Germany in conjunction with main force attacks. The squadrons concerned would retain their Pathfinder status and tour but would come under the operational and administrative control of the Group to which they were attached. The Group would also be responsible for its own marking and planning of the raid while co-ordination of timing and routing would be undertaken at Bomber Command headquarters. No. 5 Group was chosen for this experiment and Nos. 83 and 97 (Lancaster) Squadrons which No. 5 Group 'supported' in the Pathfinder force were transferred to that Group for Pathfinder duties together with No. 627 (Mosquito) Squadron which would provide low marking. The reasons for the selection of No. 5 Group was that it was the largest operational Group and could, if required, supply at least two effective forces for a combined attack on multiple objectives and also because it already had much experience in the development of marking and bombing techniques during a recent series of precision attacks in France. Sir Arthur Harris was satisfied that it would prove a 'thoroughly sound' experiment and even if it failed the Pathfinder squadrons could revert to No. 8 Group within 48 hours.

Precision attacks on industrial targets in Occupied Territory

While the Strategic Air Forces were pursuing their night and day attacks on the G.A.F. and related industries and industrial areas in Germany the Air Staff, in consultation with the Ministry of Economic Warfare, had been preparing a list of targets for Bomber Command in occupied territory which were to be carried out in the moon periods prior to D-Day and which would either contribute directly to Overlord and Pointblank or at the very least provide valuable experience in the precision bombing of small, isolated targets. Apart from any other reason, it was essential, in the face of Sir Arthur Harris' often reiterated statements that his Command could not effectively attack small objectives, to determine exactly the capabilities of the force.

The Air Staff concluded that there were no longer any major industrial targets in occupied territory, the destruction of which would materially affect the German war effort. There were however a number of small aircraft factories and repair depots which might be attacked as part of the plan to neutralise the G.A.F. These, numbering 23 targets, together with three experimental targets, the marshalling yards at Trappes, Montdidier airfield and an ammunition dump at Maintenon, were sent to Bomber Command on 4 March, (1)

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(1) Industrial targets in Friedrichshafen were also included. In view of the successful attacks that were carried out a revised list was issued by Air Ministry on 29 March.

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O.R.B.  
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Encls. 97A  
- 105A

B. Cmd.  
Night Raid  
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The majority of the targets were unsuitable for attack by more than 50 aircraft. Others required, by reason of their proximity to built-up areas, the special precision technique evolved by No. 617 Squadron to which they were specifically allocated. Thus with the exception of a successful raid on the aircraft factory at Meulan les Mureaux by Halifaxes of Nos. 4 and 6 Groups on 2/3 March using Oboe ground marking-technique, No. 5 Group was solely responsible for the serious damage inflicted in every instance on eight further aircraft factories and repair depots, two explosive works, a needle bearing factory and a rubber tyre works in France between 1 March and 6 April.

Ibid No. 548  
and  
B. Cmd.  
Quarterly  
Review No. 8

Bearing in mind the character of the night bomber force the extreme accuracy of these operations against small, precise targets was remarkable. In particular, a raid on the Nadella needle bearing factory at La Ricamarie near St. Etienne on 10/11 March was an outstanding achievement in night precision bombing. The target, which covered an area no more than 170 by 90 yards, was almost completely destroyed by Lancasters of No. 617 Squadron. Although the majority of these attacks were executed by this specialist squadron good results were achieved by No. 5 Group main force aircraft against similar objectives, especially the aircraft factory at Marignane and the aircraft assembly plant and depot at Toulouse.

B. Cmd.  
Night Raid  
Report No. 547  
and 571

O.R.S (Bomber  
Cmd.) Rept. No.  
S. 154

The technique evolved for these attacks was based on visual marking of the aiming point with red spot fires combined with the R/T and W/T control of the main force by a Master Bomber. Before zero hour flares were dropped by Illuminator aircraft either with the help of Oboe proximity markers or, for targets beyond Oboe range, on H2S. The aiming point was then marked visually in the light of the flares with red spot fires. These were assessed by the Master Bomber who called in other marker aircraft to back up the most accurately placed markers with further spot fires. He then directed the main bombing force accordingly. This method was used with minor variations on all No. 5 Group operations in April and the early part of May when conditions were suitable for visual marking.

B. Cmd.  
Night Raid  
Report  
Nos. 590 - 601

Between 28/29 April and 9/10 May very destructive attacks were made on the aircraft factory at Clermont - Ferrand, an airframe repair factory at Oslo and Tours and an aircraft assembly works at Toulouse. Other targets heavily damaged included the explosive works at St. Medard en Jalles near Bordeaux, the Antwerp Motor Assembly Plant, the Foundry and Stamping Plant at Gennervilliers and the Ancey Ball Bearing Works, the latter being completely destroyed.

Attacks by No. 5 Group on targets in Germany

Ibid  
Report  
No. 584

Meanwhile on 22/23 April No. 5 Group made its first deep penetration into Germany as an independent force. On that night 265 aircraft were despatched to bomb Brunswick using the No. 5 Group marking technique in conjunction with a main force raid on Dusseldorf. On the same night a strong attack was made on Laon marshalling yards in northern France while Mosquitos, in addition to multiple attacks on airfields in northern France, also made a diversionary raid against Mannheim. Although there was some evidence that the variety of routes followed had confused the enemy controllers, losses on the Dusseldorf raid, which incidentally inflicted heavy damage on the target, were moderately heavy at 4.9 per cent.

No. 5 Group on the other hand lost only four (1.6 per cent) aircraft, a very small total for such a deep penetration. Unfortunately its attack on Brunswick was spoilt by an accidental release of sky markers which, despite the accuracy of the red spot fires, drew a proportion of the bombing to the south of the target.

Nevertheless the experiment was considered sufficiently successful to warrant a further attempt, and on 24/25 April, No. 5 Group made an extremely accurate attack on the heart of the city of Munich in conjunction with a main force raid on Karlsruhe. The enemy controllers were undoubtedly troubled by the night's tactics which forced them to take into account four separate bomber streams comprising the Munich force, two Karlsruhe streams and a Bullseye feint, by operational and training aircraft over the North Sea. Nor was this all, for six Lancasters made a feint, dropping target indicators and flares over Milan, in conjunction with the raid on Munich which was routed over Italy. Losses were comparatively light (Karlsruhe, 19 aircraft) (3.0 per cent) and Munich nine aircraft (.35 per cent) but this hopeful start was short lived. Two nights later, on 26/27 April 21 aircraft (9.3 per cent) failed to return from a No. 5 Group raid on Schweinfurt, at least 14 falling victim to enemy fighters. Surprisingly for such a heavily defended target, there were only seven (1.4 per cent) aircraft missing from a main force attack on Essen on the same night - a very low rate for the Ruhr.

On 27/28 April Bomber Command executed what was to prove one of the most successful raids of the war when 311 bombers made a concentrated attack on Friedrichshafen for the loss of 18 (5.6 per cent) aircraft. This target, as the reader will recall, was recommended as being one of the most profitable for moonlight attack because of its association with V weapons, aircraft, radar and tank production. Daylight reconnaissance showed that all six of the most important factories were severely hit.

The month of May was given over to the attack of targets in the occupied countries in connection with the preparations for Overlord but the series of strategic operations over Germany during this phase was ended by five attacks which took place at the end of the month. On 21/22 May there was a somewhat scattered attack on Duisberg in the Ruhr and on 22/23 May Dortmund and Brunswick were bombed. The former town suffered a concentrated attack. Heavy losses were suffered during the Duisberg attack and 21 of the 29 missing aircraft fell victim to fighters especially on the return route. On 24/25 and 27/28 May marshalling yards at Aachen were attacked during which 31 bombers were lost, again the majority to night fighters.(1)

Further Changes in the Enemy's Defence System

By this time it was evident that the changes in the enemy defence system forecast at the end of March had taken place. During that month and the early part of April the night fighters had been adjusted and regrouped so as to provide cover for southwest Germany and to enable them to intercept the bombers on both the inward and the outward routes as well as over the target. Responsibilities between the various fighter groups were re-allocated and assembly

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(1) This was one of the transportation targets.

Ibid  
Report  
No. 586

Ibid  
Report  
No. 588

See p. 34 and  
Chap. 8 p. 187

B. Cmd.  
Night Raid  
Report  
No. 589

Ibid  
Report  
Nos. 611  
and 612

Ibid  
Report  
Nos. 614  
and 616

O.R.S. (B.C.)  
Report No.  
103 Para. 18  
et seq.

beacons for long range fighters were extended westwards into France.

This change restricted the tactical manoeuvres of Bomber Command. The rising tempo of the attacks against transportation and important objectives in occupied territory during April together with smaller penetrations into Germany itself hastened the enemy's process of readjustment and opposition against bomber forces attacking targets in occupied territory began to increase although the overall loss rate for that month compared with March was much lower (2.2 per cent as opposed to 3.8 per cent).

During May the German defence system was further readjusted as the Allied preparatory attacks in France and Belgium increased and as, with the shorter summer nights, targets in Germany were restricted to the Ruhr area. Fighter groups based in France, Belgium and Holland were strengthened to form a first line of defence. These groups operated from their own bases and were no longer required to assemble en masse at beacons further inland as a preliminary to operating at long range. More remotely placed groups were used as a second line of defence to the fighters in the Netherlands. At the same time subsidiary beacons were established as far west as Ghent, Evreux and Orleans. This enabled the fighters to contact approaching bomber streams from comparatively short range often with the assistance of Benito, or, more recently, V.H.F. -D/F equipment. The general method of control consisted, as before, of passing plots of the position of the bombers on R/T and W/T frequencies with a minimum of direct instructions.(1)

Ibid  
Report  
No. 104. para.  
23 et seq

By the end of May it was possible to classify the occupied territories in three categories according to the distribution of the enemy defences. Thus the increased strength of the fighters in northwest France and Belgium caused bomber losses in heavily defended areas to rise sharply from 1.9 per cent in April to 4.3 per cent in May. Attacks on coastal targets and objectives elsewhere in France were still comparatively unopposed subject to the possibility of routes lying partly in the defended areas where fighters might be encountered. On the other hand, it was clearly only a matter of time before these defences were also strengthened. Finally the risk of heavy casualties was greatly increased by the new methods of precision bombing which required aircraft to remain in the target area much longer than was normal.

This situation lent further weight to the Commander-in-Chief Bomber Command's warning to the Air Staff that tactical evasion was nearing its limit and as will be seen, was the reason for the British bomber force operating once again by day as well as by night. But this did not occur until 14 June, and for the time being the night bombers had to continue as best as they could with their policy of evasion.

Preparatory Operations in support of Overlord

Operational Planning of the Transportation Offensive

It will be remembered that the transportation plan had a strategic and a tactical phase. The purpose of strategic

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(1) See also R.A.F. Signals History, Vol. VII, pp. 175-176.

See Chap. 1

operations against railway centres in northern France and western Germany was not to bring traffic to a standstill, since this was too large a task for the available effort in the time remaining before D-Day, but rather to canalise that traffic and force the enemy onto the roads. This would be a preparation for the tactical phase in which key road and rail points through which enemy reserves might move to the battle area would be cut. Aiming points in the strategic phase were to be locomotive sheds, servicing, maintenance and repair facilities rather than marshalling yards although it was recognised that dislocation of the latter and damage to rolling stock, water supply and other facilities would provide a useful bonus.

It was essential that the strategic phase start as early as possible so that the tactical plan could be of assistance to the ground forces during the landing operations and it was all the more necessary because the Allied bombers had a multitude of tasks to fulfil before D-Day. The delay in reaching a firm decision on the transportation plan was therefore a matter of grave concern to the Air Commander-in-Chief, A.E.A.F. On 2 March he wrote to the Air Ministry seeking clearance for night and day attacks on 75 rail centres in France and Belgium and in particular for 12 French rail centres which the Commander-in-Chief, Bomber Command had agreed to bomb during the March moon period subject to Air Ministry approval. As with all targets in occupied territory the difficulty was mainly one of danger to civilian life but the Air Staff agreed, as an experiment, to clear six centres in less populated districts for Oboe ground marking attacks and these were included in the directive on moonlight targets sent to Bomber Command on 4 March. (1) Others were cleared later in the month and up to and including 10/11 April Bomber Command made 15 Oboe ground marking raids on eleven separate marshalling yards beginning with the attack on Trappes on 6/7 March.

A.H.B./  
IIS/110/14/136/  
15/2  
Encl. 7

A.H.B./IIH/241/3/  
599(F)  
Encl. 43A.

Particular attention was given to the operational planning of this new offensive, especially in regard to economy of effort. Bomber Command had had little experience of this type of target and one of the immediate problems was to determine the exact weight of attack necessary to produce the required density of bombs per acre recommended by the railway experts. Since its solution was typical of the work conducted by the Operational Research Section of Bomber Command during 1944 and 1945 it is of interest to examine how the problem was tackled.

From an analysis of crater plots in attacks on Le Creusot, Friedrichshafen, Montbelliard, Boulogne and a number of Crossbow targets, it was found possible to arrive at a theoretical figure for the average random bombing error on lightly defended targets. This was reckoned at about 500 yards from the mean point of impact (M.P.I.) of the craters. Similarly, assuming that marking would be done blindly by specially equipped Pathfinder Mosquitos, it was estimated that the average marking error on short range Oboe operations would be about 250 yards at 15,000 feet and 400 yards at 28,000 feet. Assuming that bombing would be between these heights, an average marking error of 300 yards was accepted. Finally while no definite

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(1) The railway centres chosen were Trappes, Aulnoye, Le Mans, Amiens/Longeau, Courtrai, Laon.

figures were available for systematic bombing errors (i.e. displacement of the centre of the bomb distribution from that of the markers) a theoretical error of 400 yards was agreed upon. For these figures the overall radial bombing error for short range Oboe attacks on lightly defended targets was calculated at 640 yards.

Using this tentative figure as a basis, a transparent grid was constructed on the scale of the target maps to show the proportion of 500 pound bombs which could be expected to fall within unit one acre cells of the grid and hence the number of bombs to be aimed in each case could be calculated theoretically. Allowance was also made for errors and technical failures. On past experience it was estimated that only 70 per cent of all bombs despatched was actually aimed correctly and values calculated from the grid had to be stepped up accordingly.

But a further difficulty had to be overcome. The railway experts had produced their estimates of required densities in terms of 500 pound bombs; while these constituted a normal load for Stirling aircraft they were uneconomical for Halifaxes and Lancasters which were able to carry a large number of 1,000 pound bombs without reducing the total weight of bombs carried. Thus the actual number of bombs despatched would depend on the proportion of 1,000 pound bombs carried which, in turn, would depend on the type of aircraft employed.

It was also obvious that while, in some cases, the estimated weight of attack would achieve the required density per acre, in others more would be needed when such factors as the vagaries of the weather, marking aids and the small size of the targets were taken into consideration. The principle adopted was that it was more economical to send the bare requirements, or even less, than to increase the weight of attack with a possible waste of effort. Where the effort proved insufficient, the attack could be repeated providing allowance was made for the time factor as D-Day approached and tactical objectives increased.

#### The Attack against Transportation Targets

Oboe ground marking was used on all of the 15 attacks made between 6/7 March and 10/11 April with great success. The only variation in method occurred in the raid on Aulnoye on 10/11 April when two aircraft of No.1 Group, acting as Master Bombers, assessed the Oboe dropped green target indicators after which they dropped red target indicators visually. This was the forerunner of the 'controlled Oboe' technique which was so successful in a later stage of the transportation attacks. Normally both red and green target indicators were dropped by Oboe aircraft, the red being used to distinguish those markers which were considered to be more accurate. The main force which was invariably instructed not to bomb unless target indicators were seen gave these preference. Since the majority of rail targets were elongated or complex in shape, two aiming points were normally selected and these were than marked individually and successively bombed in separate waves.

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(Bomber Command)  
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Headquarters A.E.A.F. evolved a system of categories for the assessment of target priorities. They were as follows:-

- Category 'A' Sufficiently damaged to require no more attention until further notice.
- Category 'A' + Eliminated so far as heavy bombers were concerned but possibly requiring daylight attack by medium bombers to complete the destruction of particular facilities.
- Category 'B' Severely damaged but retaining vital installations and requiring repeat attack on lower priority than Categories 'C' and 'D'.
- Category 'C' Attacked but with little or no material damage and requiring repeat attack on highest priority.
- Category 'D' Rail centres authorised for attack but so far not bombed and to be placed at second priority.
- Category 'E' Rail centres in plan but not yet cleared for attack.

A.H.B./IHH/24.1/3/  
553  
Encl. 10A.

Of the eleven rail centres attacked by Bomber Command up to 10/11 April five, namely Trappes, Vaires, Lille (Deliverance), Le Mans and Amiens were allotted Category 'A', the last two having been bombed twice. The remaining six, Laon, Ghent, Aulnoye, Courtrai, Villeneuve and Tergnier were eliminated in further operations during April and May. (1)

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At this point it is of interest to compare the estimated requirements with the results actually achieved on the first 15 raids. It was found that the overall average radial error obtained was 680 yards as compared with the 640 yards assumed. Similarly the estimate that 70 per cent of the bombs despatched would be correctly aimed was reduced in practice to 55 per cent. The actual weight of bombs discharged on the eleven targets was 28 per cent over the estimated requirement but this was entirely due to the four repeat attacks. Omitting these the bombs discharged were only 95.3 per cent of requirement in accordance with the principle that a smaller effort would be more economical even though it meant, as actually happened, a further attack to complete the necessary destruction.

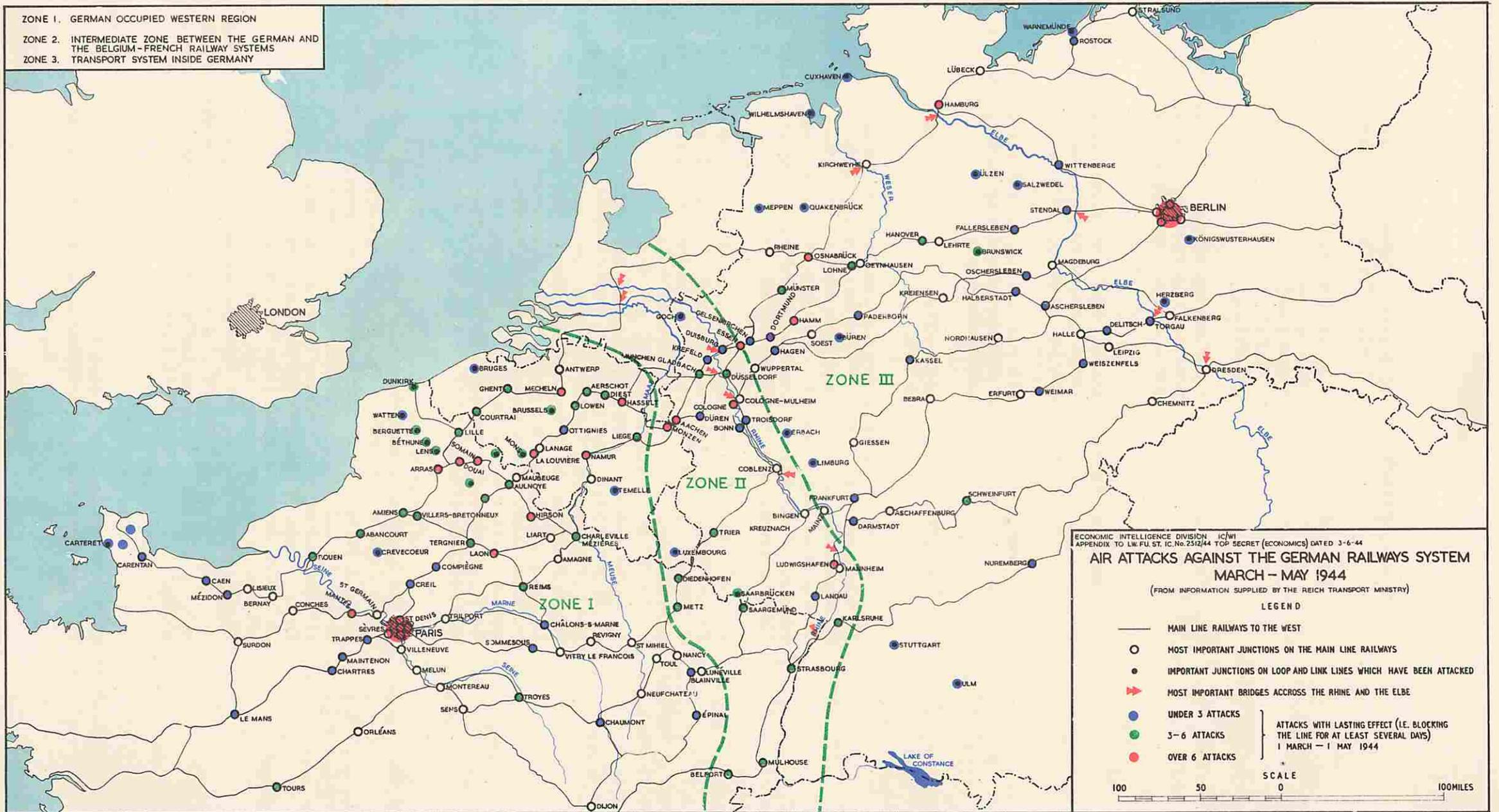
See pp. 28,29.

An analysis of the missing rate is also of interest here in the light of earlier observations on changes in the enemy's night fighter defences. Only 26 of the 2,513 main force (i.e. omitting Obce Mosquitos) sorties despatched (1.03 per cent) failed to return, giving an average of 1.73 aircraft missing per attack. This, however, is not a representative figure since it was greatly increased by the heavy losses sustained over Tergnier (10 aircraft) and the second attack on Aulnoye (seven aircraft) both on 10/11 April. If these figures are left out, the rate per attack falls to 0.69 which was normal for that period although, as already remarked, the missing rate over occupied territory rose steeply in subsequent operations when the enemy's fighter defences were pushed westwards.

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(1) Rail centres attacked between 6 March and D-Day with German estimates of damage inflicted will be seen on Map 2.

ZONE 1. GERMAN OCCUPIED WESTERN REGION  
 ZONE 2. INTERMEDIATE ZONE BETWEEN THE GERMAN AND THE BELGIUM-FRENCH RAILWAY SYSTEMS  
 ZONE 3. TRANSPORT SYSTEM INSIDE GERMANY



Comparison of Marking Techniques on Transportation Targets

ORS (Bomber Cnd.)  
Sum. of attack  
on Tours M/Y  
10/11 April  
1944.

ORS (Bomber Cnd.)  
Rept. No. S. 154.

Although the Oboe ground marking technique used on the first fifteen rail centre attacks had produced very promising results, there was plenty of room for improvement in accuracy if the principle of economy of effort was to be maintained. On 10/11 April No. 5 Group, operating for the first time independently against a transportation target, made a highly successful attack on the marshalling yards at Tours, using the visual ground marking technique which it had developed in raids on French factories. In the remaining nineteen attacks during April different techniques were tried with varying success. These included two further visual ground marking raids by No. 5 Group against Juvisy and La Chapelle, five raids, including an attack on Aachen in western Germany, using the Musical Newhaven method, and towards the end of the month, six attacks by the Controlled Oboe method which had been used for the first time in the raid on Aulnoye on 10/11 April. (1)

See p.35.

O.R.S. (Bomber  
Cnd.) Rept.  
No. S. 154.

The analysis of these operations showed that the total number of hits achieved when expressed as a percentage of the number expected was higher for those attacks in which the No. 5 Group technique had been used. In this method, it will be recalled, targets were marked visually with red spot fires by illuminator aircraft and were then assessed by the Master Bomber before the main force bombed. Controlled Oboe raids achieved the next best results. In this instance all the Oboe Mosquitos attacked before zero hour, each dropping a different coloured marker, unlike Oboe ground marking and the Musical Newhaven method where markers were discharged at intervals during the raid. The target was then illuminated by flares in the light of which a Master Bomber assessed their accuracy and directed the main force accordingly, if necessary dropping further markers. The Musical Newhaven technique differed from the No. 5 Group method in that the marking was done with target indicators instead of spot flares. Although an improvement on normal Oboe ground marking, it was found to be considerably inferior to either of the first two methods and there seemed to be no doubt that for raids on which No. 5 Group technique could not be used, Controlled Oboe, in which accuracy was achieved by coloured markers was by far the most effective method so far evolved.

Completion of the Transportation Offensive

A. H. B. / ITH/241/  
3/553

By the beginning of May attacks against the railway systems of northern France and Belgium were well under way and on the 1st the Eighth Air Force attacked the first of its allotted targets. In addition to Bomber Command a considerable effort had been made by A.E.A.F. On 14 April direction of the Strategic Air Forces had passed to the Supreme Commander and on 20 April S.H.A.E.F. issued the first complete list of transportation targets cleared for attack by R.A.F. Bomber Command and the U.S. Eighth, Ninth and Fifteenth Air Forces. Targets for Bomber Command comprised a total of 22 in occupied territory and four in western Germany. On the following day the list was re-issued showing temporary priorities and included a number of targets outside Germany not yet cleared for attack.

(1) See also Annexe B for description of marking techniques in use during 1944/45.

See Chap.1.

A.H.B./IHH/  
241/3/553

As a result of Cabinet pressure during April the Supreme Commander was forced on the 29th to suspend 27 targets in occupied Europe which were located in thickly populated districts. After discussions with the Air Commander-in-Chief at the beginning of May General Eisenhower determined to resist further pressure from the Prime Minister to abandon the transportation plan and on 5 May these restrictions were removed. A revised list of targets was issued showing their allocation between Commands and their priorities in terms of estimated civilian casualty rates. The way was at last open for the completion of the offensive, the only proviso being that targets with the highest casualty rates should be attacked last and as near to D-Day as possible.

Notwithstanding the growing number of tactical objectives requiring attention, between 1 May and D-Day Bomber Command made 32 further attacks on rail centres, many of which were being bombed for the second or even the third time. In particular, Trappes and Tergnier which had already been allotted Category 'A' were, in view of their importance, downgraded to 'B' at the end of the month after they had been repaired and were again put out of action by two raids on 31 May/1 June. Marking techniques used on the majority of raids in May were variations on the controlled Oboe and No.5 Group techniques and for the most part bombing showed a considerable increase in accuracy. A comparison of bomb densities round the aiming point for attacks in May compared with those in March indicated an improvement of the order of 165 per cent.

A.C.M. Leigh  
Mallory Despatch  
pp.14 - 17 and  
B.A.U. Report  
No.1, p.3.

A.H.B./IIS/112/  
1/100/9 (A)  
Encl.34A.

In all, in the three months since 6 March, Bomber Command had attacked 37 railway centres in France and western Germany of which 22 had been allotted Category 'A' and 15 Category 'B'. During the course of these operations it had dropped 40,921 (short) tons of bombs which represented almost half the effort against railway centres by A.E.A.F. and the Eighth and Fifteenth U.S. Air Forces. In all, 51 rail centres had been put out of action and the remainder so seriously damaged as to impose awkward restrictions on traffic. On 3 June the Air Commander-in-Chief, Sir Trafford Leigh Mallory, was able to state at the Air Commander's Conference that, with the exception of Paris, the transportation plan was complete and heavy bombers would not be used against railways in France unless any particular centre was found to be in extensive use by the enemy. (1)

A.C.M. Leigh  
Mallory Despatch  
p.16

By this time the first stage of the tactical plan designed to isolate the Normandy battle area by cutting all rail and road communications to it was also nearing completion. By 20 May the strategic plan was considered to have reduced rail traffic to the point where it could be assumed that such trains as were still running came into a military category and restrictions on the attack of travelling locomotives and all rolling stock were removed on 21 May. Thereafter fighter sweeps and 'train busting' missions over France and Belgium by A.E.A.F. and over Germany by the Eighth Air Force were organized on a large scale.

Three days later, on 24 May, the main task of bridge cutting was begun by the Ninth U.S. Air Force. The possibility

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(1) For contemporary German opinions on the success of the Transportation Plan the reader should consult A.H.B.6 Trans VII/125. This document is quoted in Chap.11 of the Narrative.

A.H.B./IIS/112/1/  
100/9  
(A) Encl. 26A.

A.H.B./IIS/110/  
14/136/15/6

A.H.B./IIS/110/  
14/136/15/6

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615 - 621

of heavy bombers undertaking this commitment was vetoed by General Spaatz at an Air Commanders conference on 6 May. He maintained that it would be wholly uneconomical, a view in which the Air Commander-in-Chief entirely concurred. Experimental attacks had already been made by fighter bombers on bridges over the Meuse and Seine with great success and experience showed that this was, after all, a valuable method of attack. By 6 June, all 24 road and rail bridges between Rouen and Paris had been blocked and 18 of them completely broken by the Eighth Air Force. Twelve other bridges over the Oise, Meuse, Moselle, the Albert Canal, Escaut, Domer and the Loire were either impassable or down after attacks by A.E.A.F. with some assistance from the Eighth Air Force, Bomber Command, which was already heavily engaged in completing the strategic aspect of the plan, also contributed to the tactical phase by bombing railway junctions connected with the assault area. Starting with a raid on Lison on 26/27 May, by D-Day the Command had bombed junctions at Angers, Laval, Saumur and Nantes, all but Nantes receiving two attacks.

Attacks on Airfields and Radar Installations

A.H.B./IIS/110/  
14/136/15/4

There were three important commitments for the Strategic and Tactical Air Forces in the tactical bombing programme before Overlord, namely putting out of action enemy airfields within range of the assault area, the disruption of enemy radar cover and W/T facilities and the destruction of certain selected coastal batteries before D-Day. The airfield plan was, in fact, the tactical extension of Pointblank operations. Its object was to deny to the enemy the use of those airfields within 150 miles range of Caen thereby imposing on the enemy air forces the same disadvantages in disposition as would be suffered by Allied aircraft operating from bases in the south of England. The plan was to be accomplished in two stages. The primary object of the first stage was to attack permanent installations and destroy the aircraft repair, maintenance and servicing facilities thereby inflicting the maximum strain on the operational ability of the G.A.F. while the second stage would consist of attacks designed to damage runways and landing areas in order to interfere with the actual operation of aircraft. A total of 41 operational airfields with permanent facilities was selected for this purpose of which 22 were in the assault area together with, for purposes of deception, seven in the Brest peninsula and 12 in the Pas de Calais. A further 59 operational bomber bases with important facilities located in France outside the 150 mile range and also in Belgium, Holland and western Germany were selected for attack by the Eighth and Fifteenth U.S. Air Forces when opportunity offered in order to increase the difficulties under which the G.A.F. would be operating and to add weight to the deception scheme.

A.H.B./IIS/112/1  
100/9(A)  
Encl. 26A

A.H.B./IIS/241/3/  
533 Encl. 31A

Since Bomber Command was already heavily engaged in completing the major share of the transportation plan and was committed to the attack of a number of coastal batteries before D-Day, quite apart from other tasks, it had very little surplus effort to devote to the airfield programme. At an Air Commander-in-Chief's conference at Stanmore on 6 May, Air Vice-Marshal Oxland on behalf of the Commander-in-Chief Bomber Command, agreed to take on eight airfields but he warned the Air Commander-in-Chief that Bomber Command had as much as it could undertake and such attacks would be given priority below that of transportation targets and coastal batteries. On 11 May this commitment was increased to 12 airfields on the understanding that their attack would

absorb only surplus effort from the Command and in fact only seven were bombed before D-Day. Of these, four were visited in some strength by heavy bombers, the remainder being allotted to Mosquitos of No. 8 Group.

An experimental attack by heavy bombers had already been made, on 3/4 May, on the airfield at Montdidier. This target had been included in the March moonlight directive and was effectively bombed by 92 Lancasters of No. 8 Group using a form of controlled Oboe groundmarking. At least 46 hits were scored on the runways, and a number of huts and buildings were destroyed. On 7/8 May heavy bombers from Nos. 1, 3 and 8 Groups were despatched to attack the airfields and their installations at Rennes, Tours and Nantes, severe damage being inflicted on all three. On the following night No. 5 Group was despatched to attack the airfield at Lanveoc near Brest and the nearby seaplane base at Poulmic. Reconnaissance showed that both targets were badly damaged, in particular direct hits were scored on the main hangar and the apron at the seaplane base. During the remainder of the month small forces of Mosquitos attacked airfields at Courtrai, Caen and Orly and finally, on 27/28 May a force of 78 Lancasters led by five Mosquitos from No. 8 Group again attacked Rennes. Although the main weight of this attack was centred on fields south-west of the target the airfield was covered with craters and barracks and runways were seriously damaged.

Bomber Command  
Night Raid  
Report No. 595

Ibid  
Report No. 599

Ibid  
Report No. 616

A.C.M. Leigh  
Mallory Despatch  
p. 28

A.H.B./IIS/110/  
14/34 Pt. I.  
Encl. 6A.

By the first week in June 34 airfields in the main programme had been bombed, the bulk of them by the Ninth Air Force with assistance from Bomber Command, the Eighth Air Force and 2nd Tactical Air Force. Only four had been allotted Category 'A' and 14 Category 'B' and the programme was still far from complete although the Eighth Air Force had also bombed 12 operational bomber bases in the second area. But despite opposition from the Deputy Supreme Commander, the Deputy Chief of Air Staff and General Spaatz, who were concerned at the possibility of serious interference from the G.A.F. during the early stages of the landings in Normandy, the Air Commander-in-Chief was by then satisfied that his forces could deal effectively with any enemy air activity over the beachheads, a confidence which proved fully justified in the event, and a halt was called.

AEAF Air Signals  
Report on  
Operation  
Neptune and  
A.H.B./IIS/110/  
14/136/15/5

Almost simultaneously with the airfield programme operations had begun to disrupt enemy radar cover and W/T facilities. Enemy radar cover in north western Europe extended from Norway to the Spanish border and constituted a serious obstacle to the success of the landings. This cover was provided by a chain of coastal stations, each composed of a number of installations, the density of which was such that there was a major site containing an average of three pieces of equipment every ten miles between Cherbourg and Ostend. It was backed up, as in the United Kingdom by an inland system of rather less density. The scale and variety of equipment employed in this organisation would alone have made the task of impairing it by air attack almost impossible. On the other hand it was obviously vital to the safety of the air and surface forces engaged in the landings that the system should be prevented from functioning efficiently. The planners of Overlord decided that the system could be seriously impaired by destroying certain essential equipment by air attack and comprehensively jamming others by radio counter measures. These operations were co-ordinated by a SHAEF Radio Counter Measures Advisory Committee set up on 15 May under the Director General, Signals Air Ministry.

Apart from acting in an advisory capacity to the Naval and Air Commanders-in-Chief, one of their main tasks was to distinguish between and select targets suitable for direct air attacks and those suitable for jamming. Action was then initiated by the Air Signals Officer-in-Chief and his staff.

It was decided to bomb installations (of those unsuitable for jamming) which could report on shipping, control coastal guns or which might menace the airborne operations. As with coastal batteries it was necessary for security reasons to attack two targets outside for every one attacked within the assault area. In general the object of the plan was to destroy the enemy's very long range radar installations which, on account of their narrow beam, were most difficult to counter electronically and which would be of great value to him in all operations, and, secondly, to inflict the greatest possible damage on selected air reporting and coast watching sites. It was believed that even where no serious damage resulted, air attacks would at least succeed in lowering the morale and efficiency of the radio operators.

Even on this selective basis the programme was a formidable one, the more so since it was inadvisable to begin operations too soon for fear of giving the enemy time to improvise replacements before D-Day. Attack on the long-range aircraft reporting stations began on 10 May since these could be the least quickly repaired. A week later attacks began on installations used for night fighter control and control of coastal guns and on 25 May, 42 sites, including between them 106 installations, were scheduled for attack. By 3 June only 14 of the sites were confirmed destroyed and in order to conserve effort it was decided to devote the remaining time to the attack of the 12 most important sites, six of which were to be selected by the Navy and six by the Air Force. The targets selected contained between them 39 installations and all were attacked in the three days remaining to D-Day, a remarkable effort.

The onus of these operations fell mainly on aircraft of A.E.A.F. which flew 1,668 sorties against radar installations up to D-Day. Some of the most spectacular damage was, however, inflicted by R.A.F. heavy night bombers which played a comparatively small but very effective part in the campaign by attacking and putting out of action four important W/T stations. The first target to be attacked was the station at Mont Couple. This was a large installation containing about 60 transmitters. A raid by 39 Lancasters and five Mosquitos of No. 8 Group on 19/20 May was comparatively unsuccessful due to the failure of Obco but on the night of 31 May/1 June a force of 103 heavy bombers drawn from Nos. 6 and 8 Groups made an extremely accurate attack using a form of controlled Obco ground marking. Only a negligible proportion of the transmitters survived the bombing which, for a target no more than 300 yards long and 150 yards wide, was a remarkable example of heavy precision bombing and the station became completely unserviceable. On the same night 122 aircraft of Nos. 6 and 8 Groups attacked the wireless station at Au Fevre. Although the main concentration fell just outside the target area, a number of direct hits were obtained and this station also became completely useless. The third station to be put out of action by heavy bombing was at Berneval near Dieppe. This was attacked by 101 Lancasters of No. 1 Group led by Pathfinder Mosquitos on 2/3 June using normal Obco ground marking. Severe and extensive damage was caused, the central and most important part of the station being destroyed.

A.C.M. Leigh  
Mallory Despatch  
p.22 et seq

Bomber Command  
Night Raid  
Report No. 609

Ibid  
Report No. 620

A.C.M. Leigh  
Mallory's  
Despatch p.24

Bomber Command  
Night Raid  
Report No. 622

No. 5 Group, however, achieved the most spectacular results in this series of precision raids on W/T stations by their attack on Ferme d'Urville near Cherbourg on 3/4 June. An accurate and concentrated attack was made by 99 Lancasters of that Group led by three Pathfinder force Mosquitos using the controlled Obco technique, as a result of which the station was completely destroyed. Photographic reconnaissance showed the target to be the centre of a well defined concentration of many hundreds of bomb craters. All the W/T masts and buildings had been demolished by direct hits and not only was the station made useless but it was no longer practicable to use the same site for rebuilding the installations. The true effects of this remarkable attack were not known until some time afterwards when it emerged that Ferme d'Urville was the headquarters of the German 'Y' service in north west France and its destruction must have been a major blow to German intelligence at that critical time.

Ibid  
Report No.623

A.H.B./IIS/110/14  
136/15/5

Military Targets

Bomber Command also attacked two important military target systems. These were discussed at the Deputy Supreme Commanders meeting on the employment of the Strategic Air Forces held on 3 May and consisted of training camps of the German Army and ammunition dumps. The Army believed that the latter should only be bombed if there was nothing else more important, whilst in the case of the former, only camps containing key personnel were to be singled out for attack. From 30 April to 7 May 1,758 tons of bombs were dropped in four attacks on ammunition dumps situated at Maintenon, Aubigne-Racan, Sauble sur Sarthe - Louailles, Salbris and Bruz. Bomber Command inflicted much damage on all targets.

A.H.B./IIS/112/1/  
100/9(A)

Encl.22A and  
A.H.B./IIH/24.1/3/  
553

Encls.23-24A.

Bomber Command  
Night Raid  
Reports Nos.  
592-599.

Ibid  
Report No.595

On 3/4 May 354 bombers from Nos. 1 and 5 Groups made a devastating attack on Mailly Camp, one of the chief German tank centres in northern France and which was believed to be the base of 21st Panzer Division. Heavy casualties to personnel were caused and garages and barracks were completely destroyed. But the raid was unfortunately an expensive one for 42 aircraft (11.3 per cent) failed to return. The reason for the high losses was that the bombers were concentrated over a datum point in bright moonlight while the Master Bomber was endeavouring to issue instructions to them. The bomber stream thus made an ideal target for enemy night fighters, which inevitably caused the majority of casualties. Two attacks were also made on a military camp at Bourg Leopold in Belgium. Only the second raid met with any success and a number of personnel huts and motor transport shelters were either destroyed or damaged.

Ibid  
Reports Nos.  
503-616

Neutralisation of Coastal Batteries

But Bomber Command's most important commitments during the tactical phase was the attack of certain coastal batteries before D-Day and this task was an essential element in the air support plan. It only remained to decide when such attacks should begin and what proportion of the air effort should be allotted to them. It was obviously advisable in the interests of security either to delay attacks until the last moment or to accept a greater number of targets which would necessitate spreading the attacks to include batteries in the Pas de Calais (cover) area.

Both the Air Commander-in-Chief and the Commander-in-Chief Bomber Command were sceptical about the effectiveness of air attacks against batteries, particularly by night. At the

AEAF/22004

same time the possibility of visual day bombing of coastal batteries was opposed by Professor S. Zuckerman (Scientific Advisor to A.E.A.F.) on the grounds of the extreme difficulty of locating many of the targets in question. However the Navy and Army both insisted that those batteries capable of firing on the assault force should be put out of action and there was no other alternative but air bombardment. At a conference of the A.E.A.F. Bombing Committee on 31 January, it was proposed that night bombing by Oboe, would be the best method of attack. Headquarters A.E.A.F. agreed to discover how many batteries could be bombed by the Air Forces immediately before the assault. The Air Commander-in-Chief opposed the suggestion that attacks should start in the preparatory period as he considered that the necessary cover operations might absorb a large part of the available effort which would be required for other urgent tasks.

Events in the ensuing weeks forced him to modify his views. Reconnaissance showed that a number of open batteries were being given strong concrete casemates and by the beginning of March this work, although still incomplete, was proceeding apace. Since it was obvious that when all the protective coverings were in place the chances of destroying the guns from the air would be remote, Twenty-First Army Group recommended that 17-mm and larger batteries which were housed in concrete should be bombed before D-Day. This proposal was accepted and it was suggested that bombing should start immediately the concreting of emplacements was discovered. Headquarters A.E.A.F. decided that No. 617 Squadron with its specialized knowledge and technique should be asked to fulfil this commitment. At an A.E.A.F. meeting on 21 March Air Vice-Marshal Oxland, whilst reminding the Air Commander-in-Chief of his Command's numerous tasks, agreed to discover how many batteries could be bombed by No. 617 Squadron before D-Day. In the meantime the meeting agreed that an experimental attack should be made as soon as possible on the heavy batteries at Le Havre which were then rapidly nearing completion.

AEAF/22008

On 26 March the Air Commander-in-Chief wrote to the Air Ministry requesting that either Bomber Command or the Eighth Air Force should attack the Le Havre batteries, but before a decision could be given there was a change of plan and the task was allocated to the Ninth U.S. Air Force. The reason for this is not apparent from the documents studied. It had by that time been accepted that bombing would only delay the construction of the batteries and it is possible that in view of the need for rigid economy of effort it was decided that heavy night bombers would more profitably be employed against transportation targets, then at top priority, leaving the harassing attacks on coastal batteries to medium bombers. At all events, 219 Marauders bombed the Le Havre battery in daylight on 10 April, apparently with success, and thereafter it was decided that coastal batteries in the Neptune and cover areas should be taken on by the Tactical Air Forces as a primary commitment during the preparatory phase.

In the meantime staff officers from the three services were preparing the joint fire plan for the assault in which they awarded first priority to the destruction of batteries in the Neptune area capable of firing on approaching naval forces. There were 49 known batteries in the assault area, a number of which were still under construction and obviously all of them could not be attacked immediately before the

assault began. At the same time it was necessary to restrict the number of targets for two reasons; the first being that there were only a limited number of armour piercing bombs available and secondly that it would be necessary for security reasons to attack two targets outside for every target inside the Neptune area. Thus they decided that, with the exception of ten batteries to be attacked in the assault phase, only open emplacements would be bombed. It was recognized that these operations would have a harassing rather than a destructive effect. The Joint Fire Plan was finally issued on 8 April and 24 batteries were chosen as being the maximum which could reasonably be attacked in the time available. Eight were situated in the Neptune and 16 in the cover areas. They were arranged in priority groups each containing two targets in the Pas de Calais, Dieppe and Neptune areas. It was essential that all batteries in one priority should be attacked before beginning the next priority for reasons of cover.

The Deputy Supreme Commander, however, still doubted whether such precise targets could be eliminated by air attack. At a Supreme Commander's conference on 3 April naval and military representatives insisted that this commitment should be met and General Montgomery even went so far as to put batteries above rail targets in priority should it be necessary.

Meanwhile the Tactical Air Forces continued to attack batteries in the Neptune and cover areas and by the end of April had bombed 23 targets although there was as yet still no reliable evidence as to the success of these operations. By that time Bomber Command had completed the greater part of the transportation targets programme. On 3 May at a meeting held at SHAEF by the Deputy Supreme Commander it was agreed that, after transportation targets, the order of priority for targets attacked by Bomber Command should be first coastal batteries and second airfields. The Commander-in-Chief Bomber Command, himself reluctant to attack such small targets, eventually agreed to take on six gun sites and attacks began on 7/8 May when 56 Halifaxes of No.6 Group led by Pathfinder Force Mosquitos were despatched to attack the battery at St. Valery en Caux using Oboe ground marking technique. This was followed on 8/9 May with attacks on batteries at Cap Gris Nez, Berneval and Morsalines. By the end of May, Bomber Command had made 30 attacks on gun batteries in the course of which 6,969 tons were dropped on the targets. At the Air Commander's conference on 31 May the representative of Twenty-First Army Group announced that the pre-D-Day programme of batteries was practically complete and there was reason to believe that very real delay had been caused to construction work. Five batteries in the Neptune area had been completely destroyed and six so severely damaged that they were unlikely to be effective on D-Day. He asked, however, that a further five gun positions in the assault area should be attacked as a matter of urgency. From 1 to 5 June 10 attacks were made against batteries of which only one was in the assault area. On the night of 5/6 June Bomber Command concentrated its effort within the assault area. These final operations will be reviewed in Chapter 4.

Minelaying Operations. (1)

During the preparatory period of Overlord the minelaying programme was planned to meet both strategical and tactical

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(1) A more detailed account of the minelaying campaign will be found in R.A.F. Narrative 'The R.A.F. in Maritime War Vol. V. See note on types of mines carried Annex B Armament.

A.H.B./IIS/  
112/1/10

AEAF/T.S.22014

A.H.B./IIS/  
112/1/100/9(A)  
Encl. 21A.

Bomber Command  
Night Raid  
Report Nos.  
599 - 620.

A.M. War Room  
Sum. of Bomber  
Command Ops.  
May 1944.

A.H.B./IIS/  
122/1/100/9(A)  
Encl. 33A

requirements. In the former category U-boat training in the Baltic was to be disorganized and the passage of U-boats proceeding from the Baltic and to and from the operational bases on the Biscay coast was to be blocked. It also aimed at interfering with the movement of enemy troopships between Germany, Russia and Norway and the general dislocation of enemy seaborne traffic. In the tactical category the main task was to guard the flanks of the invading forces against U-boats and light enemy craft.

A.H.B./IIS/410/  
14/136/25/1

The special minelaying plan for Overlord was issued on 7 April. Minelaying operations were to be divided into six phases during which the laying of special (evasion and delayed action) mines would be gradually introduced and increased mine laying activity in the assault area was to be conducted as unobtrusively as possible. Ten days before the launching of the assault aircraft of Bomber Command would lay special type mines in the Baltic, Kattegat, Heligoland Bight, Frisian Islands and the Biscay ports and it was hoped to make the maximum use of these mines before the enemy had time to evolve the appropriate minesweeping technique

Bomber Command  
Quarterly  
Review No.9  
Apr.-June 1944

Minelaying operations of Bomber Command began to increase during April and May, the approaches to U-boat bases in the Baltic and along the French west coast were mined constantly and the tactical side of the plan was fulfilled by mining the channels between Ushant and the Brest peninsula, the approaches to Morlaix, St. Malo, Cherbourg, St. Peter Port (Guernsey) and St. Anne (Alderney) and off the Dutch and Belgian coasts. Sorties were also flown along the northwest German coast.

Bomber Command  
Night Raid  
Report No.575

Ibid  
Report No.604

Mention must be made of two outstanding operations. On the night of 9/10 April Lancasters of Nos. 1 and 5 Groups laid mines in the narrow channel connecting the east Prussian ports of Königsberg and Pillau. It was subsequently learned that both ports were closed for a period of 13 days. On 12/13 May 22 Mosquitoes of No.8 (Pathfinder) Group successfully mined the Kiel Canal in moonlight. But the main weight of the mining offensive round the French and Dutch coasts was borne by Stirlings and Halifaxes of Nos. 3,4 and 6 Groups Bomber Command. The following is a summary of minelaying operations during the period March to May 1944.

A.M. War Room  
Sum. of Ops.  
March-May 1944.

	<u>Aircraft Despatched</u>	<u>Effective</u>	<u>Missing</u>	<u>Mines laid</u>
March	518	466	5	1,472
April	854	779	20	2,643
May	826	759	12	2,760

Bomber Command  
Quarterly  
Review No.9.

Contemporary reports issued by the Ministry of Economic Warfare estimated that the mining of the Kiel Canal, the western Baltic and the Heligoland Bight was successful and that during the first six months of 1944 the enemy lost some three million tons of cargo carrying capacity and 1 to 4 million tons of imports.

CHAPTER 3

BOMBING POLICY DURING THE PERIOD OF CONTROL BY SHAEF  
14 APRIL TO 15 SEPTEMBER 1944

Employment of the Strategic Bomber Force after D-Day

After D-Day there were two courses of action open to the Strategic Air Force; firstly, it could revert to the attack of industrial targets in Germany on which it had been engaged before the preparatory operations of Overlord; secondly, it could bomb target systems which directly benefited the operations of the Allied Expeditionary Force. The British Air Staff held that as soon as the heavy bombers were released from their commitments in support of Overlord they should switch over to the attack of oil targets as their primary objective. Attacks on German fighter aircraft production should be maintained to safeguard any threat from the air, in particular, attacks were to be directed against the jet aircraft industry and jet fuel plants. The views of Headquarters U.S.ST.A.F. largely coincided with those of the Air Ministry. It believed that the bombing of the oil industry was the most important task, followed by attacks on the ball bearing industry, tank and ordnance depots and the motor transport industry, in that order. The Army Staff on SHAEF also agreed that oil targets should come first, but as far as transportation targets were concerned, they believed in drawing two lines of interdiction (attacks on bridges) across northern France and Belgium to stop German rail traffic passing from east to west. This policy was supported by U.S.ST.A.F. but was not approved by Headquarters A.E.A.F. which continued to observe the policy of attrition - destruction of rail centres and facilities by heavy bombers, supplemented by tactical interdiction and strafing attacks in the battle area. (1)

A.H.B./  
II/70/218

U.S.ST.A.F. Plan  
Employment of  
Strategic Air  
Forces, 10 June  
1944

SHAEF(G2) Use of  
Air Power against  
Enemy Military  
Transport and  
Supplies, 7 June 1944

Adv. A.E.A.F.  
O.R.B.  
June-Sept. 1944

A.M. File  
S.46368

The Supreme Commander instructed that when the heavy bombers were not required by SHAEF they should attack oil targets, aircraft production and the tank and motor transport industry. A priority list for aircraft production targets was issued weekly by the Air Ministry in the following order:-

- (a) Fighter and bomber aircraft production, including jet fuel and ball bearing plants.
- (b) Airfields with concentrations of operational aircraft.
- (c) Aero engine plants.
- (d) Cities associated with aircraft production were to be attacked by Bomber Command when nights grew longer.

From the second week in July lists of oil targets were issued separately to the two Bomber Commands by the Joint Anglo-U.S. Oil Targets Committee, through Air Ministry. (2)

D.S.C/T.S.100/9  
Pt.I. Encls.40,  
51A.

The execution of this programme was impeded by two events. The first was the flying bomb offensive from the Pas de Calais

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- (1) Targets for heavy bombers were issued by SHAEF Bombing Committee.
  - (2) There was no common directive to the heavy bombers concerning oil at this stage.

Eighth Air Force  
Diary of operations App. 11

and northern France which began on 12/13 June just when the Deputy Supreme Commander was about to despatch the heavy bombers against the oil industry. They were immediately turned against the firing sites. At the same time German pressure against the beachhead was increasing, particularly round Caen, which was to involve the heavy bombers, Bomber Command, in particular, in a number of close support operations, while farther afield they continued to hammer throughout June and July at French railway centres to delay the arrival of enemy reinforcements. It devolved upon the Eighth Air Force to maintain the offensive against Germany in the form of attacks on aircraft production, Berlin and oil and transportation targets, while Bomber Command occasionally attacked the Ruhr synthetic oil plants by night.

Control over the Strategic Bombers at this stage was very loose. As long as the attack on crossbow targets was maintained and there were enough bombers available for close support operations the Supreme Commander gave Sir Arthur Harris and General Spaatz considerable latitude for their choice of industrial targets. The allocation of bombing effort by the Strategic Air Force in June was as follows:

	<u>Short tons</u>
Tactical Targets	53,772
Transportation	36,431
Cities and Areas	32,080
Oil	17,033
Other industrial Targets	3,040

During the period 7 June to 15 September, Bomber Command dropped 33 per cent of its total effort on Crossbow targets, 13 per cent on military targets, 15 per cent on transportation targets, 14 per cent on towns and 11 per cent on oil targets. The Eighth Air Force dropped in the same period its greatest tonnage on airfields and aircraft factories which accounted for 33 per cent of its total, 21 per cent fell on oil targets, 13 per cent in Crossbow targets, 12 per cent on transportation targets, 10 per cent on miscellaneous industrial targets and no more than .34 per cent on close support targets.

Views of the British Air Staff

The small tonnages being dropped on the principal strategic targets soon began to cause disquiet among the British Air Staff. Little more than a week after the landings, they had mooted plans for the return of the heavy bombers to the control of the Chief of Air Staff and the Commanding General U.S.A.A.F. They argued as follows: the attack of oil was going to have a decisive effect on the war and all the intelligence and raid interpretation agencies for industrial targets were centred on London. When SHAEF moved to the continent co-ordination of the heavy bombers would be very difficult. The Supreme Commander was concerned only with the land battle and as time went on demands for close support would diminish. Crossbow targets were at that moment receiving the greatest proportion of the heavy bomber effort and the Air Staff was in a better position to receive intelligence and to advise on the correct targets than was SHAEF. A big attack on German morale, which, with its political implications, could only be planned in London, was being considered. The Chief of Air Staff could also exercise a more definite control over the Eighth Air Force. There had already been complaints from the Secretary of State for Air that the Americans were not adhering to the Air Ministry list

See Apps.  
18-19

A.H.B/ID/3/601(B)  
and II/70/218

of priorities particularly in regard to Crossbow targets. (1)

A.H.B./II/70/  
272(E)

Apart from this, the Air Staff had reason to believe that the British and U.S. Bomber Commands were uneasy under the aegis of S.H.A.E.F. The Air Staff of the latter was unfitted to cope with the intricate problems of strategic bombing with the result that the staff of Bomber Command, for one, was uncertain where to look for direction, while the Americans found it difficult to co-operate with Headquarters A.E.A.F. Furthermore, U.S.ST.A.F. (Europe) was by then nearly three times the size of Bomber Command and its headquarters fulfilled a function comparable to and, in fact, parallel with the British Air Staff. The Americans felt that recognition of their great bomber force was overdue. There was no doubt that, in order to prevent a serious rift in the relations between the R.A.F. and U.S.A.A.F. and to ensure that strategic bombing plans for the final phase of the war were successfully executed, a system of joint control of the heavy bombers was essential.

However, the Chief of Air Staff deemed that the time was not yet ripe to suggest a change to the Combined Chiefs of Staff and deferred the matter until the C.C.S. conference at Ottawa in September. In the meantime the Allied organisation for intelligence and strategic target selection became even more closely integrated. Agencies such as the Joint Intelligence Sub Committee, the Ministry of Economic Warfare, the U.S. Enemy Objectives Unit, the Directorate of Bomber Operations and Air Ministry and War Office Intelligence were already on intimate terms. In the following weeks joint Allied committees were to be formed on oil and Crossbow targets in addition to the G.A.F. targets committee which drew upon the advice of members from Bomber Command, U.S.ST.A.F. and SHAEF. The work of these committees will be discussed in the following pages.

Attitude taken by the Commanders of the Strategic Air Forces towards control by SHAEF

A.H.B./IIH/241/  
3/580  
D.S.C./T.S.100/9  
Pt. II, Encls. 15A  
and 47A

Both Sir Arthur Harris and General Spaatz were anxious to return to targets in Germany but both had different reasons for wanting to do so. Sir Arthur Harris continued to stress at Air Commanders' meetings, as he had done at the Presentation of Plans for Overlord on 15 May, that if the bomb tonnage on Germany was allowed to drop below 10,000 tons per month, war production would recuperate and that if bombing ceased, essential war production would return to normal within five months. Furthermore he continued to complain of the varied number of tasks, such as attacks on Crossbow targets, oil, G.A.F., support to the ground forces, naval targets, all considered to be equally urgent, which his force was expected to perform and which, in his opinion, was merely a diversion from proper strategic operations, area attacks on industrial towns in Germany.

Now that he had been placed under General Eisenhower's command Sir Arthur Harris resented any interference from the

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(1) On 11 and 12 July the Eighth Air Force had attacked transportation and aircraft production targets in Munich and the Fifteenth Air Force had bombed Toulon. The weather on the 11th had also compelled blind bombing technique over Germany (A.H.B./ID/3/601(B)).

B.C./S.30716/4  
Encls.14A-15A and  
Chap. 1 p.37

B.C./S.31030  
Encls. 31A  
et. seq.

See Chap.1 p.21

Air Ministry. This arose when target priority lists concerning Crossbow and aircraft production were sent direct from Air Ministry to the Strategic Air Force commanders. Sir Arthur Harris was also incensed firstly by the fact that two of his Mosquito squadrons from No. 100 Group had been attached to A.D.G.B. during the summer months to intercept the flying bombs and secondly that the orders for them to remain under A.D.G.B. were sent to him direct from the Air Ministry and not via the Supreme Commander. The Air Staff were within their rights to retain the squadrons because the Chiefs of Staff could overrule the Supreme Commander's authority when the security of the British Isles was concerned. Strategic target lists were, however, from the end of July onwards, addressed direct to SHAEF and copies were sent to the two heavy bomber forces for information. But there is no doubt that the Commander-in-Chief Bomber Command co-operated wholeheartedly with SHAEF and it cannot be denied that the brunt of the heavy bomber attacks in close support of the Armies was borne by Bomber Command from June, at the time of the break out from the beachhead, until September when the Channel ports were reduced.

General Spaatz, on the other hand, was probably content that the Supreme Commander should continue to direct strategic bombing operations. He had not, however, been as conscientious in his support of Overlord as Sir Arthur Harris. He later admitted that even in the pre-Overlord and Overlord period he had chosen oil targets whenever weather permitted in order to provoke large scale air battles with the G.A.F. (The attack of oil, nevertheless, paid good dividends as will be shown.) General Spaatz estimated that the transportation plan was not responsible for more than a 10 per cent loss of the total weight of the attack on oil which might have been possible if an all out offensive had been made. After D-Day he considered that the heavy bombers had two major tasks to perform namely, the destruction of the German Army's system of supply and the neutralisation of the G.A.F. When weather conditions were favourable for visual bombing over Germany, the heavy bombers should be diverted from that country only in the event of a crisis in ground operations and when Crossbow targets required attack. Like Sir Arthur Harris, he believed that the heavy bombers were better employed in bombing industrial targets in Germany and he doubted whether the heavy bomber attacks on flying bomb sites were effective.

The Supreme Commander was not unduly influenced by the views of General Spaatz and instructed his Deputy that, although Crossbow targets were top priority, apart from support to the Armies, the Air Forces should take advantage of favourable weather over Germany. The aircraft industry, oil, ball bearings and vehicular production, in that order, should be the principal targets.

In fairness to the two Air Commanders directly responsible for Overlord, both Sir Arthur Tedder and Sir Trafford Leigh Mallory did not forget that the heavy bombers had other tasks beside that of supporting the Armies. Sir Arthur Tedder directed that, as soon as the beachhead had been firmly established, oil targets were to be attacked while the Air Commander-in-Chief sought every opportunity to keep the heavy bombers on German targets when there was no special task for them to fulfil in the battle zone. In September after the Allies had crossed the Seine he disapproved of the large diversions made by Bomber Command against the Channel ports. Unfortunately the Army had overriding priority in their demands for support.

D.S.C./T.S.100/9  
Pt.I Encl. 40A  
A.E.A.F. Hist.  
Record and Diary  
July 1944.

See Lib. N.W.  
Europe Vol.IV  
Chap. 6.

Control of the Air Forces immediately after the Establishment  
of A.E.F. on the Continent

By the end of August the initial phases of Overlord had been completed. On 1 September General Eisenhower, who had moved his advanced headquarters to the continent, assumed direct military control of the Allied Expeditionary Force. The Advanced Headquarters of A.E.A.F. had been on the continent since 10 August and, during September, the operational staff of A.E.A.F. crossed the Channel and established itself alongside SHAEF. Air Chief Marshal Leigh Mallory now assumed full control of A.E.A.F. and Air Marshal Coningham reverted to command of 2nd T.A.F. only. On 9 September the Air Commanders who had begun to hold their meetings at A.E.A.F. Headquarters at Granville on the west coast of Normandy agreed that because of the rapid advance of the Armies across northern France it was no longer practicable to control tactical operations from Headquarters A.E.A.F. and that discussions at their meetings should be restricted to operations of a strategic nature. In future, meetings were to be held only twice a week. As Granville was now so far from the scene of operations, meetings were henceforward held at Versailles where SHAEF Forward and Headquarters A.E.A.F. were situated. As far as the Strategic Air Forces were concerned the system of command remained unchanged, and the Deputy Supreme Commander continued to supervise Strategic air operations until the directive issued by the Combined Chiefs of Staff on 16 September,

It is now time to consider the five strategic target systems which were attacked periodically during this phase.

Changes of policy for heavy bomber targets

Oil

See Chap 1

J.I.C.(44)218  
(O)(Final)

in  
A.H.B./ID3/1773(C)

See App.11  
and  
Map 3

The reader has already been acquainted with the oil plan which was submitted as an alternative to the transportation plan. At the time when the latter was chosen as the strategic bombing plan for Overlord, it was stated that the oil plan would make a decisive contribution to the battle once the bridgehead in Normandy had been expanded. By the last week of May 1944, there was considerable evidence from Intelligence to suggest that Germany's oil position had taken a very marked turn for the worse. After attacks on Ploesti in April by the Fifteenth U.S. Air Force and those on 12, 28 and 29 May on synthetic plants in eastern Germany by the Eighth Air Force, the Technical Sub Committee on Axis Oil (1) reported that German oil supplies had been

- (1) A body formed in 1942 under Sir Harold Hartley which reported to the Chiefs of Staff through the Joint Intelligence Sub Committee. (See Report A.O.(46) 1 to be found in A.H.B./IA/21). This report gives a detailed account of the oil offensive throughout the war. Attacks on oil by Bomber Command had been suspended in 1940 because it was impossible to maintain heavy and accurate attacks and because of counter-invasion measures then necessary. Although the Axis oil industry was not again deliberately attacked until August 1943 (Ploesti) it always remained one of the leading potential objectives of Allied Strategic air power when this could be built up to the requisite strength and received the appropriate priority in Intelligence work.

reduced to five per cent below current consumption and that a similar deficit would recur in June if production was not further reduced or military consumption increased. It reckoned that the Wehrmacht had sufficient reserves, if cut off from other sources of supply, to carry on for one to two months only. The Joint Intelligence Sub Committee believed that a concentrated attack on oil production would make it impossible for Germany to wage full scale operations within three to six months.

A.H.B./ID/1773(C)

On 30 May the British Chiefs of Staff after considering the report, proposed that as soon as Overlord was properly established, enemy oil targets should be attacked and that Bomber Command should take on the four large synthetic oil plants in the Ruhr. The Prime Minister was informed of the decision and copies of the oil report were sent to General Eisenhower at SHAEF and to General Wilson in the Mediterranean theatre of war. By 10 June U.S.ST.A.F. and SHAEF had issued plans for the use of the strategic bombers, both placing oil attacks at a high premium.<sup>(1)</sup> The British Air Staff, too, were greatly impressed by the findings of the oil committee and, as subsequent reports issued by the Joint Intelligence Sub Committee confirmed their original deductions, decided early in June to go ahead with plans for the bombing of oil targets in the Ruhr.

A.H.B./ID/12/144  
and A.M. File  
S.46368 Pt. IV

Attacks on the German oil industry fitted exactly into the Air Staff's plans for strategic bombing that summer. While they recognized the need for maintaining attacks on the G.A.F. and the aircraft industry, they also required a target system which at the same time would substantially affect the German economy and disrupt military operations in the field. The short summer nights confined the raids of Bomber Command to the Ruhr valley and the Rhineland. Night attacks on the big synthetic oil plants in the Ruhr would, they believed, affect both industry in the Ruhr and operations in Normandy. The bombing of transportation targets behind the battle front was to be a complementary operation and would compel the enemy to rely more and more on motor transport thereby increasing his consumption of petrol.

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- (1) See U.S.ST.A.F. Plan for the Employment of the Strategic Bomber Force, 10 June 1944, which concluded that 'Germany is facing an oil crisis which can probably be turned into military collapse if the efforts of available Air Forces are simultaneously directed ruthlessly against this one system of targets'. Also SHAEF G2 Paper 'Use of Air Power against Enemy Military Transport and Supplies', 7 June, which stated that 'If engagements continued on three fronts elimination of 2/3rds to 4/5ths of the German oil output would force collapse on one or more fronts once military reserve stocks were used up. Elimination of this out-put in (say) June and July and disappearance of military reserve stocks by (say) the end of August would cause the full impact to be felt from September onward..... It would appear that the advent of the long range escort fighter and the reduction in German fighter aircraft production, make possible for the first time a thorough smashing of the Axis oil industry by day and night heavy bombers. All Axis oil producing plants have been located and targetted'.



A.M. File  
S.46368  
Pt. IV

The Ruhr industrial area was considered to be unsuitable for precision day bombing because of the strong concentration of flak and the industrial haze which invariably obscured the factory area. These factors did not affect night bombing to the same extent and the Americans therefore asked that Bomber Command should undertake to bomb the Ruhr plants by night leaving the synthetic plants and major refineries in central and northern Germany to the Eighth and the Roumanian and central European refineries to the Fifteenth Air Force. The Air Staff proposed that four out of the ten synthetic oil plants in the Ruhr were operationally practicable for R.A.F. heavy bombers using Oboe and, whenever possible, low level marking technique. They were Gelsenkirchen-Nordstern, Gelsenkirchen-Scholven, Wesseling and Homberg. The remaining six oil plants which were to be bombed after the four already mentioned were Wanne-Eikel, Sterkrade-Holten, Castrop-Rauxel, Dortmund-Kamen, Dortmund and Bottrop-Welheim.

Ibid

On 3 June the Deputy Chief of Air Staff asked Air Chief Marshal Harris whether he would be prepared to bomb these targets as soon as the operations in Normandy permitted the attack of purely strategic targets. On 13 June Air Chief Marshal Harris wrote to Air Marshal Bottomley to remind him that the Commander-in-Chief Bomber Command no longer had responsibility for choosing strategic targets. Sir Arthur Harris had, however, agreed with the Deputy Supreme Commander to attack targets in Germany which were within range during the short summer nights and which would prevent the enemy advancing his defences further in France. He estimated that it would be necessary with Oboe marking to drop 3,225 tons on each target to put it out of action and a total of 32,250 tons would therefore be required to complete attacks against all ten targets. This represented one month's normal effort. Nevertheless he hoped that with the improved accuracy of bomber crews that figure might well prove to be conservative.

The first R.A.F. attack on an oil target after the launching of Overlord was made on the night of 12 June. In the face of heavy demands for support in the battle area two more oil targets were bombed that month, five in July and four in August. The first daylight raid against an objective in Germany in 1944 was an oil target - the synthetic oil plant at Homberg which took place on 27 August. (1)

General Spaatz, for his part, issued a directive to U.S.ST.A.F. on 8 June which stated that oil must be one of the primary objectives. The Fifteenth Air Force was to bomb the refineries of Ploesti, Vienna, Budapest and synthetic petroleum plants in Silesia, Poland and Czecho-Slovakia. The Eighth Air Force was to bomb synthetic oil plants in eastern and central Germany (Politz, Merseburg-Leuna, Ruhland) and crude oil refineries at Hamburg, Bremen and Hannover.

The attacks on the Oil industry in May and June, small though they were, at once had a disastrous effect on German industry and fully justified the optimistic deductions of

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(1) Great importance was attached to these attacks by the Air Staff, 'not only because of the intrinsic importance of the plants but also in the interests of the prestige of the R.A.F. vis-a-vis the Americans.....The urgency of the task is such that the Americans must destroy them if Bomber Command do not'. (Note by Director of Bomber Operations in A.H.B./ID3/1773(c)).

Allied Intelligence. On 30 June Albert Speer, Minister for Armaments and War Production, warned Hitler that 'the enemy succeeded on 22 June in increasing the effects on aviation spirit by 90 per cent. Only by the most speedy reconstruction of the damaged works - which was well below schedule - can the effects of this catastrophic attack be eliminated.' Speer then proceeded to give figures illustrating the decrease in production during May and June and showed that in June only 53,000 tons of aviation fuel had been produced as against a requirement of 195,000 tons in May. He reckoned that unless the oil plants were given adequate protection there would be insufficient stocks of fuel for the Wehrmacht. Speer proposed that certain measures should be taken at once, in particular, the construction of concrete air raid shelters in the plants to enable workers to remain there during air attacks; the fitting of generators to Service vehicles for the purpose of reducing the consumption of fuel and cuts in liquid fuel requirements for civilian purposes. He also proposed that petrol supplies for the Army and Air Force should be cut down ('every ton of fuel wasted now may in two months time be bitterly regretted'); fighter protection of industrial works must be strengthened; smoke units to conceal plants and flak should be increased, the latter at the expense of the protection of German towns; finally, more attention should be given to the destruction of Allied reconnaissance aircraft which were instrumental in discovering when oil plants had recommenced production.

As a result of Speer's warnings vigorous efforts were made by the enemy to reconstruct the damaged plants. Orders were issued to the Armed Forces insisting on strict fuel cuts; no manpower was to be withdrawn from the synthetic oil industry and large labour forces were drafted to the oil plants which had undergone attack. Many of these counter-measures soon became evident to the Allies. On 8 July the Air Staff announced the formation of a Joint Anglo-American Oil Targets Committee. It was to be composed of members from the Air Ministry, the Ministry of Economic Warfare and U.S.ST.A.F. (1) It was to review constantly the Axis oil position, assess the effectiveness of attacks on oil targets and was to determine priorities. The Committee decided to adopt the policy of giving first priority to the attack of aviation fuel production. This entailed an offensive against hydrogenation plants and refineries. A list of 36 targets in Germany, in order of priority followed. Oil targets in the Balkans were not included because of the fluid situation on the Eastern Front, (2) but the Committee held that the

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- (1) Detailed composition of the Committee under Mr. O. L. Lawrence, which remained virtually the same until the end of the war, after absorption into the C.S.T.C. in October, was as follows:-  
Air Ministry A.I.C.(1), A.I.3(c).  
War Office M.I.10(e).  
Economic Advisory Bureau (F.O. and M.E.W.).  
Enemy Objectives Unit (U.S. Embassy).  
Petroleum Attache (U.S. Embassy).  
U.S.ST.A.F.  
SHAEP (G2)  
Air Cover Intelligence Unit.  
R.E.8 (Ministry of Home Security).
- (2) The Russians were then conducting an offensive into the Balkans.

Flensburg  
Docs.  
NID/PAL/725  
PG. 25940  
P.3

DSC/T.S.100  
Pt.5, Encl.64A and  
A.H.B./IIH/241/2/  
616A

Floesti refineries in Roumania should be the primary target in that area and that the Bergius Synthetic plants and the Hungarian and Polish refineries should rank second in priority. The policy for attacks on oil targets was that as many oil producers as possible should be bombed so as to cause approximately one month's interruption of output. For the long range bombers in the Mediterranean theatre the Floesti refineries and the Blechhammer synthetic plants in German Silesia should rank at the highest priority.

D/SAC/H.20  
Encls. 1A-5A.

Another measure which was taken at this time to improve the system of choosing oil targets was the introduction of a number of oil experts to the Allied Central Interpretation Unit at Medmenham who were to assist in assessing the damage caused by the bombing. Lieutenant Colonel W. L. Forster (Petroleum Warfare Department), an authority on the oil industry who had been an advisor on the attacks on the oil refineries at Floesti in August 1943, recommended this change and he agreed to assist the work of the Joint Oil Targets Committee. (1) On 24 July in a memorandum to the Chief of Air Staff which was virtually a summary of the work of the Committee to that date he suggested that attacks on the oil industry should be concentrated on the smaller petrol producing plants. In general he disapproved of very heavy attacks on a limited number of targets. He believed that a single 500 or 1,000 pound bomb, provided it struck the proper place, would be enough to close an oil refinery for a week. He considered that heavier damage inflicted on vital plants would merely lengthen the delay in re-opening the works but would not cut down the daily total loss to the enemy. Attacks made by small numbers of aircraft would mean that a greater number of targets would be hit within a given time. It was therefore necessary to maintain a rapid supply of information about the state of oil production in order that attacks on active plants could be maintained constantly.

The following procedure had been instituted. A daily telegraphic report from Allied Central Interpretation Unit was made to the Directorate of Bomber Operations and Intelligence staffs at Air Ministry and U.S.ST.A.F. Thus in less than 24 hours after an aerial reconnaissance the status of oil plants could be revised and the heavy bombers were able to strike at the most profitable targets. A number of oil technicians were also attached to the Headquarters M.A.A.F. in an advisory capacity.

At the same time Colonel Forster urged that the petrol producing plant at Merseburg Leuna and the Crude oil storage facilities in the neighbourhood of Floesti should be put out of operation as soon as possible as he believed that these two sources provided at least one half of the enemy's petrol producing capacity. It was unnecessary to dispatch large numbers of aircraft to achieve this and the oil tanks at Floesti could be reckoned, he set alight by cannon fire or incendiary bullets. The two plants should be considered as an alternative and not as secondary targets as they were then in the current list of oil priorities. Air Chief Marshal Tedder supported this theory and agreed with Colonel Forster that the Ministry of Economic Warfare lacked technical knowledge to give sound advice on oil

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(1) The Deputy Supreme Commander had recommended Colonel Forster to the C.A.S. for this appointment on 22 June (See/A.H.B.ID3/1773(c).)

targets. But he was afraid that there was a possibility of two sets of target priorities being issued and wrote to the Deputy Chief of Air Staff to prevent this occurring.

A.H.B/ID3/1773(c)

On 20 June the Chiefs of Staff instructed the Joint Intelligence Sub Committee to prepare an appreciation of attacks on oil every fortnight. The first appeared on 3 July. During that month it seemed to the Allies that the enemy's oil stocks were falling to a dangerously low level as a result of Allied air attacks. In the last week of August the Joint Anglo-American Oil Targets Committee issued a paper which estimated that the Axis oil supplies stood at 48% of pre-attack production. Of this total 13% was within reach of the Mediterranean Strategic Air Forces and 21% in reach of the heavy bombers based in the U.K. This estimate was based on the assumption that the Russians would cut off the oil supplies of Rumania, Poland and Estonia (Rumania and Bulgaria capitulated to the Russians at the end of August thus denying the Ploesti oil refineries to the enemy) and that no further attacks would be made by the Allied Air Forces. The Committee concluded that it was within the power of the Strategic Air Forces during the next few weeks to strangle German oil production and, provided these attacks were pressed hard enough the enemy might have to face a critical situation in his war economy which might prove decisive to the Allies. This paper was submitted to General Eisenhower and Air Chief Marshal Tedder.

Flensburg Docs.  
NID/PAL/725  
PG.25940  
p.1

The Allied estimates of the blow to German oil production were indeed close to the mark. Writing to Hitler on 29 July, Speer stated that during that month the Allies had attacked oil plants almost immediately after they had been repaired and had inflicted so much damage that a severe decrease in production had resulted. He reiterated his requests for the increased air protection of industrial works and illustrated his argument by a table which showed that the total number of fighters available for the defence of the oil industry had declined from 788 at the beginning of June to 460 by the close of July.

DSC/T.S.100  
Pt.7 Encl.9A

By the time the Allies had reached Brussels and were heading towards the Rhine oil targets were assuming a greater significance. On 13 September a meeting was held at the forward headquarters of U.S.ST.A.F. recently established at Versailles near SHAEF. The Deputy Supreme Commander, General Spaatz and the Deputy Chief of Air Staff attended and at the end of the conference decided that the Strategic Air Force should continue to give full support to the ground forces during the battle for Germany. Oil targets were to rank as first priority, rail and water communications. (especially round the Ruhr) second and the G.A.F. was to stand as third priority. They believed that if the effective attacks against oil were continued combined with the effort made by the Tactical Air Forces the enemy's war effort would be brought to a standstill.

This contention was borne out by Speer who informed Hitler on 30 August that the oil plants at Leuna, Brux and Politz 'although only recently in commission' would now be unable to produce anything for some weeks. (1) He went on to

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(1) They had been attacked by U.S.A.A.F. at the close of August.

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NID/PAL/725  
PG.25940  
P.13

say that since the home defences against air attack had not yet been substantially improved, oil production during the month of September would inevitably decrease. He warned the Fuehrer that in spite of drastic fuel cuts the Army's mobility in operations on the western front would be severely handicapped. The only hope was that during the autumn poor flying weather would offer some respite from Allied air raids and at the same time it might be possible to increase fighter strength in the intervals between raids on oil targets. (1)

#### The Ball Bearing Industry

The heavy attacks against the ball bearing industry in February 1944 have been described in Volume V of this narrative. By the summer its importance as a major target system had been overshadowed by oil, although ball bearing targets continued to figure on the Air Ministry list of strategic targets until September, and were included in the proposed new directive to the heavy bombers discussed by the C.C.S. that month. (2) Apart from a heavy attack on Schweinfurt in February and two small but successful operations against French ball bearing plants at Annecy and La Ricamerie later that spring, together with incidental damage caused in area attacks on Berlin, Nuremburg and Stuttgart, Bomber Command took no further part in the attack of this target system. A request by the Air Staff on 3 June to bomb the Jaeger ball bearing works at Wuppertal in the Ruhr using Mark II Oboe met with no response.

See Chap. 2

A.M. File  
S.46368  
Pt. IV

Sir Arthur Harris continued to regard ball bearings, as indeed he regarded oil, as a 'panacea' target suggested by the Ministry of Economic Warfare whose deductions he deeply suspected and he was convinced that the attack of ball bearings was unprofitable. (3) The Ministry of Economic Warfare, on the other hand, believed that there was abundant evidence of the shortage of ball bearings even to the extent that Germany was offering Sweden fighter aircraft in exchange. It held that Sir Arthur Harris had expected a fatal blow to the German war effort whereas in fact there had not been an important drop in production until April and May 1944. It had only hoped 'to have eliminated a significant though minor part of the enemy's capacity for weapon and equipment production' for that period.

B.B.S.U.  
Report  
The Strategic  
Air War against  
Germany,  
pp. 104-110

After the war it was discovered that the costly raids against Schweinfurt and Regensburg had, on the contrary, caused little permanent damage to the capacity of the industry and had, indeed, acted as a spur to its more vigorous dispersal. The attacks in February 1944 provided Speer with an opportunity to take aircraft production under his control and to increase the output of fighter aircraft. (4) The attack of transportation and oil affected the production of aircraft to a much more serious degree than the attack of component parts.

#### The G.A.F.

Attacks on aircraft production continued to be made by the Eighth Air Force and the effort involved may be seen by

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- (1) See Summary of Allied raids on oil targets, Chap.4, p.100
  - (2) Attacks on aircraft production were not considered seriously again until January 1945.
  - (3) See his letter to A.C.A.S. (I) on July 1944 (A.H.B./ID4/380).
  - (4) See Chapter 11

See App. 11

referring to the Eighth Air Force Diary of Operations. These targets were out of range for Bomber Command's operations in the short summer nights. At the same time the increased strength of the enemy's night fighter force, which was noted in Chapter 2, was causing the operations staff of Bomber Command some concern. The G.A.F. was suffering few casualties and their night fighter pilots were gaining valuable experience. It was clear that during the autumn and winter it would no longer be possible to rely on a policy of evasion supported by radio countermeasures and various tactical schemes such as erratic routings, diversionary attacks and tail warning devices. Furthermore tactical plans during the winter months would be restricted by weather.

B. C/S. 31912

Two plans which were designed to reduce the fighting efficiency of the G.A.F. were produced during the summer of 1944. On 9 July, Headquarters A.E.A.F. requested the Eighth Air Force to co-ordinate a large scale operation (Butterscotch) against the G.A.F. which would also involve Bomber Command and the Tactical Air Forces. The operation was to take place on or as soon as possible after 10 July when weather conditions were favourable. The Combined Operational Planning Committee<sup>(1)</sup> was responsible for planning and co-ordinating the operations. Bomber Command was to attack nine airfields, all in Belgium and Holland, each target being attacked by 100 aircraft. The Eighth Air Force heavy bombers were to bomb 17 airfields, each target being attacked by a maximum of 108 aircraft. The American targets were situated in northern France and western Germany. Fighter cover was to be provided by the Eighth Fighter Command and 60 Spitfires from A.D.G.B.

See p 101

These operations took place on 15 August and the results will be discussed in Chapter 4. On 3 September Bomber Command delivered an attack exclusively directed against night fighter airfields.

B. C/T. S. 31865

Another problem of Bomber Command during the Normandy battle was the enemy's early warning system which covered the coast line between Cap Gris Nez and Terschelling on the west coast of Holland. There was a second line of defence farther inland consisting of Benito stations which controlled the medium range night fighters. The destruction of these two lines of defence would enable Bomber Command to operate with far lower losses and with greater tactical freedom. These targets were only suitable for attack by fighter bombers and Bomber Command requested A.E.A.F. to deal with them. Target priorities were as follows: one, 'Hoardings' and 'Chimneys' <sup>(2)</sup> between Cap Gris Nez and Terschelling; two, medium range Benito stations in northern France. Operations carried out by A.E.A.F. in response to this request were successful.

See Chap. 2

Towards the end of July Allied Intelligence discovered that an increasing number of German night fighters were being equipped with a device known as Naxos. This was a ten centimetre receiver originally produced by the enemy as a 'homer' on Allied bombers, fitted with H.2.S. Installed in a night fighter

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(1) A Committee composed of R.A.F. and U.S.A.A.F. <sup>officers</sup> set up in May 1943 to plan and co-ordinate Pointblank Operations.

(2) Types of German radio-location equipment

See Chap. 6  
p. 130

it could, when used in conjunction with direction finding stations, enable the pilot to home on to H2S transmissions. (1) Strict radio discipline on the part of bomber crews was the best counter measure against German A.I. fighters.

The device threatened Bomber Command's activities during the coming winter and it was believed that it would force bomber crews to switch off their H2S. The main fitting depot for Naxos was at Werneuchen near Berlin and as it was a target suitable for precision bombing Air Chief Marshal Harris requested General J. Doolittle to attack it at the earliest opportunity. The Eighth Air Force did not extend its activities to the Berlin area during the autumn and early winter and Werneuchen was not bombed.

#### The Combined Bomber Offensive and Crossbow

At 04:18 hours on 13 June the first flying bomb launched against England fell near Gravesend. It was followed by three others widely scattered over Kent and the London area. The Chiefs of Staff Committee did not regard this first attack as dangerous. They were unwilling to divert the heavy bombers from their primary task of supporting the ground forces in Normandy and they were as yet uncertain as to whether the missiles had been launched from the 'ski' or the 'modified' sites. (2) But a heavy flying bomb attack on the night of 15/16 June created an atmosphere of urgency and among other steps taken by the British Government it requested the Supreme Commander, in his capacity of directing the heavy bomber forces, to do all he could to destroy the supply and launching sites subject to the requirements of the land battle. The Prime Minister also decided to form a Crossbow Sub Committee of the War Cabinet at which were represented the Ministry for Home Security, the Air Ministry, the Supreme Commander and Air Defence Great Britain. Not an executive body, its task was to review all counter measures against the threat from flying bombs and rockets.

D/SAC/H21  
Encl. 30A

D. S. C. / T. S. 100/9  
Pt. 1, Encl. 59A

On 18 June General Eisenhower confirmed a verbal instruction in a minute to Air Chief Marshal Tedder. Crossbow targets were to take 'first priority over everything except the urgent requirements of the battle; this priority to obtain until we have definitely gotten the upper hand of this particular menace'. At the Air Commanders meeting at Stanmore that day the Supreme Commander directed that an intensive bombing effort be made against Crossbow targets and that, apart from the land battle, they should take priority over other types of targets.

The Air Commander-in-Chief was nominally responsible for air operations against Crossbow but his main interest lay in organizing air support for the land battle and he could, therefore devote little time to the defence of Great Britain against guided missiles. Air Marshal Hill, Commanding Air Defence Great Britain, therefore became responsible for

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- (1) German night fighters were being fitted with Naxos from January 1944 onwards but in an American attack on Quakenbruck on 8 April 1944 all the Naxos-equipped aircraft were destroyed and it was not until 7 July that replacements of Naxos - fitted Ju. 88's began to arrive. (See R.A.F. Signals History, Vol. VII, pp. 186-190).
  - (2) The reader will find a detailed account of the flying bomb and rocket campaign in R.A.F. Narrative, Air Defence of Great Britain Volume VII.

A.H.B.  
Narrative,  
A.D.G.B.  
Vol. VII  
Chap. 4

defensive measures involving fighter aircraft, balloon barrages etc. while the Deputy Supreme Commander maintained his prerogative over heavy bomber operations. The Directorate of Operations (Special Operations) Air Ministry sifted and passed on target intelligence to the British and U.S. Bomber Commands. The following order of priority was adopted. First, the large launching sites, second, the supply sites and third the forty-seven 'modified' sites which had been identified in the Pas de Calais - Somme area. Further targets added were a suspected rail head for flying bomb supply at Neucourt and the electricity supply system in the Pas de Calais; the last place being suggested by General Spaatz.

D/SAC/H21  
Encl. 33A

Poor weather interfered with heavy bomber attacks during the remainder of June and the beginning of July. As might be expected Air Chief Marshal Harris and General J. Doolittle (Eighth Air Force) believed that the best form of counter measure against Crossbow was the attack of industrial targets in Germany, particularly those associated with production of the V weapons. Nor could their criticisms be answered so long as evidence as to the accuracy of the attacks was unforthcoming. There were two factors which militated against a satisfactory bombing programme. In the first place the Deputy Supreme Commander did not issue a directive to conform the policy for Crossbow, although it is true that on several occasions at the Air Commander's meetings Air Chief Marshal Tedder reiterated to the Strategic Air Force commanders the high priority of Crossbow targets. There was one directive which was issued by Headquarters A.E.A.F. on 29 June requesting the heavy bomber forces to observe the following list of priorities: Crossbow, railways and bridges, fuel dumps, but as the reader already knows that Air Commander-in-Chief could not personally order the Strategic Air Forces to act. The Eighth Air Force, in particular, tended to be even more emphatic about the importance of attacking targets in Germany than the staff of Bomber Command and on more than one occasion the actions of General J. Doolittle were queried by the Deputy Supreme Commander. Furthermore a number of senior air officers, of whom the Chief of Air Staff was one, believed that the heavy bombers should not be drawn away too much from strategic targets in Germany or from the support of the ground forces in Normandy. (1)

D.S.C./T.S. 100/  
9 Pt. 1  
Encl. 69A  
Pt. 2  
Encl. 30A

A.E.A.F./T.S.  
13165/AIR/  
Pt. IV  
Encl. 45A

C.B.C. (44)  
5th Mtg  
11 Jul. 1944

In the second place intelligence on suitable targets was lacking and therefore not consistent. The large sites were, for example erroneously believed to be connected with the launching of rockets. The Strategic Air Force commanders were in favour of attacking storage depots, of which seven had been identified by the end of June. Nevertheless both the Chief of Air Staff and the Deputy Supreme Commander insisted that attacks on modified sites should continue as it was one of the few targets about which there was no uncertainty.

There were several occasions on which the Commander-in-Chief Bomber Command expressed his opinion on Crossbow targets. On 18 July in a memorandum to Mr. Duncan Sandys, Chairman of the War Cabinet Crossbow Sub Committee he gave it as his opinion that the rocket firing sites and the flying bomb supply dumps were for the time being the only profitable targets in this category. He warned against the diversion of effort from targets in Germany and pointed out that if left alone for another month

D.S.C./  
T.S. 100  
Pt. 5  
Encl. 56A

(1) Sir Charles Portal was in favour of 'constantly devoting a small effort to harassing' launching sites A.H.B./II/70/272(E)

and a half, Germany would have recovered from the bombing offensive and would resume full industrial production. He believed that the combined U.S. British bomber forces would be able to destroy any single German city (with the exception of Berlin) by one combined attack. In the course of these operations both the German night fighter force and the remnants of the day fighters would be eliminated. Once the Allied Air Forces had neutralised the enemy's night fighter force, the only safeguard to the direct attack of Germany the heavy bombers could drop over 7000 tons of bombs on any selected target in Germany provided the weather was suitable. But the longer the Allies delayed, the more expensive deep penetrations into Germany would become. A fortnight earlier, as already noted, a similar warning was sent to the Supreme Commander by General Spaatz.

See p. 90

Formation of the Joint Anglo-U.S. Crossbow Targets Committee

As a result of recommendations made by General F. L. Anderson, Deputy to General Spaatz, on 8 July the Intelligence organisation and the Target Advisory Body concerned with Crossbow was thoroughly overhauled. Target information henceforward became the sole responsibility of the Air Ministry and this was to be forwarded to an Anglo-U.S. Committee, run on the same lines as the Oil Targets Committee, with representatives from Air Ministry and the Strategic Air Forces. (1) Their function was to sift all intelligence and recommend on the order of priority for targets. The Deputy Chief of Air Staff disapproved of any representation of Bomber Command on this committee as it would mean the inclusion of the other air forces and Commands and would result in the discussion of tactical matter at too high a level.

D/SAC/H21  
Encl. 59B  
et seq.

D.S.C./T.S.100/  
9 Pt 2 Encl.22A

The prevailing system of control of Crossbow operations was discussed at the Air Commanders' conference on 18 July attended by Air Chief Marshals Tedder, Harris and Generals Spaatz and Doolittle. The Deputy Supreme Commander said that it was important to discover the relative amount of effort which should be devoted to the three major target systems, support of the Normandy battle, Crossbow, and strategic targets in Germany. After much discussion it was decided that the Combined Operational Planning Committee which included representatives from Bomber Command, the Eighth Air Force, Air Ministry and Bomber Command Operational Research Section, should select Crossbow targets. Their aim was defined as being firstly the reduction of flying bombs to a total of 30 in the period of 24 hours by the beginning of September and secondly the prevention of the launching of rockets by that date.

A.E.A.F.  
Hist. record  
and Diary  
July 1944

The first meeting of the Joint Crossbow Target Priorities Committee was held on 21 July. On the next day the Air Commander-in-Chief requested the Deputy Supreme Commander, that he be relieved of his Crossbow responsibilities. To this Air Chief Marshal Tedder agreed, and the Combined Operational Planning Committee selected targets under the Supervision of the Deputy Supreme Commander until the over-running of the flying bomb launching sites. This was not so

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- (1) On 15 July General Spaatz wrote to the Deputy Supreme Commander and asked that there should be adequate American representation on the Joint Crossbow Committee as the 'Allied attack (on Crossbow facilities) has fallen in majority to the U.S. Air Forces in the U.K.' He suggested three representatives from the U.S.ST.A.F.

much a change as a clarification of the existing system of air command.

Thus by the middle of July the anti-Crossbow organization was more proficient and at least it was known what was the best type of target for the heavy bombers to attack. On the other hand while the heavy bombers caused severe damage at certain installations the best form of counter measure lay in the defence, that is to say, the action of fighter aircraft, anti-aircraft guns, ballons and searchlights.

A.H.B. Narrative  
A.D.G.B.  
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Chap. 5

On 1 August the Combined Operational Planning Committee introduced a plan for a general offensive against Crossbow targets. There were to be three phases of attack, two by day and one by night and all were to be completed within a period of 24 hours. The Eighth Air Force was to attack Crossbow production targets in Germany while Bomber Command was to attack a storage depot in France and six launching sites. Six hours later the second phase was to take place. It was to consist of a combined attack on launching sites by both bomber forces. In the third phase Bomber Command was to attack two storage depots by night. The brunt of this operation was borne by the heavy bombers because the Tactical Air Forces, although included in the scheme, did not participate because of the developing mobile battle in Normandy.

The week 2 to 9 August witnessed the heaviest bombing attacks yet devoted to Crossbow. In spite of the attacks flying bombs continued to be launched at a high rate and any slackening of effort cannot definitely be attributed to the heavy bomber forces. Other factors now came into play; the disorganization of enemy communications as a result of Allied air attack and the steadily deteriorating military situation in Normandy. With the Allied Armies across the Seine the flying bomb menace was over. On 6 September the Air Ministry informed the Deputy Supreme Commander that the Chiefs of Staff had agreed that the bombing of Crossbow targets should cease immediately with the exception of those targets concerned with the airborne launching of flying bombs.

The effect of the Rocket Attacks on Bomber Command operations

The Allies anticipated that it would not be long before the enemy began to launch their long range rockets known by the code name Big Ben(1) and during August 1944 a number of preparations were made to combat the threat. On 27 August instructions concerning appropriate countermeasures were issued by Headquarters A.E.A.F. It was stated that this formation would be responsible for:-

B.C/S.31961

- (i) The issue of appropriate warning of impending attacks.
- (ii) The co-ordination of immediate air counter-measures against rocket objectives.

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(1) Detailed information about the rocket attacks and the countermeasures taken will be found in R.A.F. Narrative "Air Defence of Great Britain Vol.VII", Chapter 6 et seq.

- (iii) The maintenance and dispatch of an armed reconnaissance force.
- (iv) Calling on the Allied heavy bomber forces for additional action.

In so far as the plan affected the Strategic Air Forces it was stated that the Air Commander-in-Chief would inform the Deputy Supreme Commander if he considered that heavy bombers should be placed at immediate readiness for countermeasures. He was also to consider at the appropriate moment whether the heavy bomber forces could profitably be employed in the destruction of firing points, control points and equipment.

Bomber Commander and the Eighth Air Force had attacked four large sites, believed to be associated with rockets, from the start of the flying bomb offensive until the middle of July. They were at Mimoyecques, Watten, Siracourt and Wizernes. It was not until after their occupation by Allied ground forces that it was discovered that only two sites, at Wizernes and possibly Watten, had been connected with the rockets. These targets had been suspended from attack but reconnaissance showed that construction work was still proceeding at Watten and Mimoyecques and further attacks were made against them by Bomber Command during August.

See VIIIth  
A.F. Diary of  
Ops. App. 11

Meanwhile operations against rocket activity had been confined to industrial targets in Germany such as hydrogen peroxide plants but on 31 August and 1 September Bomber Command bombed nine forward storage depots in the Pas de Calais area as it was feared that the Germans would make a final attack before being driven out of France by the Allies.

The swift advance of the Allied Armies across France and into Belgium tended to lull the Allied Command into a sense of optimism and when the first rocket fell in the United Kingdom on the evening of 8 September it came as a surprise. The intended employment of Bomber Command for countermeasures was, however, on a small scale, principally on account of the small size of the targets. The Air Marshal Commanding A.D.G.B. could approach Bomber Command for support when there were targets unsuitable for his force but the Commander-in-Chief Bomber Command, after consultations with the Air Ministry and A.E.A.F., stated that the majority of the targets associated with long range rockets were too small for his Command to attack. Only two raids were made on storage depots in September, and henceforward no further attacks were made against rocket storage depots or supply depots by heavy bombers.

B.C./S.31961/1

Bomber Command was also concerned for a short time with radio countermeasures against the rockets. A good deal of thought had been given to the jamming of the radio control of the rocket and, as the chances of effective jamming by ground stations were very small, the Combined Chiefs of Staff decided that in the event of rocket attack against the United Kingdom four bomber squadrons were to be made available for radio counter-measures. Two Liberator squadrons were to be provided by U.S.ST.A.F. and two squadrons by Bomber Command for the purpose. This would supplement the one existing squadron in Bomber Command already equipped for radio jamming (No.192 Squadron). No.214 Squadron (Fortresses) was chosen for this task and the other was to

be composed of Liberator aircraft which were to be supplied by the U.S. Chiefs of Staff and named No.223 Squadron. Both squadrons were under the control of No.100 Group and were to be held in readiness for countermeasures when the rocket attack began.

Of the two new squadrons earmarked for radio countermeasures only No.214 was ready for action by 8 September and No.192 Squadron was called upon to fill the gap. They began operations on the 9th. These were limited to a four hour patrol every twelve hours flown by a Fortress of No.214 Squadron carrying jamming equipment over the Rotterdam-Amsterdam area and a listening watch by Halifaxes and Wellingtons of No. 192 Squadron over the North Sea. No.223 Squadron was ready for operations by 18 September. So long as the rocket attack did not become intensive, Bomber Command was able to retain these specialist aircrews for bomber support operations whenever they were required. The patrols did not, however, prove successful as they heard nothing and saw the flash of rockets only occasionally. It appeared that radio control of the rockets was not essential and in any case a large ground warning organization was being established on the continent. The operations by Nos.223 and 214 Squadrons were therefore cancelled on 27 October.

Proposed Heavy Bomber Operations against German morale

There was one proposed countermeasure against the flying bomb attacks on southern England which so far has not been discussed. This was to be a heavy attack against Berlin in daylight by the combined bomber forces. The Operation was discussed by Air Chief Marshal Tedder, Generals Spaatz and Doolittle, but significantly not by Air Chief Marshal Harris, at the Air Commanders conference on 20 June. It would appear that the plan originated with the British Air Staff and it was also supported by the Deputy Supreme Commander who hoped that it would demonstrate to the enemy that the Allies were able to send an enormous bomber force to Germany in spite of the diversion of the bomber effort to Crossbow targets. He believed it might also help to counter balance the enemy's grossly exaggerated claims of the damage caused by flying bombs in the London area. It was an operation which naturally appealed to the Strategic Air Force Commanders because it was exclusively concerned with a target deep in Germany. Moreover, a period of fine weather was forecast after the storms following the Normandy landings of which the Air Commanders desired to take full advantage.

This air operation happened to coincide with an offensive before Caen which Twenty-First Army Group were planning and for which heavy bomber support was expected. Apart from this requirement, the move of the 1st S.S. Panzer Division towards the front was causing the Army some anxiety and it was anticipated that they might require heavy bombers to delay its arrival. Nevertheless the Air Commanders agreed to send the Strategic Air Forces to Berlin when the weather was favourable provided that the ground forces were not deprived of air support.

On the following day, 21 June, 1300 heavy bombers of the Eighth Air Force took off for Berlin. But the weather was poor and only 600 aircraft attacked the primary target causing damage in the area of the Chancellory and disrupting a number of marshalling yards. The effort by Bomber Command in the operation was cancelled at the last moment, for the reason that, owing to operations in France, the maximum fighter cover for

D.S.C./T.S.100/9  
Pt. 1  
Encl. 63A.

See R.A.F.  
Narrative  
See Lib. N.W.  
Europe, Vol. IV  
Chap. 1

8th Air Force  
Summary of  
Ops.  
June 1944.

A.H.B./ID/4/83

both British and American bomber forces was not available. The Commander-in-Chief Bomber Command therefore believed it would be foolish to penetrate so deeply into Germany in daylight with inadequate protection. The Deputy Supreme Commander consequently ruled that Bomber Command should not take part in the raid and to this the Americans agreed as they would obviously benefit from the greater cover thus made available to themselves. (1)

D/SAC/H21  
Encl. 51A

The Air Commanders did not embark in any further operations against Berlin for the time being. General Eisenhower was, in principle, emphatically opposed to the retaliatory method of attack. This type of operation in relation to Crossbow was discussed at a Chiefs of Staff conference held on 3 July. The Chief of Air Staff made it quite clear that he was opposed to such operations since it diverted the heavy bombers from their primary objectives in Germany, industrial targets, and believed that, if embarked upon, it would be doing exactly what the enemy wanted. General Eisenhower expressed his views on the subject on a copy of the minutes of the conference belonging to Air Chief Marshal Tedder 'I am opposed to retaliation as a method of stopping this business (the flying bomb attacks) - at least until every other thing has been tried and failed. Please continue to oppose.' The Chiefs of Staff again discussed retaliatory operations two days later when they reviewed two reports; one on chemical warfare in connection with Crossbow prepared by the Joint Planning Staff and a paper by the Air Staff on the reprisal bombing of small German towns. They rejected both the use of gas against Crossbow installations and reprisal raids although they stated that, in the case of the latter, 'they did not wish to rule out the possibility for all time.' (2)

At a second meeting held on 5 July the Chiefs of Staff discussed the practicability of a combined bomber attack against enemy civilian morale and agreed 'that the time might well come in the not too distant future when an all out attack by every means at our disposal on German civilian morale might be decisive.' They recommended to the Prime Minister that the possibilities of such an operation being mounted should be examined and a plan made.

A.H.B./II/70/72

After consultations with the Foreign Office, the Ministry of Economic Warfare and U.S.ST.A.F. the Air Staff issued on 17 July a paper dealing with air attack on German civilian morale. This operation was known by the Code name Thunderclap. It considered that the German people were still cowed and apathetic and that they were unlikely to protest against their present regime until the Wehrmacht had been well and truly defeated in the field. At that crucial stage it might be possible for the Allies to make a decisive attack on the political and military centres of Germany. Three different

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- (1) Planning for a big daylight attack by Bomber Command in Germany continued. Early in July a plan was made for a thousand bomber attack on Bremen; cover and escort were to be provided by U.S.ST.A.F. The first daylight operation, in fact, took place over the Ruhr on 27 August.
  - (2) The Supreme Commander was equally determined not to sanction the use of poison gas as a countermeasure against Crossbow. D/SAC/H21 Encl. 56A

forms of attack were suggested. One, widespread fighter bomber attacks on civilian objectives; two, an attempt to bring all road and rail traffic in Germany to a halt by proclaiming to the enemy that every kind of movement would be attacked; three, the bombing of small towns (with populations up to 20,000 inhabitants). The success of all these operations depended largely on good weather while in the case of the last named only a small proportion of the German population would be affected.

A big air attack on Berlin, a city which contained five per cent of the total population of Germany and which was the chief administrative centre and also contained various military objectives, was a more reasonable proposition for in view of the size of the target area, aircraft would not have to depend on good weather to bomb it. The effect of a sullen population might also influence the German government (when at such close quarters). The Air Staff believed that the German High Command should be made to realise that organised surrender was preferable to continued resistance. Meantime the Allies should continue to bomb military and industrial objectives until the defeat of the German Army was foreseeable. This might possibly be hastened by a large scale attack against the administrative centre of Berlin.

It was emphasised that the operation depended on good timing. Such an attack would only be effective when the Germans at last realised that their rulers were powerless to stop such attacks being repeated indefinitely. This in turn would depend on the weight of the attack and the condition of civil and military morale at the time. The bombing of Rotterdam in 1940 was quoted as an example where the Germans had applied these principles.

A supplementary operation to the big attack on Berlin was planned by the Joint Planning Staff. They took into account the recent attacks on small targets in the field by Bomber Command. With this experience behind the bomber crews they believed that a number of small targets scattered over Germany connected with the Party machine might be subjected to attack. Such targets were to be Nazi and S.S. headquarters officer training schools, barracks and camps. The raids would take place in conjunction with a propaganda campaign by the Political Warfare Executive and activities by the Special Operations Executive. The plan, produced in the first week of August, was soon drastically revised; firstly because the attack of these precision targets would conflict with the normal strategic bombing objectives; secondly because the plan depended entirely on extremely favourable weather and thirdly, it would not be likely to disorganise the governmental machine as the targets were too widespread.

Ibid

A.H.B./II/70/72

The Chiefs of Staff reviewed the question of air attack on the German civilian population when they met on 5 August. The Chief of Air Staff suggested that, as the Air Forces which would participate in the operation were then under the control of the Supreme Commander, the planning for such an attack should be done by SHAEF rather than by the Air Staff. To this his colleagues agreed and the Committee decided to write to the Supreme Commander and request him to submit his plans for an operation on the lines suggested by the Air Staff.

The views of the Supreme Commander on heavy bomber attacks on the civilian population have already been discussed and his Deputy also considered that the Strategic Air Forces were better

D.S.C./T.S. 100  
Pt. 6  
Encls. 26A, 26B.

employed in bombing oil targets and in affording close support to the ground forces. However, by 12 August, when SHAEF was informed of the plan, the defeat of the German Army in Normandy was imminent. On 14 August General Eisenhower wrote to Air Chief Marshal Tedder stating that as military defeat of the enemy was rapidly approaching it was no longer necessary to dispatch heavy bombers against strictly military targets and he asked him to prepare the plan as requested by the Chiefs of Staff.

A.H.B./IIS/110/  
14/34 Pt. II

See Chap. 9  
p. 199 et seq

At a meeting of senior Allied air officers held at Stanmore on 16 August, two days before the closing of the Falaise Gap, proposals to use heavy bombers to complete the destruction caused by the Armies and Tactical Air Forces were discussed. When the Deputy Air Commander-in-Chief, Major General R. Royce suggested an all out attack against Germany, Air Chief Marshal Tedder said that the moment for such an operation was not yet opportune. Shortly after on 4 September the Commander-in-Chief Bomber Command suggested that the attack on Berlin ought to be carried out. But the Air Staff were already becoming preoccupied with a combined bomber attack on the Ruhr. Meanwhile the enemy had eluded defeat for an interval and the plan for Operation Thunderclap was shelved until late in January 1945 after the Russians had launched their offensive in eastern Poland and Silesia.

#### Naval Targets

Bomber Command made periodic attacks against naval targets on the northern and western seaboard of France. The most important of these operations was against a concentration of naval craft in the harbours of Le Havre and Boulogne which took place in daylight on the evenings of 14 and 15 June. Small forces of aircraft struck at shipping or submarine pens from Lorient to Bordeaux.

There was also an operation against a major unit of the German Fleet - the battle cruiser Admiral Von Tirpitz which took place on 15 September. Since early in 1942 the Tirpitz had been based in various anchorages along the Norwegian coast with the object of preying upon the supply convoys to Russia but her role in these operations had not been particularly successful. Three bombing attacks by aircraft of Bomber Command and torpedo attacks by the Fleet Air Arm that year had met with failure. However, after a raid against Spitzbergen in September 1943, which had proved to be the final offensive sortie of the Tirpitz, she was put out of action in Alten Fjord for six or seven months by midget submarines of the Royal Navy. In February 1944 a small force of Russian aircraft made an abortive attack on her but shortly afterwards midget submarines of the Royal Navy inflicted minor damage. From 3 April to 29 August five attacks on the Tirpitz were made by Barracudas of the Fleet Air Arm but only one attack (the first) caused any appreciable damage; 13 direct hits were scored and three to four months elapsed before repairs were completed. But there was no task for the Tirpitz during this period as the convoys to Russia were not operating. She remained, nevertheless, a potential threat to Allied naval operations in northern waters.

A.H.B./1D3/2029(B)  
and 1D/12/83

At the beginning of August the Air Staff learned that the Admiralty wanted Mosquito bomber aircraft to carry out an attack on the Tirpitz. (1) The Barracudas were too slow to be effective, as they gave the enemy ample time to shroud the battleship in smoke. The Mosquitos, carrying 2,000 pound bombs (armour piercing), would take off from carriers and land at a Russian base after the attack. The Chief of Air Staff pointed out, however, that the operation, including the time required for training, would entail a serious diversion from the bomber offensive and that, in any case, it would be necessary to consult the Supreme Commander, under whose charge the heavy bombers were then placed. General Eisenhower, while acknowledging the importance of sinking the Tirpitz, did not consider that an attack justified such a diversion at that moment. But the Admiralty maintained that the Supreme Commander was not in a position to judge the world-wide strategic significance of a successful attack against the Tirpitz. They held moreover, that it was time the Strategic Air Forces returned to the control of the Combined Chiefs of Staff.

See also p.52

On 23 August the Joint Planning Staff submitted a report estimating the pros and cons of an air attack on the Tirpitz. They stated that so long as the Tirpitz remained in her present condition, it was necessary to retain one fast battleship and a fleet carrier in home waters which otherwise would be despatched to the Far East. In so far as the strategic air effort was concerned, 15 Mosquito Bomber aircraft would have to be withdrawn from the Bomber Support Group (No.100 Group) for a period of six weeks. This would mean a reduction of 500 tons of bombs in the strategic air effort during that period. They believed that, provided the Russians agreed to British aircraft landing on their territory, the operation was 'just feasible'. The Air Staff also wanted to go ahead with the attack, which they believed would enhance the reputation of the R.A.F., and on 24 August the Chiefs of Staff invited them, in consultation with SHAEF and Bomber Command, to examine the possibility of sinking the Tirpitz by air attack.

The Commander-in-Chief Bomber Command produced three reasons why it would be unwise to use Mosquitos in an attack on the Tirpitz. He doubted whether the Mosquito would be able to achieve greater surprise by its speed than naval aircraft; furthermore it was unable to carry a sufficiently heavy bomb load and finally he could ill afford to spare Mosquitos at a time when, with the lengthening nights, the regular bombing of Berlin by these aircraft had recently begun.

A plan was, in the meantime, being prepared by Bomber Command in which Lancaster aircraft of No.5 Group carrying 12,000 pound (Tallboy) bombs would attempt to sink the Tirpitz. Preparations for the operation known as Paravane went ahead during the first week of September. The plan was that the bomber force consisting of the two Tallboy squadrons (Nos.9 and 617) should leave airfields in the north of

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(1) Discussions on a raid by Bomber Command on the Tirpitz had taken place in October 1942 and July 1943. The chief difficulties were the long distance to the target area and the consequent complexity of arranging to refuel at Russian air bases, the lack of a heavy armour piercing bomb and the detraction of valuable aircraft from the combined bomber offensive. (A.H.B./IIC/65/179).

Scotland during the evening and, after crossing the North Sea and flying overland across Nowway and part of Sweden, would bomb the Tirpitz shortly after dawn on the following morning. They were to land and refuel at an airfield near Archangel before returning to their home base. Meanwhile arrangements were made with the Russians for the accommodation of the force and on 2 September the Supreme Commander gave his approval to the operation.

On 11 September, planned as the eve of the attack, Air Chief Marshal Harris judged that weather conditions favoured an attack made from Russian rather than from British bases. If they did not seize this opportunity the attack would have to be postponed indefinitely because of unsuitable weather. The force from No. 5 Group therefore took off that evening, landing in Russia early the following morning. The attack on the Tirpitz took place on the 15th and put the battleship permanently out of action. Henceforward she was only fit for use as a block ship and was sailed to Tromso. The move brought the ship within closer range of aircraft based in the United Kingdom. The Tirpitz was finally sunk in another attack made by Bomber Command on 12 November. A fuller account of these operations will be described in Chapter 4.

CHAPTER 4

BOMBING OPERATIONS FROM 6 JUNE TO 15 SEPTEMBER 1944

Return to Daylight Operations

The most significant development of British heavy bomber operations over enemy occupied territory, once a foothold had been gained in Normandy, was the return to daylight operations for the first time since May 1943. The occasion was an attack on a concentration of light naval craft at Le Havre on the evening of 14 June. There was no enemy fighter opposition and no aircraft were lost. This was followed up on the next evening by an attack on Boulogne harbour. For the remainder of the period under review daylight attacks were made on flying bomb launching sites and storage depots and close support was provided to the ground forces. The success of these operations which involved only a shallow penetration into enemy occupied territory eventually led to a daylight attack on a target in the Ruhr on 27 August. Strong fighter cover was provided on all operations by Spitfires of A.D.G.B. During the months of June and July 0.4 per cent of the total force of bombers operating in daylight became casualties to flak or enemy aircraft.

O.R.S.  
(Bomber Cmd.)  
Report Nos.  
107, 109.

There were two reasons which made the Commander-in-Chief, Bomber Command change his mind - hitherto he had been strongly opposed to operating by day. In the first place it had become evident during the assault that the G.A.F. was unable to interfere to any large extent with Allied air operations over the beachhead and secondly it was equally reasonable to suppose that during the short summer nights experienced at that time, the bombers would inevitably suffer serious casualties on all night operations. Sir Arthur Harris decided that it would be better to operate by daylight over enemy occupied territory rather than risk casualties during the short nights.

Bomber Cmd.  
O.R.B.  
Overlord  
Supplement  
No.2 p.8.

Daylight operations were discussed at a meeting of the Tactical Planning Committee on 24 June and it was agreed that night bombers operating by day should not fly in formation, the reason being that the necessary training would involve too many operational crews at such a critical stage of the War. The Committee agreed that the characteristics of the various aircraft participating would provide a natural dispersal in height and consequently no requirement for height dispersal would be demanded.

Bomber Cmd.  
Overlord  
Appendices  
Supplement 2  
Encl. 2.  
June 1944.

On 2 July Headquarters Bomber Command issued an order to all Groups which concerned daylight operations. It stated that the success of recent shallow penetrations in daylight had suggested that deeper raids might be carried out with a lower casualty rate than might be expected if the same target was attacked at night. Bombers were to fly in pairs forming a cohesive column as this made it easier for the supporting fighters to cover the bomber stream. Pathfinder Force aircraft would fly in the van of the main force and could adjust their speed in accordance with their height. As aircrews were not experienced in identifying targets by day Pathfinder aircraft would mark the target by suitable methods and the bombing would be controlled as usual by a Master Bomber. When attacking targets out of Obco range each force would be led by Pathfinder aircraft with fins and rudders painted white and they were not to be overtaken by other aircraft. Operations were to be so planned that the route to the target was to be flown at an average height of 15,000 feet

Ibid  
Encl. 3.

until within 100 to 150 miles of the target area when a slow climb to operational height would commence. Aircraft would be routed as far as possible to avoid flak zones. During July 6, 847 sorties were flown in daylight over enemy occupied territory - an increase of over 4,000 sorties compared to the daylight effort in June.

Provision of Long Range Fighter Escort

A.H.B./  
ID/4/84

After the decision to revert to daylight operations, the problem of providing an adequate long-range fighter escort for the heavy bombers arose. During the Battle of France there was, of course, no requirement for long-range fighters and A.D.G.B. was able to muster the necessary escort without any tactical problems occurring. With the presence of the Allied Armies on the frontiers of Germany the need arose for long range penetrations into the Reich by day, and this was not made any the easier because of the lack of long range fighters in the R.A.F. Investigations into this problem began early in September. Judging from the operations of the Eighth Air Force, the British Air Staff estimated that the fighter force should have a unit equipment of at least half that of the heavy bombers. On 22 August the Eighth Air Force was composed of 2,268 heavy bombers and 1,033 long range fighters. On this basis Bomber Command with a unit equipment amounting to 1,460 heavy bombers would require a unit equipment of 720 long range fighters for full scale daylight operations. The Air Staff considered this total was in excess of the number required, for two reasons: first, long range modifications could not rapidly be incorporated into the fighters allocated for Bomber Command; second, in any extensive daylight operations over Germany the Eighth Air Force would also be operating and would divert a fair proportion of the enemy fighters.

Bomber Command proposed that No.11 Group, in which 18 Spitfire and two Mustang Squadrons had already been earmarked for a heavy bomber support role, should come under command of the Commander-in-Chief. Sir Arthur Harris argued that No.11 Group had already been working closely with his bombers and understood their requirements. On the other hand, the Air Staff held that No.11 Group contained the basis of the air defence of Great Britain and thought it undesirable to break up this organisation at that stage of the war. Bomber Command would also have to take over the administration and training commitments of the Group which would involve a temporary loss of efficiency. They recommended that the fighter squadrons which could be made available for long range escort duties with Bomber Command should be placed in No.11 Group, but they were to be allocated exclusively for long range fighter escort duties with Bomber Command, and should be placed under the operational control of its Commander-in-Chief. The force, they proposed, should include only Mustangs and Spitfires, meaning all the Mustang squadrons available in A.D.G.B. plus the Mustang wing in 2nd T.A.F. which would have to be replaced by Spitfires.

A.H.B./III/  
241/3/591(A)  
Encls. 1A - 16A

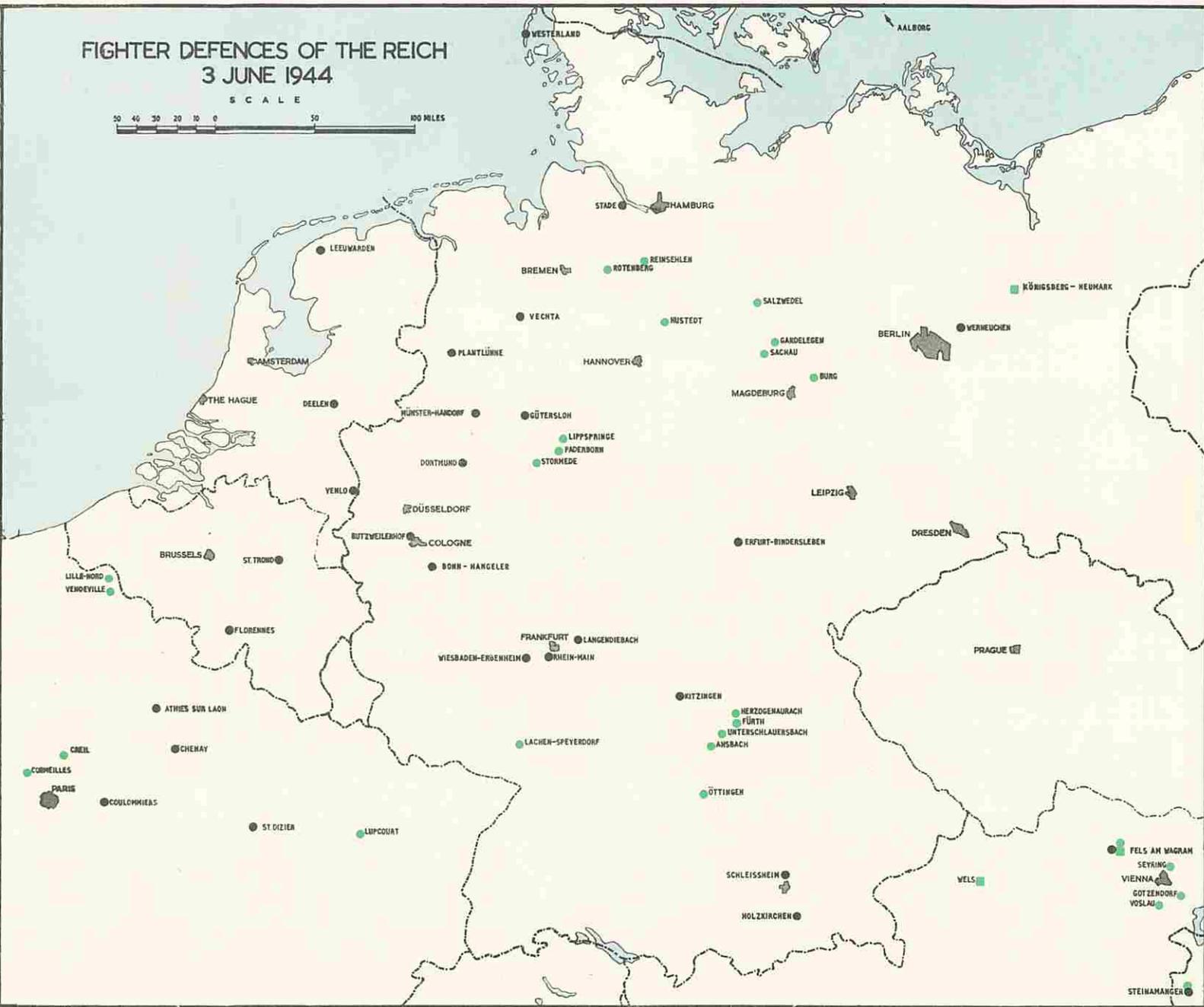
Sir Arthur Harris, who in the spring of 1944, had been approached about the practicability of operating a small daylight bomber force, was somewhat sceptical of this proposal and maintained that all the advantages of 'round the clock' bombing would be gainsaid. Nor did he consider the armament of his bombers to be substantial enough. However, by 29 July, in view of the success of his daylight attacks on enemy-occupied territory, he was urging the Air Staff to provide his Command with long range fighters for deep daylight penetrations. The Spitfires of No.11 Group were subject to three major

DATA FOR AIRFIELDS SHOWN

Unit	A/C	Location	Strength	Sorty
<b>S.E. FIGHTERS</b>				
Stab. J.G.1	FW.190	Lipp Springs	2	1
I/J.G.1	FW.190	Lipp Springs	46	24
II/J.G.1	FW.190	Stornede	39	26
III/J.G.1	ME.109	Paderborn	37	16
Stab. J.G.2	FW.190, ME.109	Orell	3	2
I/J.G.2	FW.190	Corselles (Lfl. 3)	23	15
Stab. J.G.3	ME.109	Salzwedel	8	1
I/J.G.3	ME.109	Burg	28	17
II/J.G.3	ME.109	Sachau	50	25
III/J.G.3	ME.109	Ansbach	67	16
IV(Sturm)J.G.3	FW.190, ME.109	Salzwedel	51	27
I/J.G.5	ME.109	Herzogenaurach	33	16
II/J.G.5	ME.109	Gardelegen	41	18
Stab. J.G.11	FW.190, ME.109	Rotenburg	1	0
I/J.G.11	FW.190	Rotenburg	17	17
II/J.G.11	ME.109	Rustedt	36	21
III/J.G.11	FW.190	Reinschlen	23	16
10/J.G.11	FW.190, ME.109	Aalborg (Denmark)	9	7
J.G.Stab.2.B.V.	ME.109	Ansbach	5	0
Stab. J.G.26	FW.190	Lille-Nord (Lfl. 3)	2	2
I/J.G.26	FW.190	Vendeville, Denain (Lfl. 3)	31	20
II/J.G.26	ME.109	Lupcourt (Lfl. 3)	37	22
Stab. J.G.27	ME.109	Seyring	5	2
I/J.G.27	ME.109	Fels am Wagram } Defense of Vienna	44	31
II/J.G.27	ME.109	Gotzendorf } District	23	19
III/J.G.27	ME.109	Steinmanger (Szonbathely)	21	17
IV/J.G.27	ME.109	Uttingen	65	25
II/J.G.53	FW.190	Unterschläuerbach	21	11
Stab. J.G.104	ME.109	Fürth	4	1
Stab. J.G.105	ME.109	Lachen-Speyerdorf	5	1
Stab. J.G.106	ME.109	Voslau (Defense of Vienna District)	12	6
Special high altitude Gruppen			789	437
<b>T.E. FIGHTERS</b>				
II/J.G.26	ME.110	Wels (Austria)	31	15
Stab. J.G.26	ME.110	Königsberg Neumark	5	1
I/J.G.26	ME.110	"	17	0
II/J.G.26	ME.110	"	53	34
7/J.G.26	ME.110	Fels am Wagram (Austria)	10	3
			116	53
<b>NIGHT FIGHTERS</b>				
Stab. N.J.G.1	ME.219, ME.110	Deelen (Arnhem-Apeldoorn)	3	1
I/N.J.G.1	ME.219, ME.110	Venlo	34	14
II/N.J.G.1	ME.219, ME.110	Deelen	21	11
III/N.J.G.1	ME.110	Leeuwarden	21	17
IV/N.J.G.1	JU.88, ME.110	St. Trond	24	16
Stab. N.J.G.2	JU.88	Deelen	6	1
I/N.J.G.2	JU.88	Rhein-Main	34	26
II/N.J.G.2	JU.88	Butzweilerhof	33	18
III/N.J.G.2	JU.88	Langensiebach	28	18
Stab. N.J.G.3	JU.88, ME.110	Stade	5	1
I/N.J.G.3	JU.88, ME.110	Vechna	28	22
II/N.J.G.3	JU.88	Plantlünne	36	17
III/N.J.G.3	ME.110	Stade	28	22
IV/N.J.G.3	ME.110, JU.88	Westerland: Grove	34	16
Stab. N.J.G.4	JU.88	Chenay	2	1
I/N.J.G.4	JU.88, ME.110	Florennes (Lfl. 3)	19	12
II/N.J.G.4	ME.110, DO.217	Coulommiers (Lfl. 3)	19	10
III/N.J.G.4	ME.110, DO.217	Diessen (Lfl. 3)	20	8
Stab. N.J.G.5	ME.110	Deelen	3	1
I/N.J.G.5	ME.110	St. Dizier (Lfl. 3)	17	11
II/N.J.G.5	ME.110	Güterloh	15	9
III/N.J.G.5	ME.110	Athies Sur Laon (Lfl. 3)	16	8
IV/N.J.G.5	ME.110	Erfurt-Binderleben	17	13
Stab. N.J.G.6	ME.110	Schleissheim	2	1
I/N.J.G.6	ME.110	Kitzingen	23	17
II/N.J.G.6	ME.110	Steinmanger (Szonbathely)	6	3
III/N.J.G.6	ME.219, ME.110, ME.109	Verneuchen (Berlin)	23	14
I(Nel.)N.J.G.7	JU.88	Lünster-Handorf	2	1
Stab. J.G.300	FW.190	Bonn-Hangelar	2	1
I/J.G.300	ME.109	Bonn-Hangelar	42	14
II/J.G.300	FW.190	Dortmund	25	13
III/J.G.300	ME.109	Wiesbaden-Erbenheim	46	25
I/J.G.301	ME.109	Holzkirchen	39	29
I/J.G.302	ME.109	Fels am Wagram (Austria)	39	16
			732	404

FIGHTER DEFENCES OF THE REICH  
3 JUNE 1944

SCALE  
50 40 30 20 10 0 50 100 MILES



A. N. S. I. OMA No. 1088

\* These units, although listed as day and night fighter units, were used almost exclusively as night fighters.

limitations: first, their range precluded penetrations deeper than Essen; second, the overload tanks required for this extreme range were inadequate for the purpose of providing cover for the Mosquito Pathfinders; finally, the fighters were limited by being unable to take off or land at night. This restricted the hours of daylight during which an attack could take place. Suitable target weather often occurred during the first or last hours of daylight and an opportunity once lost might not return for days or even weeks. After the first large scale raid in daylight on the Ruhr, Sir Arthur Harris, enumerating these arguments, wrote to the Supreme Commander and asked that immediate action should be taken.

A.H.B./  
ID/4/84

On 19 September a conference was held at Versailles at Headquarters A.E.A.F. to discuss the provision of fighter escort to Bomber Command and the transfer of the Mustang Wing in 2nd T.A.F. to A.D.G.B. It was attended by the Deputy Supreme Commander, the Air Commander-in-Chief, the Deputy Chief of Air Staff and the Commander's-in-Chief of Bomber and Fighter Commands. Sir Arthur Harris made 'an impassioned plea' for long range fighter escort over Germany. He argued that his bombers were inadequately armed with .303 machine guns and predicted that the Germans might well convert their night fighter force into day fighters. With long range escort day bombing could be considerably cheaper than bombing by night. Equally strong views were expressed by 2nd T.A.F. for the retention of its Mustang wing. Air Marshal Coningham maintained that it was invaluable for close support in the event of rapid moves by the ground forces.

The meeting agreed that both Mustang wings should operate in support of Bomber Command as first priority and in support of 2nd T.A.F. as second priority; 2nd T.A.F. was to retain the three additional Spitfire IX squadrons previously earmarked for exchange with A.D.G.B. for Tempest squadrons to compensate for the loss of the Mustang wing. A.D.G.B. was responsible for training this Mustang wing to land and take off in darkness. The transfer took place in the last week of September; three Mustang III and four Spitfire IX squadrons moved from 2nd T.A.F. to A.D.G.B.: five Tempest and two Spitfire XIV squadrons transferred from A.D.G.B. to 2nd T.A.F. There were, henceforward, seven Mustang III squadrons available in A.D.G.B. for long-range fighter cover.(1)

Tactical Developments, June to September.

O.R.S.  
(Bomber Cmd.)  
Report No.  
S.172

Two important tactical innovations which were made at this time were the Mandrel Screen and Special Window Force. The former was first used on the night of the Normandy landings on 5/6 June by Nos.199 (R.A.F.) and 803 (U.S.A.A.F.) Squadrons, their task being to cover the approach of the airborne forces. The object of the Mandrel Screen was to reduce the range of the enemy's early warning system by jamming his coastal radar equipment such as Chimney, Hoarding and Freya. The screen was formed by disposing pairs of aircraft or jamming centres in such a way as to prevent the enemy radar piercing the screen. In this manner not only could the approach of a bomber force be covered but it was possible to deceive the enemy as to the objective of the raid and so cause him to send his fighters to the wrong areas or

(1) For further discussions on long-range fighter cover see chapter 5, p.120.

to become airborne unnecessarily.<sup>(1)</sup> One ruse employed in connection with the Mandrel Screen was an intentional breakdown of the screen while a 'spoof' force flew through it to mislead the enemy as to the true direction of the attack. For ten days after D-Day the Mandrel Screen was not used to give cover in the Channel area as it would have interfered with naval and Army communications. From 16/17 June it was flown in support of normal bomber operations with the aircraft operating the screen flying over the North Sea. Nos.803 and 199 Squadrons of No.100 Group specialized in this function.

The Special Window Force was made up of aircraft which the heavy bomber squadrons of No.100 Group were able to spare on any given night but usually duties fell upon the Stirlings of No.199 Squadron and Halifaxes and Wellingtons of No.192 Squadron.<sup>(2)</sup> The object of the force (usually between 7 and 13 aircraft) was to simulate a large bomber stream approaching the enemy coast by dropping Window of the appropriate types. A number of variations could be made:-

- (a) by simulating a separate independent bombing raid following its own route away from other main raids
- (b) by accompanying or following a route close to a bomber force breaking away from the main route to make feints at alternative targets
- (c) by saturating an area on a route or round a target.

Several of these tactics were often employed on one night's operations. The Special Window Force was also used in conjunction with the Mandrel Screen and gave the impression of a large force approaching the enemy coast and had the effect of diverting the German fighters from the main attack.

Four other countermeasures were introduced at this time. These were Fidget, first used on 18/19 June, Village Inn, Jostle and Window Type M.B., all used for the first time in July. Fidget was the ground system used to jam enemy commentaries on his M/F (and sometimes on the H/F) band to night fighters during the course of a Bomber Command attack. Jostle was an airborne form of jamming communications and was designed to upset the enemy controller's commentary in the H/F band. The equipment was carried in Fortresses of No.214 Squadron, No.100 Group. Village Inn was a backward looking A.I. device by which blind firing was possible, but was not used as such in July.<sup>(3)</sup> The equipment proved to be a good tail warning device. Finally Type M.B. Window was evolved when the frequency of the enemy's latest A.I. (SN.2) was discovered.<sup>(4)</sup> It was most successful when poor visibility made numerous A.I. contacts essential to the enemy.

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- (1) See also R.A.F. Signals History, Vol.VII, pp.198-206.
  - (2) See R.A.F. Signals History, Vol.VII, pp.196-198 for further details. The force did not operate after D-Day until 14/15 July in an attack on French targets.
  - (3) Automatic Gun Layer (Turret) (A.G.L.(T)). Enemy fighters could home on its plotting signals so it had to be used with caution. (A.H.B./IIE/76 p.59).
  - (4) When a Junkers 88 equipped with SN.2 landed by mistake in the U.K. on the night of 13 July. (See R.A.F. Signals History, Vol.VII, p.156).

A.H.B./  
IIE/76  
p.65

O.R.S.  
(Bomber Cmd.)  
Report No.109

DATA FOR AIRFIELDS SHOWN

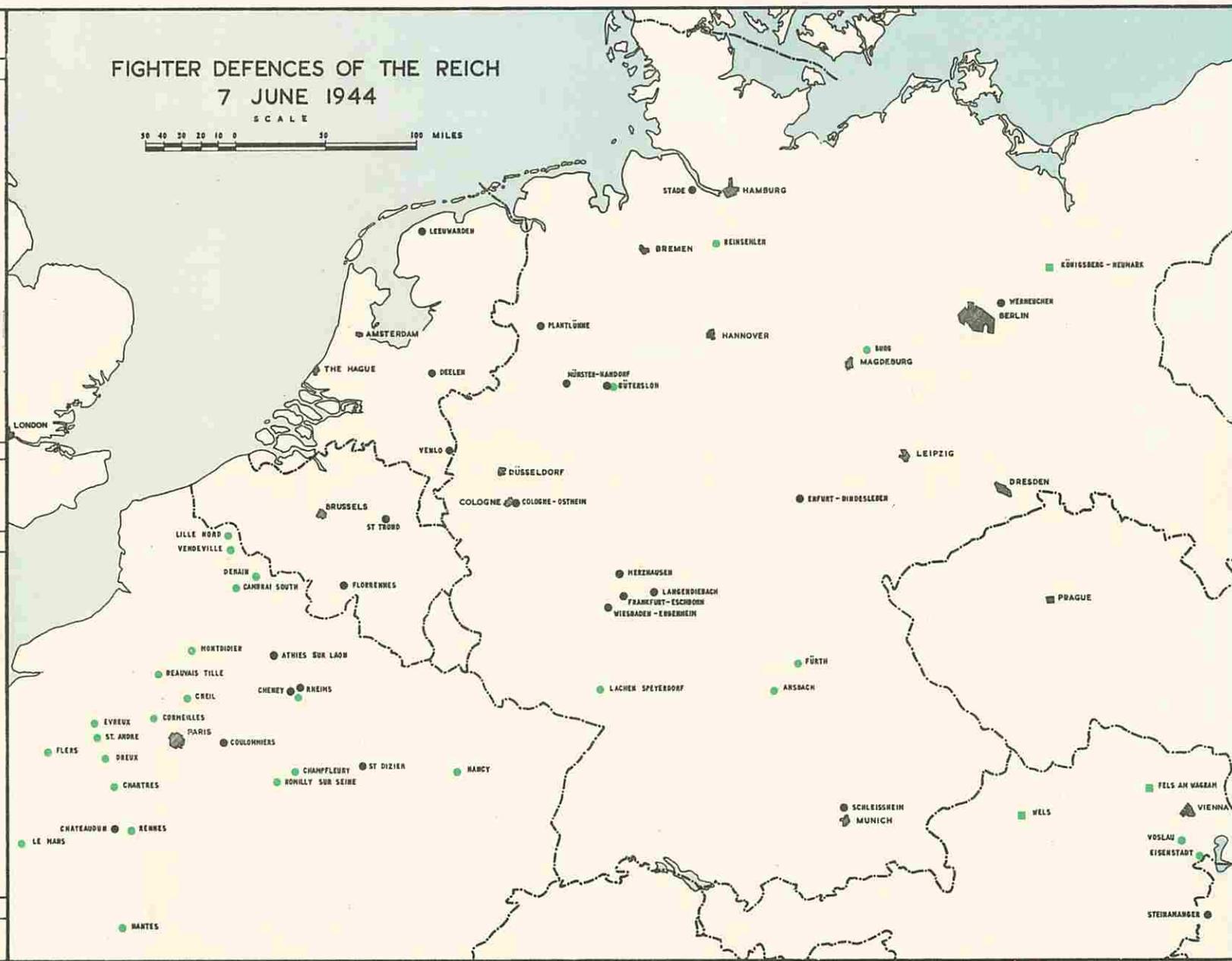
Unit	A/C	Location	Strength	Serviceable
<b>DAY FIGHTERS</b>				
Stab J.G. 1	FW. 190	Beauvais-Tille	-	-
I/J.G. 1	FW. 190	Le Mans	25	12
II/J.G. 1	FW. 190	Flers	25	13
III/J.G. 1	ME. 109	Beauvais-Tille	8	5
Stab J.G. 2	FW. 190, ME. 109	Creil	3	2
I/J.G. 2	FW. 190	Cormeilles	18	3
II/J.G. 2		Güttersloh	-	-
III/J.G. 2		Cormeilles	17	6
Stab J.G. 3	ME. 109	Evreux	-	-
I/J.G. 3	ME. 109	Burg	30	13
II/J.G. 3	ME. 109	Evreux	-	-
III/J.G. 3	ME. 109	St. Andre	64	21
IV/Sturm/J.G. 3	FW. 190, ME. 109	Dreux	22	21
Stab J.G. 4	ME. 109	Amorbach	-	-
I/J.G. 5	ME. 109	Montdidier	16	15
Stab J.G. 11	FW. 190	Rennes	1	0
I/J.G. 11	FW. 190	Rennes	14	4
II/J.G. 11	ME. 109	Beauvais-Tille	17	12
III/J.G. 11	FW. 190	Reimschellen	12	3
IV/J.G. 11	FW. 190, ME. 109	Beauvais-Tille	-	-
Stab J.G. 26	FW. 190	Lille-Ford	2	2
I/J.G. 26	FW. 190	Vendeville-Domain	23	13
II/J.G. 26	FW. 190	Cambrai South	11	8
III/J.G. 26	ME. 109	Nancy	29	16
Stab J.G. 27	ME. 109	Romilly sur Seine	4	4
I/J.G. 27	ME. 109	Rheims	16	13
II/J.G. 27	ME. 109	Eisenstadt (Austria)	11	-
III/J.G. 27	ME. 109	Romilly sur Seine	21	17
IV/J.G. 27	ME. 109	Champfleury	19	12
II/J.G. 28	ME. 109	Nancy	-	-
III/J.G. 28	FW. 190	Chartres	19	12
Elms-St. J.G. 104	ME. 109	Fürth	4	4
Elms-St. J.G. 106	ME. 109	Lachen-Speyerdorf	5	3
Elms-St. J.G. 108	ME. 109	Voelau (Austria)	12	6
Special High Altitude Gruppen			445	236
<b>NIGHT FIGHTERS</b>				
I/J.G. 1	ME. 110	Fels (Austria)	35	18
Stab J.G. 26	ME. 110	Königsberg - Neumark	5	5
I/J.G. 26	ME. 110	Königsberg - Neumark	17	10
II/J.G. 26	ME. 110	Königsberg - Neumark	57	33
7/J.G. 26	ME. 110	Fels an Wagram (Austria)	10	3
			124	65
<b>NIGHT FIGHTERS</b>				
Stab N.J.G. 1	FW. 219, ME. 110	Deelen	3	1
I/N.J.G. 1	ME. 219, ME. 110	Venlo	28	13
II/N.J.G. 1	ME. 219, ME. 110	Deelen	21	9
III/N.J.G. 1	ME. 110	Leeuwarden	24	16
IV/N.J.G. 1	JU. 88, ME. 110	St. Trond	25	18
Stab N.J.G. 2	JU. 88	Coulommiers	-	-
I/N.J.G. 2	JU. 88	Chateaudun	-	-
II/N.J.G. 2	JU. 88	Coulommiers	16	16
III/N.J.G. 2	JU. 88	Langendiebach	36	24
Stab N.J.G. 3	JU. 88, ME. 110	Stade	4	1
I/N.J.G. 3	JU. 88, ME. 110	St. Trond	25	22
II/N.J.G. 3	JU. 88	Plantlume	34	12
III/N.J.G. 3	ME. 110	Stade	37	22
IV/N.J.G. 3	ME. 110, JU. 88	Cologne-Ostheim	34	23
Stab N.J.G. 4	JU. 88	Chenay	2	1
I/N.J.G. 4	JU. 88, ME. 110	Florennes	19	14
II/N.J.G. 4	ME. 110, DO. 217	Coulommiers	21	10
III/N.J.G. 4	ME. 110, DO. 217	Rheims	19	10
Stab N.J.G. 5	ME. 110	Deelen	20	9
I/N.J.G. 5	ME. 110	St. Dizier	20	10
II/N.J.G. 5	ME. 110	Güttersloh	15	10
III/N.J.G. 5	ME. 110	Athies sur Laon	22	16
IV/N.J.G. 5	ME. 110	Erfurt-Binderleben	18	13
Stab N.J.G. 6	ME. 110	Schleissheim	2	1
I/N.J.G. 6	ME. 110	Deelen	27	18
II/N.J.G. 6	ME. 110	Stelmanger (Szombathely)	20	14
N.J.G. 10	ME. 219, ME. 109, ME. 110	Vernuchen (Berlin)	22	8
I(Bel)N.J.G. 7	JU. 88	Münster - Hamdorf	-	-
Stab J.G. 300	FW. 190	Frankfurt - Eschborn	2	2
I/J.G. 300	ME. 109	Wiesbaden - Erbenheim	44	14
II/J.G. 300	FW. 190	Merzhausen	25	23
I/J.G. 301	ME. 109	Frankfurt - Eschborn	39	31
			604	371

FIGHTER DEFENCES OF THE REICH

7 JUNE 1944

SCALE

50 40 30 20 10 0 20 100 MILES



Bomber Support

A.H.B./  
II H1/44

By the end of June there were six Mosquito Squadrons available for Serrate operations. Nos. 85 and 157 Squadrons which had recently been attached to No. 100 Group were fitted with the new A.I. equipment - the A.I. Mark X. Their task was to be low level airfield intrusion. But when the flying bomb attacks began they were attached to A.D.G.B. for anti-crossbow operations and did not return to No. 100 Group until September. (1) At the end of July all the Serrate squadrons in this Group had been equipped with the Mosquito, Mark VI which were fitted with drop tanks and which considerably increased their range.

While Serrate operations had, up to D-Day, been fairly successful there was a decline in Serrate contacts during the months of July and August. (2) This was partly due to the enemy's replacement of Lichtenstein by SN. 2, partly to the increased skill of the German pilots in evading the British fighters and partly to a slight falling off in the number of attacks against bomber aircraft. From June to September only 34 enemy aircraft were claimed to have been shot down by Mosquitos equipped with A.I. Mark IV and seven by aircraft not equipped with radar. Nevertheless both high and low level bomber support aircraft were more valuable for the fact that they confused the enemy's night defence system than that they destroyed fighter aircraft. Serrate aircraft also accompanied diversionary forces to make the feint more realistic and, on certain occasions, they patrolled areas well away from the main area of attack in order to confuse the enemy as to the correct objective of the raid.

The Effect of New Tactics on Bombing Operations

O.R.S.  
Bomber Cmd.  
Report Nos.  
107, 109  
See Map  
Nos. 4-5

Losses to the heavy night bombers did not slacken during June either over Germany or over the occupied territories. The casualty rate in areas of occupied territory defended by fighters rose to 5.0 per cent. The enemy reacted swiftly after D-Day and moved his night fighters from northwest Germany to airfields in the vicinity of Paris. More beacons were brought into use in the coastal regions and a new system of night fighter control came into use. Instead of concentrating a large number of fighters at one point each Gruppe was controlled separately and night fighters were held in readiness near subsidiary 'waiting' beacons. Single engined night fighters were used to defend the flying bomb sites against night attack and they caused a slight rise in bomber casualties in the coastal areas. Furthermore, the enemy appreciated that the British could not penetrate deeply into Germany by night and were therefore able to concentrate on the defence of the Ruhr industrial area. During the three night attacks made in this area in June, 94 bombers (11.3 per cent) were lost.

By July the casualty rate to bombers in fighter defended areas of occupied Europe had dropped a little (4.3 per cent) but the German night fighters were still very active for the reason that during the first half of the month Bomber Command attacked targets in northern France. Over the coastal areas of France single engined night fighters stationed there for the purpose of defending the flying bomb sites were causing

(1) See R.A.F. Signals History, Vol. VII, p. 177.

(2) See R.A.F. Signals History, Vol. VII, pp. 178-179.

the majority of losses. But during the second half of the month Radio Counter Measures became more effective, particularly when operating in support of raids on Germany. They proved that the enemy was most sensitive to these attacks and after 18/19 July enemy controllers tended to disregard attack operations over occupied territory and threw all their resources into the defence of the Reich.

The breakout of the Allied Armies from the lodgement area in August and the swift advance across France and Belgium during September completely altered the situation for the bombing of German targets. The enemy lost his early warning system in the Brest peninsula and along the Calvados coast. By the end of August he had evacuated his night fighter bases in France and his hold over those in Belgium and Holland was becoming precarious. At the same time Bomber Command was making full use of the Mandrel Screen and diversionary forces. Another measure was the introduction of radar silence during the outward journey until as late as possible. The element of surprise was also assisted by low flying during the early part of the route while, by September, it was possible to dispatch forces to south Germany through territory almost entirely controlled by the Allies. The casualty rate for night bombing operations dropped from 2.2 per cent in June to 1.9 per cent in August and for day operations it had dropped from 0.4 per cent to 0.48 per cent. By September the emphasis was still on daylight operations against tactical rather than strategic targets. The total number of sorties flown by day was 10,832 as compared with 6,540 sorties by night. There was no enemy fighter reaction by day. Penetrations into Germany were still shallow and bombers were routed over France and Belgium to screen them from the coastal early warning stations remaining to the enemy.

Ibid  
Report No.111

Ibid  
Report No.112

Bombing Operations in Support of Overlord:

Attacks on Transportation Targets

In the following three sections it is proposed to summarise the part played by Bomber Command during the Battle of France, namely, in attacks on transportation, support to the ground forces and operations against the V weapons. The effect on the ground battle caused by the intervention of the Strategic Air Forces has already been described in the R.A.F. Narrative, The Liberation of Northwest Europe and this account is concerned with defining in general the pattern of bomber operations and in particular the tactical (bombing) developments which occurred at that time.

The bombing offensive against enemy transportation related in Chapter 2 of this volume did not by any means cease with D-Day and in many respects it was the most important contribution made by the heavy bomber forces during the early stages of the campaign. (1) When the Armies had gained a foothold in Normandy the object of attacks against road and rail targets was to prevent the enemy supplying or reinforcing the battle area. Communications centres were to be attacked in four areas: first, in the region Nantes - Angers - Saumur - Tours - Orleans

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(1) The policy for transportation attacks, in so far as the heavy bombers were concerned, continued to be one of attrition (attack of railway centres and facilities) as opposed to interdiction (bridge attacks) although on several occasions the Eighth Air Force attacked bridges in Northern France: (See Eighth Air Force Diary of Operations.) For SHAEF views in contrast to A.E.A.F.'s on transportation see SHAEF G.2 'Use of Air Power against Enemy Military Transport and Supplies.' (SHAEF/561GX/5/INT.)

AEAF/22005  
Pt. 2.

A.H.B./  
IIH/241/3/594

Bomber Command  
Night Raid  
Reports Nos.  
626-632

See Eighth  
Air Force Diary  
of Operations

with the object of cutting traffic from southern France; second, in the Orleans - Chateaudun - Chartres - Etampes - Dreux area to block traffic from south-eastern and eastern France; third, the Paris junctions to cut traffic from north-eastern and eastern France and finally, the Rennes - Pontaubault area to cut traffic from Brest and the Brest peninsula. These operations took place in conjunction with the Eighth Air Force and A.E.A.F., the latter attacking small rail junctions and rail traffic in the same area; the fighter bombers of this force flew numerous armed reconnaissances seeking out and attacking movement of every kind. Signals informing Bomber Command of transportation targets which required attack were despatched from Headquarters A.E.A.F. (1)

For seven consecutive nights after D-Day Bomber Command bombed road and rail targets in the vicinity of the beachhead in the course of which it flew some 3,500 sorties and dropped 11,800 tons of bombs. Severe damage was caused to all targets. These operations were a triumph over adverse weather conditions. For two weeks after 6 June low cloud and rain persisted over north-western France and bombing was difficult both by day and by night. The Eighth Air Force which was inexperienced in blind bombing methods was therefore compelled to reduce its effort and a number of its missions were abortive. On the other hand Bomber Command was always able to operate during this critical period with the assistance of its navigational and bombing aids and no operation was cancelled because of weather conditions. The bombing technique employed was controlled Oboe ground marking, occasionally Oboe ground marking and once No. 5 Group visual marking and Oboe ground marking was used. Aircrews usually found it necessary to bomb from below the cloud at an altitude of from 2,000 to 6,000 feet. The marking of targets was not always accurate but corrections by the Master Bomber prevented stray bombing and usually ensured the success of the operation.

On the night of 6/7 June six road or rail centres were bombed behind the lodgement area. They were the towns of Caen, Argentan, St. Lo, Vire, Lisieux and Coutances. Two rail targets farther inland, Chateaudun and Acheres were also bombed. There was no fighter opposition and it was considered at the time that the enemy was holding back his fighters to deal with possible Allied glider landings to reinforce the troops in the beachhead. On the following night, 7/8 June, four low level attacks were made for the first time on rail centres in the Paris area in bright moonlight, two attacks being made in each of the half hour periods from 0100 hours to 0130 hours and from 0200 hours to 0230 hours. The raiders were met by powerful flak defences which caused the greater number of casualties to the 29 aircraft lost on these operations. The force to suffer most was that which bombed Massy/Palaiseau and lost 13 aircraft of which eight were destroyed by flak and the remainder by enemy fighters.

For the next five nights rail targets were attacked with the object of cutting main lines from southern and eastern France and the following important centres were bombed:

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(1) In other words attacks on transportation targets were determined on the basis of current intelligence and not by previously determined target lists as in the pre D-Day phase.

Alencon, Fougères, Amiens, Arras, Evreux, Orleans, Acheres, Dreux, Versailles, Rennes and Cambrai. Main lines were blocked and a quantity of rolling stock was destroyed. Enemy night fighter opposition was most in evidence on 10/11 June when the bombers were over the Paris and Orleans areas. German fighters came up in strength west and southwest of Paris and shot down ten bombers. Altogether a total of 18 (4.2 per cent) was lost but the bombers claimed to have destroyed or damaged nine enemy aircraft.

One operation of note that week was an attack against the Saumur tunnel carried out by a force of 29 Lancasters and three Mosquitos of No.5 Group on 8/9 June. Nineteen of the Lancasters carried a 12,000 pound (medium Tallboy) bomb. This was the first occasion on which the Tallboy was used operationally.<sup>(1)</sup> The aiming points, which were the two entrances to the tunnel, were marked by Mosquitos dropping red spot flares. One salvo of red spot flares was dropped on the southern end of the tunnel and 18 Tallboys were aimed at them. A direct hit was scored on the tunnel. The tracks and embankment were severely damaged and several roads were blocked. The largest crater had a diameter of 120 and a depth of 30 feet. The damage to the tunnel was not cleared until the Allies captured Saumur. Other precision targets were the railway bridge at Coutances at the base of the Cherbourg peninsula which was seriously damaged and two bridges (the Pont de Vaucelles and Pont des Abattoirs) at Caen attacked on 12/13 June and put out of action.

From 14 to 30 June 17 more attacks were made on railway centres, many of which were very accurate. By the middle of the month the Mandrel Screen was in operation and this undoubtedly caused a reduction in the number of bomber casualties. However in a raid on Vierzon on the night of 30 June 14 aircraft were lost. The bombers were able to reach their target without opposition as the enemy fighters had been given plots suggesting that the bomber stream was much further west than in fact it was. The enemy controller then ordered fighters to Orleans. These aircraft identified the target visually by the fires and attacked the bombers on their homeward journey. At least nine were shot down by fighters.

By the beginning of July the Germans had abandoned the idea of using railway centres west of Paris and Allied Intelligence believed that their main railheads were as far back as Belfort and Dijon. Bomber Command was requested to attack a number of these targets. Great damage was done to Dijon on 5/6 July and other targets bombed were rail centres at Tours, Culmont, Vaires, Nevers, Revigny sur Ornain, Courtrai and Givors. A total of 18 attacks were made during July. Three attempts were made to bomb Revigny sur Ornain a town southwest of Paris. On two of the raids the bombers suffered heavy casualties. Ten aircraft were lost in the attack made on 12/13 July. Although on that night a diversionary operation with a Mandrel Screen was flown over the North Sea and diverted a large number of German fighters this force was intercepted by the night fighter Gruppe stationed at St. Dizier close to the target area. The losses were increased by two aircraft which collided when orbiting the target and two more bombers shot each other down when flying wing tip to tail. In the final attack, made on 18/19 July, the raid took place in conjunction with attacks on synthetic oil plants in the Ruhr,

O.R.S.  
(Bomber Cmd.)  
Report No.  
S.161

Bomber Cmd.  
Night Raid  
Reports Nos.  
634-648

Air Cmdrs'  
35th Mtg.

Bomber Cmd.  
Night Raid  
Reports Nos.  
652-673.

Ibid  
Report No.659

(1) For development of the Tallboy Bomb see Annex B.

Ibid  
Report No.665

The force bound for the Ruhr flew through the Mandrel Screen; the enemy, believing this to be another ruse to retain his fighters in the east, as had happened before, sent his aircraft to France. The force ordered to bomb Revigny, all from No.5 Group, took the brunt of the attack and a number of combats ensued between Dieppe and the target area. Altogether 24 aircraft (20.9 per cent) were destroyed, the heaviest loss for an attack on a transportation target during the Battle of France.

Ibid  
Report No.693

A.M. War Room  
Sum. of Ops.  
June-Aug. 1944.

The rapid advance of the Armies during the first half of August put an end to transportation attacks in occupied territory and on 8 August Field Marshal Montgomery requested that transportation attacks should cease. The last attack was made on Connantre in Northern France on 18/19 August, great damage being caused. From 6 June to 18 August over 8,000 sorties were flown against transportation targets and 29,290 tons of bombs were dropped for a loss of 186 aircraft.

Tactical Bombing Operations in Support of Overlord

In the following section it is intended to give only a summary of the part played by Bomber Command in supporting the ground forces during the Battle of France and to draw attention to the experience that was gained. A more detailed account of the effect of heavy bomber support on the course of the battle may be found in Volumes III and IV of R.A.F. Narrative 'The Liberation of Northwest Europe'.

Bomber Cmd.  
Op. Order  
No.188.

A very great effort was made by this Command on the night of 5/6 June in preparation for the assault on the Normandy beaches. The drenching of the enemy's coastal defences with fire was an essential element in the plan to get the Allied Armies ashore and the heavy night bomber played an important role in this scheme. Another task which absorbed a smaller number of aircraft, but which was equally important to the success of the assault, was the Radio Counter Measures Plan executed by No.100 Group operating in force for the first time. A summary of the tasks of Bomber Command for that night will give the reader some idea of the variety of operations.

- (i) Operation Flashlamp: attack of ten coastal batteries.
- (ii) Operation Taxable: convoy simulation by means of Window in support of naval diversion Taxable.
- (iii) Operation Glimmer: similar action in support of naval diversion Glimmer.
- (iv) Operation Mandrel: a Mandrel barrage to screen aircraft of No.38 Group and IXth Troop Carrier Command carrying British and U.S. airborne forces.
- (v) Operation ABC: ABC operations to jam V.H.F. enemy fighter control.
- (vi) Titanic I, III and IV: simulation of three airborne assaults to provide diversionary cover for the real assault by British and U.S. airborne forces.

Attacks on Batteries 5/6 June

A force of 1,136 aircraft was dispatched to attack coastal batteries in Normandy. This consisted of Lancasters,

Bomber Cmd.  
Night Raid  
Report  
No.625

Halifaxes and Mosquitos of Nos.1, 3, 4, 5, 6 and 8 Groups out of which a total of 1,015 heavy bombers preceded by 42 Mosquitos bombed their objectives. The batteries attacked were as follows: La Pernelle, St. Martin de Varreville, Houlgate, Crisbecq, Fontenay, Ouistreham, St. Pierre du Mont, Pointe de Hoe, Mont Fleury, Maisy, Merville, Longues. Several kinds of bombing technique were employed. Two batteries were bombed with Oboe ground marking and emergency visual marking. Oboe Mosquitos dropped red target indicators and No.5 Group Mosquitos were to mark the aiming point with red or green spot fires in the event of the Oboe aircraft failing. Two targets were bombed on controlled Oboe ground marking. Oboe ground marking with emergency H2S ground marking was employed on six targets. In most cases the 1,000 pound type of bomb was used and 2,240 tons were dropped by the heavy bombers. Operations over the target area began at 2331 hours and were completed by 0515 hours. Six aircraft were lost of which one was shot down by flak and two went down in combat near Caen and Lisieux.

Weather conditions were favourable and there was a full moon but patches of dense cloud covered six of the targets and strike photographs taken were of little value. The same gun sites were bombed by medium and fighter bombers, in addition to being bombarded by naval guns, and it was very difficult to estimate the results of the night attacks.

However, enough evidence was gathered to justify the forecasts of a number of authorities who had been convinced, before the attacks began, that little physical damage could be expected. In two cases the guns had been moved to fresh positions, other guns were silenced temporarily during the period of the assault and then re-opened fire; several others were untouched. At the same time much damage was caused to installations on the gunsites and the enemy was unable to repair the damage before further attacks were made at a critical phase of the assault. The effect of 600 tons of bombs falling on a small target in a limited time undoubtedly affected the morale of the gun crews and shock prevented many of the personnel from working efficiently for some time after the bombing.

T.W.C.(45)10  
10 May 1945  
Report No.292  
Army O.R. Group  
Report No.10  
B.A.U. SHAEF  
(Air)

Radio Counter Measures D-1/D-Day

In the same way that for every battery attacked in the assault area two were bombed in the Pas de Calais (Fortitude area) the radio counter measures plan was designed firstly to simulate landing operations in the Pas de Calais and secondly to conceal the movement of naval forces on their way to Normandy. A total of 111 aircraft was involved in these operations. The object of Operation Taxable was to simulate a large convoy moving towards the beaches north and south of Cap d'Antifer. The air side of this combined operation was carried out by 16 aircraft of No.617 Squadron<sup>(1)</sup> which executed a series of 30 orbits with the major axis of the orbits parallel to the coast, each orbit being 0.82 miles nearer to the coastline. The operation, which required very skilful navigation, was completed successfully but did not draw any response from the enemy.

Bomber Cmd.  
O.R.B.  
App. OL/25  
June 1944

More fruitful was Operation Glimmer, a naval-air feint against the beaches at Boulogne which was the responsibility of

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(1) This squadron had been training for the task since 7 May.

No.218 (Stirling) Squadron. Enemy artillery and searchlights went into action against the convoy and fighters went up against the ABC patrol. One aircraft from No.101 Squadron was lost.

The Mandrel Screen was operated by 20 aircraft from No.199 (Stirling) Squadron R.A.F. and No.803 (Fortress) Squadron U.S.A.A.F. This operation began before midnight on 5 June and continued for five and a half hours, the aircraft orbiting at 1,800 feet round 12 points in the Channel. But the German radar reaction was less than usual and this has been attributed to the heavy damage caused in air attacks on radar stations during the preparatory bombing phase. It is believed that the stations which were still active were effectively jammed by these aircraft.

The ABC operation carried out by No.101 (Lancaster) Squadron and No.214 (Fortress) Squadron attempted to jam the enemy night fighter control system in the Normandy - Paris area. Secondly they were to give the impression that they were top cover for a landing in the Boulogne area. The enemy was so far deceived as to plot these aircraft as the 'spear-head of the bomber force in the neighbourhood of Paris'. The bombers claimed one hostile aircraft destroyed and two probably destroyed.

The operations designed to cover the airborne assault possibly helped to confuse the mind of enemy staff officers as may be seen by a study of the conflicting reports received at German Seventh Army headquarters during 6 June. But the dropping of dummy paratroops was abandoned in airborne operations later in the campaign. Valuable work was also done by the Mosquito squadrons of No.100 Group which provided screens against possible enemy night fighter attack. For the most part these operations were uneventful as the G.A.F. was quiescent.

That the assault on the Normandy beaches took the enemy by surprise was in no small measure due to the radio counter measures plan. From the point of view of Bomber Command the operations were of special value as the experience gained in the employment of special Window and the Mandrel Screen proved to be most valuable for future bombing operations on the continent. Certain equipment was obtained more speedily than would otherwise have been possible when it was a priority for operations connected with Overlord and this, too, benefited Bomber Command.

First Experiments in Heavy Bomber close Support

On the night of 7/8 June 212 bombers of Nos.1, 5 and 8 Groups dropped 795 tons of H.E. on an enemy supply point and refuelling centre in the Foret de Cerisy. This attack was made at the request of the First U.S. Army which was encountering strong resistance in the beachhead. Its accuracy was spoilt by a stray marker which dropped six miles from the aiming point and attracted the weight of the bombing. More effective was a raid on troop concentrations made a week later on 14/15 June at Aunay sur Odon at the request of the Second British Army. Henceforward the Strategic Air Forces were continually engaged in fulfilling requests from the ground forces. On the evening of 30 June the first daylight operation in response to the Army's request was made when 266 aircraft of Nos.3, 4 and 8 Groups succeeded in breaking up preparations for a German counter attack at Villers Bocage. A strong escort was provided by

A.H.B./  
IIE/76  
paras. 295-  
303

Bomber Cmd.  
Night Raid  
Report No.627

Ibid  
Report No.634

Bomber Cmd.  
O.R.B. 7227  
June 1944.

(89446)107

No.11 Group. (1) Replying to a letter of thanks from General Montgomery, Air Chief Marshal Harris drew attention to the fact that by 28 June Bomber Command had lost about 6,000 killed in Overlord operations compared with British Army casualties which were 2,500 killed and U.S. Army approximately 5,000. (2)

Ibid  
Apps. OL2/3

The first major intervention of heavy bombers in support of a ground offensive had been at Monte Cassino in February and March 1944 but that had done more to impede than to accelerate movement on the ground. For sometime the employment of heavy bombers in a tactical role had been a subject of controversy between those who believed that when the heavy bombers were used in this manner they were being diverted from their principal role, the bombing of Germany, and those who wished to use heavy bombers to attack front line targets beyond the range of artillery. Air Chief Marshal Harris and Generals Spaatz and Doolittle took the former view but Air Chief Marshal Leigh Mallory was eager to employ all available aircraft to support Second British Army's operations in the Caen area where the enemy's armour was concentrated in strength, more especially as he was concerned with the establishment of forward airfields south of Caen. (3) The Deputy Supreme Commander was also anxious to call upon every means to break through at Caen but he did not believe that bombers should be used indiscriminately, otherwise the Army would be continually requesting their assistance.

R.A.F.  
Narrative  
Liberation  
N.W. Europe  
Vol.IV. p.22

When General Montgomery was planning to capture Caen in the first week of July Bomber Command was requested to bomb a rectangular area measuring 4,000 by 1,500 yards on the northern outskirts of Caen and which was supposed to contain strong enemy defences. On the evening of 7 July 467 bombers dropped over 2,300 tons over an area of about two and a half square miles and blocked all the roads leading to the city. The operation did not come up to expectation as the main enemy defences were untouched (they lay outside the target area) and numerous craters impeded the British advance into Caen. On the other hand the troops were stimulated by this demonstration of air power while the morale of the enemy's troops declined with the knowledge that the G.A.F. was powerless to intervene on their behalf. Valuable lessons were learned for future close support operations in which Bomber Command was involved in the course of the next six weeks. These operations are summarised below.

Ibid  
p.23

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- (1) See R.A.F. Narrative 'Liberation of N.W. Europe' Vol.IV, Chapter 1, p.21.
  - (2) Just over 300 aircraft had been lost by Bomber Command from 5/6 March, when pre-Overlord Operations began, to 28 June.
  - (3) He was strongly supported by Prof. S. Zuckerman who was urging the employment of heavy day and night bombers in immediate support of ground operations (see his comments in Paper by D.B. Ops. on Density of Attack in relation to air support for Overlord dated 24 June 1944).

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A.M.W.R.  
Sum. of Ops.  
June-Aug. 1944

<u>Date</u>	<u>Target</u>	<u>Aircraft Despatched</u>	<u>Tonnage</u>	<u>Losses</u>
30 June	Villers Bocage	266	1176.2	2
7 July	Caen	467	2363.1	2
18 July	Colombelles Mondeville Sanneville Manneville Cagny	1,056	5008.3	6
30 July	Caumont Villers Bocage Jurques area	692	1380.5	4
7/8 August	Fontenay le Marmion La Hogue May sur Orne Secqueville La Campagne Mare de Magne	1,018	3461.2	10
12/13 August	Falaise	144	661.5	-
14 August	Quesnay Soumont St. Quentin Bons Tassily Fontaine le Pin Hamel le Marais	811	3669.0	2

A.H.B./  
IHH/241/3/594  
Encl. 74A.

Outstanding among the above operations was the one which took place on the morning of 18 July and was known by the code name Operation Goodwood. (1) Apart from Bomber Command the heavy bombers of the VIIIth Air Force and medium and fighter bombers of A.E.A.F. were engaged. The purpose of the offensive was a thrust by a British armoured corps in the direction of Falaise on a narrow front southeast of Caen. General Montgomery asked for heavy bomber attacks against enemy positions on the flanks of the advance and on gun positions outside artillery range and fragmentation bombing in the path of the advance. The Supreme Commander and his Deputy were in full accord with the plan.

After three days the offensive was called off because of bad weather which bogged down the armour. Apart from this the British tanks had suffered heavily in the face of the German anti-tank artillery. At the most there had been advances of about six miles. It is clear after investigating the planning and execution of this operation that co-operation between air and ground forces was still lacking and both services failed to appreciate each other's limitations. From the air point of view it appeared that the ground forces had failed to take advantage of the massive fire power placed at their disposal. On the other hand the Army claim that General Montgomery's intention was to make a limited advance only. Furthermore the Bourgeois ridge which bristled with anti-tank weapons being outside the target area was untouched by the bombing. The Corps Commander claimed that he asked for a second air attack in the afternoon to stifle opposition in this area but the request never reached the appropriate

(1) See R.A.F. Narrative, 'Liberation of N.W. Europe' Chapter 2.

authority. Consequently there was a not inconsiderable reserve of aircraft which was employed against other targets in France and Germany.

A.H.B./  
II/51/15 and  
II/69/120

AHB.6 Trans  
No.VII/73

Compared with the Eighth Air Force effort Bomber Command achieved great accuracy in its attack. The Eighth Air Force carried only light bombs (20 pound fragmentation and 100 pound general purpose) and in certain of the target areas the bombing was very scattered. Bomber Command scored good concentrations with the exception of the village of Cagny which became a strong centre of resistance. At the village of Guillerville a complete company of 21st Panzer Division was destroyed including its complement of 15 tanks. Photographs in Report No.22 produced by the Bombing Analysis Unit of SHAEF graphically show the great devastation that was caused. The results achieved by Operation Goodwood were regarded with disappointment in many quarters. Nevertheless perusal of enemy documents and particularly the confidential reports which Field Marshal Rommel and his successor Von Kluge sent to the Fuehrer show the confusion which these aerial bombardments caused. The truth was that there was still a great deal to learn in air-ground co-operation in the R.A.F. and the Army.

R.A.F.  
Narrative  
Liberation  
N.W. Europe  
Vol.IV. Chap. 4

One other operation must be mentioned here and that is the daylight attack made by Bomber Command in support of First Canadian Army on 14 August known as Operation Tractable. After Operation Goodwood it was the task of the Canadians to capture Falaise. The nature of the ground over which they had to advance was admirable for the defence and both British and U.S. heavy bombers had attacked defended areas on the axis of the advance on 7/8 and 8 August. In the course of that operation about 350 casualties had occurred as a result of an error by air crews of the Eighth Air Force. In Operation Tractable Bomber Command was to attack seven enemy concentration areas and strong points which lay 2,000 yards in front of the Canadian positions. Unfortunately 77 aircraft from Nos.1, 4, 6 and 8 Groups dropped their bomb loads behind the front line, some of them as much as six miles north of the target area. As it happened the destruction arising from the bombing was minor. About eighty troops were killed and a number of guns and vehicles were destroyed.

Bomber Cmd.  
O.R.B.  
Entry 8359  
Aug. 1944.

A thorough investigation into the incidents was at once made by the Groups concerned which culminated in a Command Court of Enquiry. It transpired that a number of troops lit their yellow recognition flares when seeing the aircraft approach with their bomb doors open and these were mistaken for yellow target indicators by certain bomber crews. Shortly after this an Army Auster aircraft took off and fired red Verey lights in a mistaken effort to prevent more bombs being dropped behind the front; these, too, were mistaken for target indicators by bombers flying in the stream. Evidence produced at the Court of Enquiry purported to show that some of the errors could have been avoided if the navigators had correctly estimated the interval of time between crossing the French coast and arriving over the target area. But only No.6 Group crews were definitely briefed to make a timed check during the approach to the target area. At the same time it must be recognized that in some of the incidents smoke from bombs and artillery impaired visibility and the bomber crews were unaware that the Army might use recognition signals.

At a conference held with the Canadians before the attack the Senior Air Staff Officer, Bomber Command was assured that no pyrotechnics which might be confused with target indicators would be used by the ground forces. There was, however, a

SHAEF operational order in existence which stated that troops would use yellow or orange signals in the event of being attacked by friendly aircraft. Bomber Command was aware of this order. It maintained, however, that the Army had never discussed the use of pyrotechnics either during previous operations or during the planning of Operation Tractable on 13 August.

Bomber Cmd.  
O.R.B.  
App/Ops. 64-66  
Vol. 4 Aug. 1944.  
No. 37 I.D.B.  
Ops.

The Commander-in-Chief Bomber Command held that the crews who had bombed visually without checking their position must be held responsible in spite of the ameliorating factors involved in the case and took disciplinary action against them. After recommendations had been made by the Court of Enquiry arrangements were made for an extra Master Bomber, referred to as the 'Long Stop' Master Bomber, to take part in all future close support operations to supervise air crews passing over the Allied front line and to prevent any further bombing incidents. Orders were given for special 'cancellation' pyrotechnics to be devised.

#### Bombing Operations against the Channel Ports

By 19 August the enemy who had lost eleven panzer divisions in Normandy began to withdraw across the Seine and by the first week in September were in full retreat towards the German frontier. On 4 September the Second British Army was in Brussels and the American Armies were pressing towards Aachen and Luxembourg. The enemy determined to hold up the arrival of Allied supplies and reinforcements by occupying Brest and the Channel ports to the bitter end. The First Canadian Army, being on the left flank of the Allied Expeditionary Force, was ordered to invest and capture Le Havre, Calais, Boulogne and Dunkirk. For the whole of September Bomber Command was engaged in making powerful daylight attacks against strongpoints and batteries defending these towns.<sup>(1)</sup> A total of 6,699 aircraft was despatched and 25,348 tons of bombs were dropped in support of the First Canadian Army and, on one occasion, First U.S. Army operations. Details are summarised as follows:

A.M.W.R.  
Sum. of Ops.  
Sept. 1944

<u>Date</u>	<u>Target</u>	<u>A/C Despatched</u>	<u>Tonnage</u>	<u>Losses</u>
5 Sept.	Le Havre	348	1880.9	-
	Brest	66	384.0	-
6 Sept.	Le Havre	344	1504.3	-
8 Sept.	Le Havre	333	535.3	2
9 Sept.	Le Havre	272	7.1	-
10 Sept.	Le Havre	932	4719.2	-
	Le Havre Battery	61	266.1	-
11 Sept.	Le Havre	218	877.1	-
17 Sept.	Boulogne	762	3391.3	2
20 Sept.	Calais	646	3372.1	1
24 Sept.	Calais	188	570.3	7
25 Sept.	Calais	872	1321.5	-
26 Sept.	Cap Gris Nez	531	2845.2	1
	Calais	191	839.5	-
27 Sept.	Calais	341	1718.4	1
28 Sept.	Cap Gris Nez	301	855.5	-
	Calais	193	260.7	-
TOTAL		6,599	25,348.5	14

(1) See R.A.F. Narrative 'The Liberation of Northwest Europe, Vol. IV, Chapter 6.

Very close liaison was maintained between the headquarters of Bomber Command and First Canadian Army and the operations were not marred by any of the mishaps which had thrown a cloud over the operations in Normandy. Signals of appreciation of the work done by Bomber Command were sent to its Commander-in-Chief by General Crocker commanding 1st British Corps, in charge of operations at Le Havre and General Grerar, the Commander of the First Canadian Army. Little fresh experience was learned in the operations and attacks on batteries were not very profitable except in the case of open emplacements while the enemy made good use of dummy positions. A large number of civilian casualties was incurred during the bombardments, particularly at Le Havre and frequently the results did not justify these high losses. But from the Army's point of view heavy bomber support was most valuable. It enabled the infantry to capture enemy positions with fewer casualties than if bomber support had been lacking and the weight of the bombardment stunned the enemy and made it possible to advance with impunity across open ground. The bombing operations against the Channel Ports were not altogether regarded with satisfaction either by the Deputy Supreme Commander or by the Air Commander-in-Chief. The latter stated in his despatch that the heavy bombers could have been more profitably employed in raiding industrial targets in Germany.

Bomber Cmd.  
O.R.B.  
App. OL2/3

R.A.F.  
Narrative  
Liberation  
N.W. Europe  
Vol. IV. Chap. 6

Crossbow Operations, 16/17 June to 1 September

The first flying bomb fell in the United Kingdom on the night of 12/13 June and three nights later 405 aircraft of Bomber Command discharged 1423.3 tons of bombs on four supply sites in northern France in accordance with the list of Crossbow priorities issued by the Air Ministry. This was the beginning of an intensive series of attacks which continued until September and was to be a major diversion from strategic targets. The bombing of the large sites and ski sites in the Pas de Calais and Cherbourg areas had been in progress since the beginning of the year and had forced the enemy to construct a new system of simplified launching sites. But apart from eight attacks made by Bomber Command between January and March, the Air Forces responsible for the bombing had been A.E.A.F. and the Eighth Air Force. Henceforward, from June to August, Bomber Command was to drop the heaviest tonnage on this type of target because it could carry a greater bomb tonnage and its blind bombing technique was more proficient than that of the Eighth Air Force. During the remainder of June 49 attacks were made on large sites, supply depots and modified launching sites. It was decided to operate by day as well as by night so as to take full advantage of any break in the poor flying weather experienced that month. Despite the weather, there was only one day, the 26th, when Bomber Command was unable to operate. The effort for June was a total of 4,057 effective sorties and 15,907 tons of bombs were released. The Eighth Air Force was more affected by the bad weather than Bomber Command and did not begin heavy attacks on Crossbow targets until 19 June but nevertheless flew 2,149 sorties in eight days and dropped 5,524 tons of bombs. (1) G.H. technique was used by the Americans for the most part.

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Report No. 636

A.M.W.R.  
Summary of  
Bomber Command  
Ops. June 1944

Eighth Air Force  
Monthly Sum. of  
Ops. June 1944

Throughout July Bomber Command operated daily against Crossbow targets in the Pas de Calais area with the exception of the 18th and 30th when the heavy bombers delivered attacks in

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(1) A more detailed account of Crossbow operations will be found in R.A.F. Narrative, Air Defence of Great Britain, Vol. VII, 'The Flying Bomb and Rocket Campaign 1944-1945'.

A.M.W.R.  
Summary of  
Bomber Command  
Ops. July-Aug.  
1944

support of the Army and on the 21st and 26th when bad weather prevented flying. The Command also operated on 13 nights during the month. Altogether 24,292 tons were dropped which amounted to 42 per cent of the total tonnage expended by Bomber Command that month. For the first two weeks of August 55 attacks were made against flying bomb targets and the bombers operated almost every day on Crossbow operations. By night in the same period six targets were bombed. In the second half of the month the anti-Crossbow effort began to diminish with the changing military situation. Sorties were flown on five days and on one night, a total of 36 targets being bombed. The total tonnage for August against flying bomb installations amounted to 19,376 tons, a falling off from the intensive phase during July. It will be recalled, however, that Bomber Command had increased its effort against targets in Germany. One of them, Russelsheim, was a V weapon manufacturing centre and was bombed on 12/13 and 25/26 August for a total of 709 sorties and 2,525 tons. Meanwhile the Eighth Air Force flew 4,266 sorties against Crossbow targets during July and August for a tonnage of 10,891.6.

See Chap. 3.

Allied troops now began to occupy the launching sites and the last flying bomb was fired from a ground site against this country on 1 September. By the end of August more attention was being paid to the possibilities of an attack by rockets and on 1 September the supply depots believed to be connected with this weapon were bombed by the Command. In fact when the rocket offensive began very little part was taken by Bomber Command.

The bombing before D-Day had forced the enemy to build small launching sites which were very well concealed and limestone caves and quarries were used for storing bombs and equipment. The launching sites were very difficult to identify from the air especially in the persistent bad weather experienced during this time. For half of a 64 day period from July to August there was cloud below 5,000 feet and only 14 days were clear. Special marking was required once the target had been located and great operational skill was required from the aircrews. Although a number of the launching sites were put out of action by the bombing, the enemy proved himself to be adept in reconstruction or removal of the sites and at the beginning of July, the heavy bombers were directed to devote their attention to dumps and storage depots, although launching sites were still to receive a heavy tonnage of bombs. The 1,000 pound and 12,000 pound (Tallboy) bombs were used effectively against the installations.(1)

O.R.S.  
(Bomber Command)  
Report No.S.192

There were three marking techniques used in daylight attacks against Crossbow or other small targets. First, there was Formation Oboe and Formation G.H. This method consisted of the aircraft flying in formation and dropping their bombs on the Oboe or G.H. leader's bombfall. Second, the visual method in which the target was identified and bombed visually with or without the assistance of proximity markers. Third, an emergency method known as Gee-D/R in

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(1) The first Tallboy attack on a V weapon site was made on 19 June in a raid by No.617 Squadron on the large site at Watten. The reader will gain some idea of the damage caused by these bombs in attacks against storage and assembly sites at Siracourt and St. Leu d'Esserent by looking at the photographs reproduced in the Bomber Command Quarterly Review, No.10, page 20.

which bombs were released on Gee or on the estimated time of arrival from the last reliable fix. By night the following techniques were used:-

- (a) Musical Newhaven and No.8 Group visual. This was controlled visual marking by flare light assisted by early Oboe proximity target indicators and, in Musical Newhaven attacks, backed up by markers of a second colour.
- (b) No.5 Group Visual. This was controlled visual marking by flareslight. Red spot fires were dropped by low flying Mosquitos using their gunsights in a shallow dive attack.
- (c) No.1 Group Visual. Visual marking with impact bursting target indicators backed up by spot fires. The bombing was controlled.

Analysis of Crossbow operations made by the Bomber Command Operational Research Section showed that formation Oboe bombing by day produced a higher mean density than any other day or night bombing technique. An examination was made of 21 attacks on flying bomb launching sites which took place in July. They involved 43 formations and the majority of the bombing took place over 10/10ths cloud. It was discovered that 29 formations (67 per cent) were successful and after analysing the damage done during the same period by daylight Oboe ground marking it was proved that Oboe formation attacks were 1.85 times as efficient as Oboe ground marking attacks in spite of the fact that the weather was frequently cloudy and the crews had had little experience in formation flying.

Next in accuracy was No.5 Group visual night technique and with it the visual daylight methods used by all Groups. The Gee D/R day technique proved to be inefficient and was subsequently abandoned.<sup>(1)</sup>

It is difficult to make any precise estimate of the value of the Crossbow campaign and in most circles the attacks against the launching sites and installations were regarded as a failure. A number of modified sites were undoubtedly seriously damaged during the period 16/17 June to 1 September. The somewhat fragmentary records of Luftflotte 3, the German tactical air formation in France, contain reports of severe damage to storage depots at L'Isle Adam, Domleger, St. Martin, Ganchin, Neucourt St. Leu d'Esserent (attacked with Tallboys) and others during July. But these damage reports do not form a comprehensive record. The fact remains that the enemy was able to launch flying bombs with unabated vigour until the middle of August in spite of the heavy tonnage of high explosive dropped against various constructions and installations. Indeed, it would appear that the air operations against Crossbow before D-Day were more significant since they delayed the start of the offensive. In particular, the attack by Bomber Command against the V weapon experimental centre at Peenemunde in August 1943 must be singled out as it probably caused the dispersal of V weapon manufacture.

There were other factors which had a bearing on the operations but they do not fall within the scope of this

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(1) An interesting analysis of bombing techniques used between March and September 1944 will be found in O.R.S. (Bomber Command) Report No.S.192.

Ibid  
Report No.B.  
219

A.H.B.6, Trans.  
No.VII/84.  
pp.29 and 35

narrative. It is sufficient to mention them; namely the tendency of the air commanders concerned to regard Crossbow operations as a most unwelcome diversion from targets in the heart of Germany; the intelligence system which did not begin to function properly until the flying bomb attacks were well under way and the diffuseness of the organization responsible for organizing counter operations. Nevertheless the number of flying bombs launched against the United Kingdom was reduced by the effort of the Allied Air Forces and in this Bomber Command played a notable part. Its effort from June to September is summarised in the following table:

Target	Date	A/C Desp.	A/C Att.	Tonnage	Losses
Supply Depots	June	-	-	-	-
	July	1,846	1,759	8,115	49
	Aug.	3,556	3,228	15,145	23
	Sept.	153	143	669	-
	Total	5,555	5,130	23,929	72
Launching Sites	June	2,014	1,971	7,374	30
	July	2,664	2,426	9,300	9
	Aug.	1,616	851	2,971	8
	Total	6,294	5,248	19,645	47
Supply Sites	June	1,647	1,317	5,232	3
	July	1,135	1,116	4,381	1
	Aug.	-	-	-	-
	Total	2,782	2,433	9,613	4
Large Sites	June	1,000	769	3,296	5
	July	571	531	2,497	5
	Aug.	398	322	1,257	2
	Total	1,969	1,622	7,050	12
GRAND TOTAL		16,600	14,433	60,237	135

The Night Bomber Offensive against Germany Operations in June and July

In accordance with the plans for an oil offensive which the Deputy Chief of Air Staff had circulated to the Commander-in-Chief Bomber Command on 3 June, and which was to begin as soon as the tactical situation in Normandy permitted, Bomber Command attacked Gelsenkirchen on 12/13 June. Three more big attacks were made during the remainder of the month against targets in the Ruhr - Wesseling, Sterkrade and Scholven Buer. The operations were greatly handicapped. It was not possible to use the Mandrel Screen on all the raids because of naval and ground force activity in the Channel area and, moreover, the nights were at their shortest so that the enemy was certain that, of all the German targets likely to be attacked, those in the Ruhr were the most probable.

Bomber Command visited Germany the first time for three weeks when it bombed the synthetic oil plant at Gelsenkirchen and photographic reconnaissance revealed widespread damage after the raid. Gelsenkirchen was considered by the enemy to be second in importance to the great plant of Politz in north-east Germany and after this attack it was reported

See Chap. 3  
p.55

A.H.B.6 Trans.  
E. 2700

that all the vital machinery was severely damaged and that there would be no production for at least three months. The enemy was confused by the number of separate forces approaching the continent (other aircraft were attacking targets in France) but the Gelsenkirchen force was intercepted on the return route and 17 aircraft (5.8 per cent) were lost. On the other hand 20 enemy night fighters were claimed to have been destroyed, including two which were shot down by intruders.

Ibid  
Report Nos. 636

Heavier losses were experienced in the attacks on Sterkrade and Wesseling. In the case of the former which took place on 16/17 June, the enemy controllers, not knowing exactly where the attack was going to develop, assembled their fighters at Bocholt on the outskirts of the Ruhr, only 40 miles from the target area. The bombers which were divided into two streams converged on this point and soon became seriously embroiled. Altogether 31 aircraft (10 per cent of the force) were lost; 14 were shot down by fighters, nine were lost to flak; the remainder, whose reason for failing to return was unknown, were also probably destroyed by fighters. Unfortunately the Mandrel Screen, which was used for the first time in support of operations over Germany flying 80 miles from the coast to jam the enemy's early warning system, did not alleviate the casualties.<sup>(1)</sup> Fidget, the ground jammer, was also used for the first time.

Ibid  
Report No. 639

A force of 265 Lancasters and Mosquitos was despatched against Wesseling and Scholven Buer on 21/22 June but both targets were covered with thick cloud and did not suffer severe damage. The losses incurred by the bomber force were largely due to the brightness of the mid summer night sky and the bombers presented an excellent target for the enemy fighters. Apart from this there were no diversionary operations or Mandrel Screen. All the bombers took the same route and were plotted by the enemy fighter controllers from the Hague to the Ruhr. Fighters concentrated on intercepting the Wesseling force and 37 bombers (27.8 per cent) were lost; eight bombers were missing from the raid on Scholven Buer.

Ibid  
Report No. 665

The next night attack on the Ruhr did not take place until over three weeks later, on 18/19 July, when a second attack was made on Wesseling and Scholven Buer. This time the raid was more effective and heavy damage was caused at Wesseling; the synthetic oil plant was inactive for three days after the raid. It was estimated that this plant would lose 80,000 tons of oil or the equivalent of four and a half months output. Only five of the 364 aircraft which flew against the two targets were destroyed. The reason for this low casualty figure was the success of the Mandrel Screen through which the main force emerged. This led the enemy fighter controllers to believe that the attack on the Ruhr was only a feint and they sent the main fighter force to France leaving the route to the Ruhr open. Unfortunately, as already described, they badly mauled the bomber force sent to raid Revigny sur Ornain near Paris.

See p.82

Bomber Cmd.  
Night Raid  
Report No. 667

The last big attack on an oil target until the middle of August was made on synthetic oil plants at Homberg and Bottrop on the night of 20 July. Both raids were most profitable. Eighty per cent of the Meerbeck plant near Homberg was destroyed or badly damaged and for the remainder of the war it never returned to full production, for a raid in November

USSES Report  
No. 25 p.1  
Exhibit D.D.A.

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(1) See also R.A.F. Signals History, Vol. VII, p.200.

Ibid  
Report No. 118  
pp. 1-2,  
Exhibit G5  
p. 4

substantially destroyed the repair work that had been carried out. At Bottrop about 450 H.E. bombs fell into the works putting the plant out of action and it was estimated that production could not be resumed for another three months. Further attacks by British and U.S. bombers caused so much damage that after the end of October further attempts to return this plant to full operation were abandoned. The diversionary scheme did not deceive the enemy fighter controllers on this occasion and 28 aircraft were lost, of which 20 belonged to the Homberg force.

Bomber Command  
Night Raid  
Report No. 670

With the lengthening nights Bomber Command now sought targets farther afield. On 23/24 July 612 aircraft attacked Kiel for the loss of only four aircraft (0.6 per cent). The extraordinarily low casualty rate is explained by the complicated plan for that night's operations. The object was to outflank the enemy's night fighter force based in the Netherlands. One force of bombers flew to Donges an oil storage depot in northern France and was routed to its target via Brittany. Meanwhile two more bomber formations were making towards the flying bomb sites on the Channel coast while the Mandrel Screen was operated over the North Sea. The latter also covered the Kiel force which assembled near Texel and flew at 2,000 feet in order to evade the German radar. Mosquitos briefed to attack Berlin flew on a parallel course nearer the Frisian Islands. A diversionary force then flew out of the Mandrel Screen inducing the enemy to believe that a major attack was developing over the Ruhr with smaller forces heading for targets in north and northwest France. Thus apart from a few fighters which came up from Schleswig Holstein and Denmark, the Kiel force arrived at the target area unmolested.

The Deputy Master Bomber assumed control over the target area as he was unable to make contact with the Master Bomber. The marking technique employed was controlled Newhaven marking. Lancasters were to drop target indicators at H Hour minus six. They were to be followed by Primary Visual Markers which were to drop red and green target indicators using the red target indicators dropped by the illuminators as a guide, but only after they had been visually identified. The marking was checked by H2S and was believed to be accurate though rather scattered in the early stages of the attack. Crews reported seeing fires 100 miles away from the target area. Ship yards of the Deutsche Werke Kiel were badly damaged and the airfield and seaplane base were hit. Damage was also done to the harbour facilities and a barracks area.

Ibid  
Report Nos.  
671, 672, 675

The last week of July was devoted to three attacks on Stuttgart. This was the first time that the night bombers had visited a south German target for three months. Losses incurred on the first two raids were not heavy considering the long distance to the target area, but on the third attack which took place on 28/29 July the enemy put up about 300 fighters of which two thirds concentrated against the Stuttgart force.<sup>(1)</sup> They intercepted it near Orleans and from that moment onwards attacked it continuously: 39 aircraft (7.8 per cent) were lost. On the same night Hamburg was bombed for the first time for a year. Here the enemy suspected that the intention was an attack on Kiel and did not intercept the bombers until they were on their way

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(1) Radar silence first imposed on bomber force. (R.A.F. Signals History, Vol. VII, p. 201).

home. A total of 23 aircraft (7.6 per cent) did not return. This made a total of 62 aircraft destroyed out of 1,142 aircraft (5.4 per cent) which composed the two forces. The enemy did not escape lightly for both bomber and bomber support aircraft claimed a greater number of victories over enemy fighters than on any previous night and 27 aircraft were claimed as destroyed.

After these three attacks there was great devastation in Stuttgart. The old city suffered most heavily especially in the central area south-west of the main station. Industrial works, including a petrol filter plant, were damaged. In the case of Hamburg it was difficult to distinguish from the damage done in the big attacks made during the summer of 1943. But six factories were seen to be damaged in various degrees.

Operations 12/13 August to 25 September

For the next six weeks night raids were made on industrial towns rather than on any specific target system. From 12 to 29 August twelve major night attacks were made on targets in Germany. It was during this period that the military situation on the continent radically altered and the German Army was pushed back to the frontiers of the Reich. This fact had an immediate effect on the casualty rate of the heavy night bomber for they were now able to approach targets in Germany from a number of directions without risking the hazards of crossing enemy-occupied territory.

The operations on the night of 12/13 August are of interest. The targets were the city of Brunswick and the Opel works at Russelsheim near Frankfurt (one of the targets named in the Air Ministry weekly list of strategic targets).

The attack on Brunswick was made only by aircraft equipped with H2S. The circumstances in which the operation was conceived require some digression. For some time past T.R.E.<sup>(1)</sup> had not been satisfied that Bomber Command were making the best possible use of their H2S equipment and yet at the same time were demanding more up-to-date variations of H2S. At a conference held at the instigation of the Chief of Air Staff on 22 April 1944 Bomber Command was instructed to make an experimental blind bombing attack against a suitable target at the earliest opportunity with as many aircraft equipped with H2S as possible. Marker flares were to be used to ensure that all crews blind-bombed the same target. The conference agreed that every bomber should ultimately be fitted with equipment which would enable it to bomb in all conditions of weather by the use of its own instruments.<sup>(2)</sup>

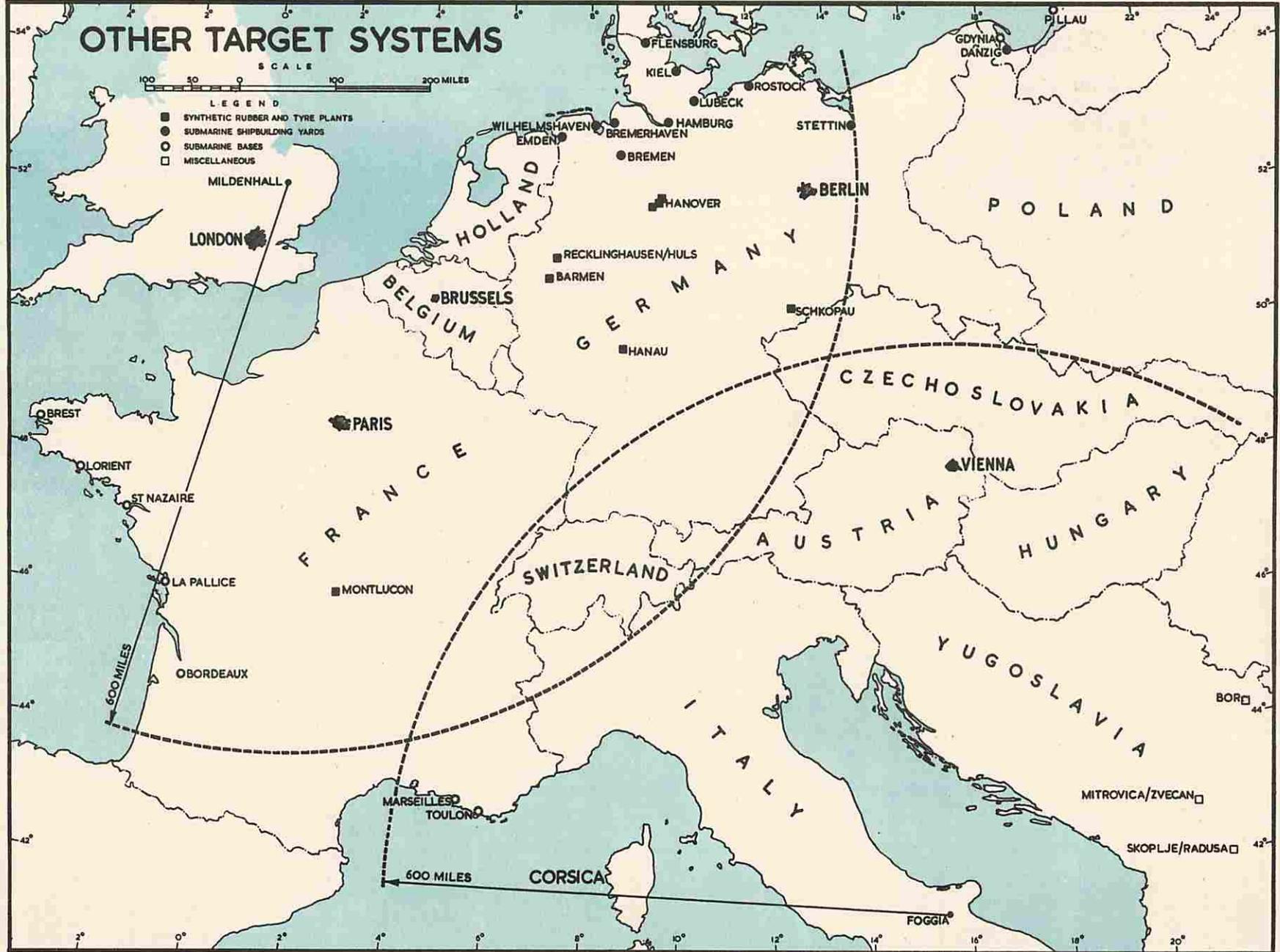
On 16 May Groups were given details of this experimental attack which was to be carried out on a cloudless night and all aircraft were to photograph the results of the bombing. The commitments of Bomber Command in Overlord and the short summer nights made it impossible to make the experiment before mid-August. The attack on Brunswick was made by Lancasters and Halifaxes of Nos. 1, 3, 4, 5 and 6 Groups which were to bomb the target in three waves. Bombing was to start at 0005 hours, very nearly two hours before the moon rose, and to continue for

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- (1) Telecommunications Research Establishment.  
(2) T.R.E. believed that there should be a specialist force of crews expert in the use of H2S within the Pathfinder Force but Bomber Command believed that it would be difficult to maintain this force in view of the high casualty rate to be expected.

A.M. File  
C.28978/46

Bomber Cmd.  
O.R.B. Entry  
No. 8372  
Aug. 1944 and  
Apps. Vol. 4  
Ops. 80 Aug. 1944

Bomber Cmd.  
Night Raid  
Rept. No. 687



13 minutes. The bombing proved to be scattered for marker flares were not used, as originally instructed, and only 17½ per cent of the bombs fell on Brunswick, the remainder falling on the Hermann Goring works at Hallendorf to the south-west, the latter place recording a similar impression on the H2S screen. A total of 27 aircraft (7.1 per cent) were lost.

A.M. File  
C.28978/46

The Air Staff considered that Bomber Command was unwilling to give a fair trial to H2S Mark II. Bomber Command maintained that H2S Mark II was not easy enough to be interpreted by the average crew to ensure any degree of accuracy; that its best use was as an aid to navigation while even the Mark III would only be useful to very skilled aircrews. They requested that H2S Mark IV should be fitted to all aircraft. The Air Staff pointed out that this would be impossible to carry out in the immediate future. They also requested Bomber Command to make a further test of H2S on the lines laid down at the conference in April. This operation never took place, probably because by the autumn the main targets of Bomber Command were precise ones, oil and communications, whereas H2S was more suitable for the bombing of area targets.

Ibid

Controlled visual ground marking was used for the small target of the works at Russelsheim. A good concentration was produced but it fell just too far to the south of the target. Thick ground haze reduced the effectiveness of the target indicators. This force was attacked by fighters both on the inward and on the outward route and 20 aircraft did not return to base.

Ibid  
Report No.697

A more successful attack on Russelsheim was made on 25/26 August when the weather was more favourable and fighter activity had slackened because of the German collapse in France. Enemy fighters did not make contact with the bomber stream until it had reached Saarbrücken about three quarters of an hour before it was due over the target area. Apart from this the casualties were lowered by the diversionary sweep, the Mandrel Screen and Window dropping and only five aircraft (3.6 per cent) were lost. All the major units of the Opel Works were hit and the labour camps west of the plant were almost completely destroyed.

Ibid  
Report Nos.  
691, 698, 701,  
715

A number of important naval objectives were raided in August and September. Three heavy attacks were made on Kiel and two against Stettin. Königsberg, the main German supply port for the Eastern Front, was attacked by Bomber Command for the first time. The attacks on Kiel took place on 16/17 August, ten nights later, and on 15/16 September. The British bombing operations took place in conjunction with the Eighth Air Force which made two small daylight attacks in the first week in August and a heavier attack (284 aircraft) on 30 August. Aerial reconnaissance after the third attack revealed that the old town and the modern shopping centre had been devastated and that three ship building yards were severely damaged. According to contemporary German reports the raid of 26/27 August was the heaviest. The whole city was affected and 2,201 houses were completely destroyed.

A.H.B.6 Trans.  
E.2391.

Thirty-three aircraft were lost by Bomber Command in the Kiel attacks. The reason for this small number was the effectiveness both of the radio counter measures and the bomber support aircraft. In the attack on 16/17 August a diversionary force flew out of the Mandrel Screen towards Holland. The second force bombing Stettin was mistaken by the enemy for a force heading towards Berlin and fighters concentrated on intercepting this stream. In the third

Ibid  
Report No. 715

raid only six aircraft out of a total of 490 bombers failed to return. This again was due to the precautionary measures taken; the main force flew at 2,000 feet on the initial approach to the target area; signal silence was observed and the Mandrel Screen which moved across the North Sea over two hours before the bombing was due to begin led the enemy fighter controllers to believe that the main attack was either a spoof or a minelaying effort. (1)

In the raid on Stettin it was estimated that 48 per cent of the bombs in the target area fell on administrative buildings and the labour of 178,000 industrial workers for one month was lost after the attack. In the second raid the main weight of the bombing fell on the northern half of the town. In the second attack on Königsberg nearly half the built up area was destroyed; the dock area and a number of important administrative buildings were demolished.

Other important night operations in the period were a fairly heavy attack on Bremen, the first heavy attacks on Darmstadt and Bremerhaven and raids on Frankfurt, Stuttgart, Munchen Gladbach, Rheydt and Neuss. On 23/24 September an attempt was made to breach the Dortmund-Ems Canal at Munster. (2)

At Bremen an area stretching over 5,000 yards from the north-western outskirts of the city was devastated; port installations and shipyards were also badly damaged. The losses for the total operations of Bomber Command that night (18/19 August) were particularly low, only five aircraft being lost out of a total of 1,037 dispatched. The other targets were the oil refineries at Sterkrade in the Ruhr, and Rieme Ertervelde in Belgium and a marshalling yard in northern France. Mosquitos attacked Berlin and Cologne. On the previous night the enemy had been deceived by a feint attack towards Bremen and, believing this to be another, did not attempt to intercept the bombers until they were over the target.

Ibid  
Report No. 693

Four important railway targets and a power station were hit at Darmstadt, which had recently been attacked by No. 5 Group. Heavy damage was caused at Frankfurt and Stuttgart. The cumulative effect of this and previous raids on Frankfurt resulted in damage to 45 per cent of all the buildings in the city. At Stuttgart it was reckoned that 63 per cent of the bombs fell into the administrative area. In this operation it should be noted, the bombers were not plotted by the enemy controllers until they reached the front line. The attacks on Munchen Gladbach, Rheydt and Neuss all situated in the Rhineland were remarkable for their low casualties. By 19 September the bombers only had to cross 50 miles of enemy occupied territory to reach these objectives.

Ibid  
Report No. 712

Ibid  
Report No. 713

Ibid  
Report Nos.  
710, 719

Another feature of night operations during August and September was the increasing number of attacks by formations of between 20 and 30 Mosquitos against important cities like Berlin, Dusseldorf, Bremen, Karlsruhe, Hannover, Hamburg and Nuremburg.

A.M.W.R.  
Sumo of Bomber  
Command Ops.  
Aug.-Sept. 1944.

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- (1) On the following night the Special Window Force with a Mandrel Screen made a feint attack on the same area and scored an outstanding success; no less than 12 enemy squadrons were deployed against them. See R.A.F. Signals History, Vol. VII, pp. 201-202.
  - (2) This operation will be described in Chapter 6 in connection with attacks on communications in Western Germany.

Daylight Operations over Germany, 27 August to 14 September

Bomber Command  
O.R.B.  
App. I 209  
Aug. 1944

The first daylight raid on the Ruhr by Bomber Command in 1944 was made on 27 August by 216 Lancasters of No.4 Group and marking was carried out by 27 Lancasters and Mosquitos of No.8 Pathfinder Group. Escort was provided by sixteen squadrons of Spitfires from Nos.10, 11 and 12 Groups making almost one fighter for every bomber. The Meerbeck Synthetic oil plant at Homberg was the target. The attack which took place at 1400 hours was made through cloud and was completed in ten minutes (the bomber stream had been concentrated to ease the task of the fighters escort). It was remarkable that, although the target was in the most heavily defended area of the Ruhr, no aircraft failed to return and enemy fighters did not attempt to interfere.<sup>(1)</sup> The Eighth Air Force attacked targets in the Berlin area at the same time but even in this deeper penetration only three aircraft were lost.

Ibid  
App. I 219  
Sept. 1944

The port of Emden was the next daylight target in Germany chosen for attack. This was the first time that the port had been bombed for over two years. On this occasion No.6 Group was responsible for making the attack and it was accompanied by Pathfinder aircraft and escorting Spitfires and Mustangs of A.D.G.B. The fighters flew at their fullest range and operated in reliefs so as to give continuous cover from the enemy coastline onwards. The raid took place in the evening and the bombers flew at 2,000 feet until they were 70 miles off the Dutch coast. That this ruse was successful is proved by the fact that the enemy fighter controllers did not plot the bomber stream until 30 miles from the coast line. The raid was effective and only one bomber was shot shown by flak over the target area.

Ibid  
Apps. I 224-  
226  
Sept. 1944

Nine raids, averaging in strength from 118 to 150 aircraft, were made against the Ruhr area on 11, 12 and 13 September. On the early morning of the 11th three simultaneous attacks were made on oil refineries at Nordstern, Kamen and Castrop Rauxel.<sup>(2)</sup> Nine aircraft (1.4 per cent) failed to return. Pilots reported that the bombing was well concentrated. On the 12th, No.4 Group bombed two oil targets, Scholven and Wanne Eickel, in the early afternoon and No.6 Group bombed Dortmund and Munster in the evening. On the evening of the 13th two simultaneous attacks were made on Nordstern and Osnabruck. Bombers which set out to raid Wilhelmshaven on 14 September were recalled as weather prevented their fighter escort from taking off.

There were four notable features about these first large scale daylight operations by Bomber Command over Germany. There was, in the first place, no active enemy fighter opposition but it must be remembered that the G.A.F. was in a state of confusion with the German Army's retreat to the frontier of the Reich. There was also an acute shortage of fuel due to the oil offensive. Secondly, a good deal of strain was imposed on the endurance of the fighter escort, especially the Spitfires and Tempests, when targets lay beyond the Ruhr area. Thirdly, the time of attack was varied as much as possible, the best time often

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- (1) 17 per cent of the aircraft were damaged by flak.  
(2) The synthetic oil plant at Castrop Rauxel did not resume production after this attack. (See U.S.S.B.S. Rept. No.122, p.1 and Exhibit 00.)

being in the early morning or about 1800 hours in the evening, the bombers returning to base in the dusk. Finally, it is important to realise that the daylight operations were usually made in conjunction with long range penetrations by the Eighth Air Force which compelled the enemy to disperse his defences.

Summary of Attacks on Oil Targets, May - September 1944.

The daylight raids by Bomber Command in the second week of September together with attacks by U.S. ST. A. F. proved to be highly significant. Between 11 and 19 September, according to Speer, German synthetic oil production came to a standstill. The fine weather at this time provided visual bombing conditions and the Fifteenth U.S. Air Force, now freed from the attack of Roumanian oil targets since their capture by the Red Army, was able to concentrate on those in Central Europe. Apart from the R. A. F. attacks on the Ruhr synthetic oil plants, the Eighth Air Force attacked Merseburg/Leuna, Lutzkendorf, Misburg, Brux and Bohlen and the Fifteenth Air Force bombed synthetic oil plants at Vienna, Blechhammer and Oswiecim. The following table shows the effort made by the Strategic Air Forces from May to September 1944. (1)

A.H.B./  
IA/21  
Table 21

<u>Month</u>	<u>No. of attacks made</u>	<u>Short tons of bombs dropped</u>
<u>MAY</u>		
R.A.F. Bomber Command	-	-
Eighth U.S. Air Force	11	2,883
Fifteenth U.S. Air Force	10	1,540
<u>JUNE</u>		
R.A.F. Bomber Command	10	4,562
Eighth U.S. Air Force	20	3,689
Fifteenth U.S. Air Force	32	5,653
<u>JULY</u>		
R.A.F. Bomber Command	20	3,829
Eighth U.S. Air Force	9	5,379
Fifteenth U.S. Air Force	36	9,313
<u>AUGUST</u>		
R.A.F. Bomber Command	20	1,856
Eighth U.S. Air Force	33	7,116
Fifteenth U.S. Air Force	23	3,997
<u>SEPTEMBER</u>		
R.A.F. Bomber Command	14	4,488
Eighth U.S. Air Force	23	7,495
Fifteenth U.S. Air Force	8	1,829
<u>TOTAL</u>		
R.A.F. Bomber Command	64	14,735
Eighth U.S. Air Force	96	26,562
Fifteenth U.S. Air Force	109	22,332
<b>TOTAL</b>	<b>269</b>	<b>63,629</b>

(1) An allusion must be made here to the minelaying operations of No. 205 Group R.A.F. (under control of the Fifteenth Air Force) against shipping in the River Danube and which had serious repercussions on German oil supplies at this time. The Danube in April 1944 was by far the most important single transport unit in eastern Europe and was used extensively for the carriage of Roumanian oil exports. Operating from Foggia, No. 205 Group laid over 1,300 mines in the Danube between Giurga and Bratislava in the period April - September 1944. Very few tankers or any other vessels succeeded in reaching the upper river during that time. Not less than 250 craft of all types, including 29 tankers, were sunk and at least 200 vessels were damaged. Speer stated, when interrogated at the end of the war, that the dislocation of shipping on the Danube was more troublesome than the concurrent raids on Ploesti oilfield. (See A.H.B./11J1/349/1/2; IA/21, p.60; No. 205 Group O.R.B. 1944c)

Operations against the G.A.F.

See Chap.3

On 15 August a combined attack by the British and U.S. Strategic Air Forces was made against G.A.F. bases in the Low Countries and western Germany. This operation (Butterscotch) had been planned by the Combined Operational Planning Committee. The airfields were used principally by night fighter squadrons but also provided bases for a few long range bombers, minelaying aircraft and intruder aircraft. (1) The object of the operation was to crater airfields, bomb aircraft and their facilities and ground-straft what ever target came into view.

Bomber Cmd.  
O.R.B. App.I  
199  
Aug. 1944

A force of 1,002 British and 692 U.S. heavy bombers was despatched, supported by nearly 1,000 fighters from Air Defence, Great Britain and the Eighth Air Force. In addition to 24 squadrons of No.11 Group 224 Thunderbolts and Mustangs provided cover for Bomber Command. Of these, two groups attacked enemy airfields an hour before the bombers arrived over the targets, to prevent fighters taking off to intercept them. The bombers crossed the North Sea in nine columns and made a rendezvous with the fighters near the Dutch coast; they then fanned out on a broad front, each column bombing an airfield at approximately mid-day. The following airfields were attacked in Holland: Deelen, Eindhoven, Gilze-Riejen, Soesterberg, St. Trond and Tirlemont. A total of 3,262 tons were dropped. The Eighth Air Force attacked nine airfields in northwest Germany. The G.A.F. did not attempt to oppose the bombers and little response was made to the deeper penetration of the Americans. More surprising was the fact that flak was very light and only three aircraft became casualties. It was estimated that heavy damage was done to the runways and the raid so disorganised the night fighters in the area that they were unable to make any determined resistance to Bomber Command's night raids on Bremen, Kiel, Stettin and Sterkrade in the next two weeks.

Bomber Cmd.  
O.R.B. App.  
I 216  
Sept. 1944

However, by the beginning of September the enemy had repaired six of the airfields and another attack was made by Bomber Command. The objectives were Deelen, Soesterberg, Venlo, Volkel, Eindhoven and Gilze Riejen - all in Holland. This time the attack took place in the late afternoon of 3 September with 670 aircraft and the escort was provided by 18 fighter squadrons. Although the Eighth Air Force did not take part and divert the enemy's fighter organization, the enemy's withdrawal into Germany had provoked sufficient confusion and no resistance was met. Two aircraft were lost. According to a situation report of Luftflotte 3 all the airfields save one (in which case the report of damage had not then been received) were unusable.

A.H.B.6  
Trans.  
No.VII/8  
p.4

Four airfields in Holland and western Germany were bombed on the night before the airborne landings at Arnhem (Operation Market, 17 September), 206 aircraft dropping 874 tons. The intention was to stifle the opposition of enemy fighters to troop carrier aircraft and gliders. Daylight reconnaissance showed that in every case runways and landing grounds were heavily pitted and some were made

Bomber Cmd.  
Night Raid  
Rept. No.716

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(1) The Admiralty had drawn attention to the danger of enemy aircraft laying 'oyster' mines in the Channel, these aircraft being based in the Netherlands. (A.H.B. /II/70169.) Scale of effort was believed to be 100 aircraft per night in July.

Ibid  
Report No.722

completely unserviceable. Hangars and workshops were not damaged and no aircraft appeared to be hit. One more airfield attack was made in this period in Handorf in western Germany on the night of 23/24 September. The majority of the force bombed the neighbouring town of Munster as the Master Bomber did not reach the target and only 23 aircraft claimed to have attacked the airfields.

Naval Warfare

The enemy's U-boats and light surface craft were a major threat to the lines of communication across the Channel to the beachhead for they were able to attack convoys and come in close to shore to interfere with the task of unloading supplies. French ports inside the Channel area such as Le Havre and Boulogne were in a good position to act as bases for such craft. The importance in the early days of establishing the beachhead, of ensuring a steady flow of reinforcement and supplies is obvious and is the explanation for the weighty air attacks against Le Havre and Boulogne a week after D-Day. In three attacks 618 bombers of Bomber Command dropped 3,131 tons for the loss of only two aircraft. The first attack on Le Havre began in daylight on the evening of 14 June with 234 bombers of Nos.1 and 5 Groups assisted by Pathfinders of No.8 Group. The attack began at 2235 hours. Two and a half hours later 119 aircraft of Nos.3 and 8 Groups bombed the E.boat pens at Le Havre with 22 Tallboys. One of the bombs penetrated the roof in the northwest corner, destroyed part of the north wall and displaced the whole corner. Investigations made after the capture of Le Havre by the Bombing Analysis Unit of S.H.A.E.F. showed that very great destruction had been done and of all the subsequent raids on the port this had been the heaviest. The dock area was badly damaged and 55 vessels of various types, including a number of naval craft (15,646 tons), were sunk.<sup>(1)</sup> An equally heavy raid was made on Boulogne on the next evening and 27 vessels (6,147 tons) were sunk or damaged. A number of 12,000 pounders were also used in this raid. Two more attacks were made on Le Havre by Bomber Command on 31 July and 2 August.

A.M.W.R.  
Sum. of  
Bomber Cmd.  
Ops.  
June 1944

Bomber Cmd.  
O.R.B.  
Entry 7061  
June 1945.

S.H.A.E.F.  
B.A.U.  
Report No.27  
and Adm.  
T.S.D./F.D.S.

A.M.W.R.  
Sum. of Bomber  
Cmd. Ops.  
Aug-Sept.  
1944

The next important naval base to be raided by the Command in conjunction with the Eighth Air Force was Brest which had already been heavily attacked by British heavy bombers when it gave shelter to the Scharnhorst and Gneisenau in 1941. The German High Command was determined not to let this valuable prize fall into Allied hands and, before finally surrendering on 19 September, gave orders for the port facilities to be demolished. Two attacks were made against coastal batteries at the request of the U.S. ground forces but air operations were also co-ordinated with the current naval plan, whose object was to prevent the escape of surface and under water craft and to sink vessels which might be used as blockships. From 14 August to 2 September 361 aircraft bombed shipping and blockships in the harbour. The latter were afterwards seen to be resting at the bottom of the docks where they had been sheltering.

Meanwhile the German Navy operating E and R-Boats and such like craft in the Channel sought refuge in harbours along the Dutch coast when their comrades on land retreated across the Seine. Here they were able to hide in pens constructed with

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(1) Three Torpedo Boats and 10 E.Boats were among the naval craft.

Bomber Cmd.  
Quarterly  
Rev. No.10.

thick concrete. On 24 August the E-and R-Boat pens at Ijmuiden were bombed by 23 aircraft of No.5 Group carrying Tallboy bombs. Two of the bombs hit the target, one making a hole 15 feet across in the centre of the roof and the other destroying a large part of the back of the pen making a gap 94 feet by 30 feet.

Ibid

A.M.W.R. Sum.  
of Bomber Cmd.  
Ops. Aug. 1944

A powerful effort was made against U-Boat installations. The designers of these shelters believed that they would be proof against any form of aerial attack. In the submarine pen at Brest the roof was 16 feet thick and the enemy had planned to increase it to a thickness of 29 feet in some parts. Nine Tallboy bombs penetrated the roof in two places. Three attacks were made on U-Boat pens at Brest between 5 and 12 August, four attacks on similar structures at La Pallice, two at Bordeaux and one at Lorient. During the month of August a total of 1,339 tons of H.E. was dropped on U-, E-and R-Boat bases. At least eight direct hits were scored on the U-Boat shelters at Brest and six at La Pallice. These operations together with the sea mining which aimed to stop U-Boats moving to southerly ports and naval and Coastal Command activity seriously harassed the passage of U-Boats to new bases. By the end of August La Pallice, alone of the Biscay ports, was open and with the occupation of the Channel and most of the Biscay ports in September, even that last refuge was blocked.

#### The Attack on the Tirpitz

See Chap.3  
p.72

The policy and planning which led up to the attack on the Tirpitz by Bomber Command in September 1944 has already been discussed in an earlier chapter and the following paragraphs do no more than describe the operation which was executed under unusually difficult conditions. It will be remembered that the plan was changed at the last moment to an attack on the battleship from a Russian airfield. Although this decision proved to be wise from the tactical point of view it did much to prejudice the success of the operation because of the numerous complications that arose. The Russians did not have sufficient time to prepare the airfield and the two Liberator aircraft carrying the ground staff, which would have been of great assistance in landing the bombers, were unable to proceed in advance.

Bomber Cmd.  
O.R.B.  
Overlord Apps.  
Supp. 2  
Encl. 3C  
June 1944.

The force consisting of Nos.9 and 617 Squadrons (No.5 Group), a P.R.U. Mosquito and a Film Unit aircraft under Group Captain C. C. McMullen, set out for Yagodnik near Archangel on the evening of 11 September. The weather forecast for the Russian base proved to be entirely inaccurate and the aircraft ran into 10/10ths cloud and heavy rain squalls.<sup>(1)</sup> The landings were made under appalling conditions, added to which there were no navigational aids as it had not been foreseen that the Russian beacon system would be different to that of the British. The force was scattered over six airfields in the vicinity of Archangel and six bombers were seriously damaged on landing. None of the personnel was injured. To quote from the report made by No.5 Group, 'It reflects considerable credit on the navigators that they reached the vicinity of Archangel let alone find one particular airfield'.

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(1) The Russians who had made a correct forecast were not consulted.

The preparation for the attack was also fraught with difficulties, for the aircrews had been entirely misled as to the adequacy of refuelling facilities. Apart from this the bombers had to be concentrated at Yagodnik and repairs carried out. A fine effort was made by the ground staff to repair the aircraft and 20 Tallboy, six J.W.(1) and the Film Unit aircraft were ready for action by 14 September. After the P.R.U. Mosquito had made several weather reconnaissances, the commander of the force decided to make the attack on 15 September. The bombers began to leave Yagodnik at 0630 hours and approached their target, in Alten Fjord at a low level. The time of attack was 1100 hours. Weather conditions over the target area were admirable and the enemy was almost taken by surprise but a smoke screen had already covered the battleship by the time the first aircraft began to bomb. The Tallboy aircraft attacked in four waves of five aircraft. Seventeen Tallboys were dropped and, after the P.R.U. Mosquito had taken photographs, there was sufficient evidence to show that the vessel had been hit at least once. Five or six more Tallboys fell close by. A few J.W. bombs were reported to have fallen near the Tirpitz. There was no fighter opposition and only two aircraft were damaged by flak. The aircraft returned to Yagodnik on completion of the raid and by 26 September 32 Lancasters and the P.R.U. Mosquito had returned to base. Post war evidence has revealed that the battleship sustained one hit forward on the starboard side and there were two near misses. Two thousand tons of water poured into the forward compartments. The damage was too extensive to be repaired on the spot and it was decided to move the Tirpitz to Tromso. She was now no longer capable of offensive action and the strength of the Home Fleet was modified accordingly. The move to Tromso brought her within range for the final coup de grâce by the R.A.F.(2)

#### minelaying

The minelaying effort which reached its climax in June 1944, when 3,014 mines were laid around the European coasts, began to decline in July and the effort from that month until September was approximately 40 per cent of the effort made from April to June. The main reason for this was the Allied occupation of former mining areas: The minelaying effort in the Bay of Biscay in July and August was made in conjunction with Naval and Coastal Command forces with the object of cutting off U-Boats and surface craft escaping from the enemy occupied ports on the western French seaboard. The routes between Denmark, Norway and the Baltic ports were also mined to catch troopships bringing reinforcements from Norway to the Western Front.

By September sea mining was no longer necessary off the French coast in the Channel and Atlantic areas and, under cover of the longer hours of darkness, operations were extended to the eastern Baltic where the canal approaches to Swinemunde and Königsberg were mined. Mining operations were also coordinated with the raids on Bremen, Bremerhaven, Hamburg and Kiel already discussed earlier in this chapter. One operation

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- (1) Johnny Walker. Bombs designed specially for use against naval vessels.
  - (2) The reader should consult the report prepared by Group Captain McMullen on the attack on the Tirpitz. This also describes in detail the administrative difficulties experienced in Russia. (See Bomber Cnd. O.R.B. Overlord Apps. Supplement 2, Encl. 3c).

Bomber Cmd.  
Night Raid  
Report No.  
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that must be singled out for mention was the successful laying of mines in the Dortmund-Ems Canal on 9/10 August by Mosquitos of No. 8 Pathfinder Group. Apart from the destruction or dispersal of U-Boats the enemy's shipping was also disorganized. Valuable personnel were also expended in the purely defensive task of sweeping minefields from the approaches to the enemy's ports. Mining also deterred neutral shipping, on which the enemy depended for the transport of valuable war materials, from entering German waters.

The minelaying effort during the period June to September has been summarised below:

	<u>Month</u>	<u>A/C Desp.</u>	<u>A/C Effective</u>	<u>Mines Laid</u>	<u>A/C Missing</u>
A.M.W.R.	June	792	725	3014	4
Sum. of Bomber	July	184	166	708	3
Cmd. Ops.	Aug.	414	378	1586	14
June-Sept.	Sept.	185	161	748	4
1944	Total	1575	1430	6056	25

SECRET

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PART II

RETURN TO THE STRATEGIC BOMBING OFFENSIVE

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CHAPTER 5

THE CHANGE IN COMMAND AND PLANS FOR THE  
AUTUMN OF 1944

The Strategic Air Forces revert to control of the  
Combined Chiefs of Staff

On 16 September the British and United States Strategic Air Forces in Europe which, since 14 April had been placed under the direction of the Supreme Commander, reverted to the control of the Combined Chiefs of Staff. The reader will recall that a proviso was made in the directive issued by the Supreme Commander in April, that the command situation would be reviewed as soon as the Armies were established on the continent. The system of command, as already seen, worked well as far as support to Overlord was concerned and Air Chief Marshal Harris, despite his early qualms over the practicability of using his force in Operation Overlord, had diligently given support to land operations whenever requested to do so. The American air commanders, for their part, were satisfied in serving under General Eisenhower and, when SHAEF moved to the continent in September, General Spaatz, Commanding General United States Strategic Forces in Europe, also established his advanced headquarters at Versailles. It appeared that General Eisenhower himself was unwilling for a change in the system of control. On 22 August he had, in fact, admitted this when in a signal to the Combined Chiefs of Staff concerning the conduct of future operations he stated that: 'There will be no change in this general system (i.e. the current system of air command) except that the Commander of the Tactical Air Force, together with representatives of the day and night Bomber Force will be with the Supreme Commander in France.' Nor did General Arnold, Commander of U.S.A.A.F. desire any alteration in the system.

The Army Air  
Forces in  
World War II  
Vol. 3, p 319  
et seq.

See Chap.4

A.H.B./  
ID7/233B  
(Pt. II)  
and  
CMS. 342  
Encls. 36A-43A

The British Air Staff, on the other hand, backed by the Prime Minister wished to regain control over R.A.F. Bomber Command. They considered that the Strategic Air Force commanders were not adhering as strictly as they might to the priorities laid down by the Air Ministry for the bombing of industrial targets in Germany, the oil industry in particular, and felt that this divergence from the main task would only increase when SHAEF moved from London to the continent. As early as 14 June, at a discussion on the oil offensive at the Chiefs of Staff conference, Air Chief Marshal Portal said he was thinking of recasting the current directive to the heavy bomber forces and the Committee requested that a revised directive be produced for their consideration. The battle in Normandy, however, kept the heavy bombers well occupied and it was not until 28 August that Air Chief Marshal Portal, in a statement to the Chiefs of Staff, advised that the Supreme Commander should relinquish his control over strategic air operations in favour of the Combined Chiefs of Staff. It was agreed that this matter should be discussed at the meeting to be held with the United States Chiefs of Staff at Ottawa in the second week of September at which the Prime Minister and President were also to attend.

The main purpose of the Combined Chiefs of Staff conference (Octagon) was to review the war situation in Europe and in the Far East, particularly with regard to

A. H. B/  
ID5/40/4  
Encl 25

making new dispositions in the latter theatre after the collapse of the Axis powers in Europe. The question of the control of the Strategic Bomber Forces in Europe was an important item on the agenda. The case advanced by the British Chiefs of Staff for a change in the system of command was as follows. The raison d'être for the control of the Strategic Bomber Force by the Supreme Commander no longer existed, now that the Allied Armies were firmly established on the continent and, because of the rapidity with which the campaign was proceeding, demands for close support would not in future be on a large scale. It was difficult for the Supreme Commander to exercise control over operations which affected both the Russian and the Mediterranean fronts as his staff was preoccupied with events on the western front. These problems could only be seen in their proper perspective by the Combined Chiefs of Staff. Furthermore, it was impossible for the Air Staff to ensure that the priorities for strategic operations against Germany were being closely observed. This was especially important in view of maintaining the weight of attack against oil targets, a factor which might prove decisive in the war against Germany. The Combined Chiefs of Staff were also in the best position to appreciate when large scale attacks against German morale were most appropriate. Finally, the move of SHAEF to the continent had made close collaboration between it and the British Air Staff, which provided guidance on the choice of strategic targets, very difficult. Effective control over strategic air operations would therefore only be diminished.

The British Chiefs of Staff proposed that the Chief of Air Staff and the Commanding General U.S.A.A.F. should exercise control over the Strategic Air Forces on behalf of the Combined Chiefs of Staff. They, in turn, would be represented by the Deputy Chief of Air Staff and the Commanding General U.S.ST.A.F., the former being permanently at the nerve centre of operations in London and the latter alternating between his headquarters in France and London. They would be able to control and coordinate operations after consultation with the British and United States Air Staffs responsible for strategic operations and SHAEF. This did not mean that demands made by the Supreme Commander for the direct support of land operations in western Europe would be neglected. On the contrary, the requirements of the land battle were to be given top priority in an emergency. The primary objectives proposed by the British Chiefs of Staff were the petroleum industry, the ball bearing industry, the tank industry, ordnance depots and the motor transport industry. The first two would affect the German war economy, while the last two would stultify ground operations. The G.A.F. was no longer a primary objective and would require no more than policing attacks. Combined attacks should be made on Berlin and other large industrial areas when weather and tactical conditions were favourable for that type of operation and unfavourable for the attack of primary objectives. Three other types of bombing operation were mentioned. First, targets in east and south-east Europe which were to be bombed in support of the Russian Armies; second, bombing in support of Special Operations Executive activities undertaken at the request of the Supreme Commanders in the European and Mediterranean theatres and, finally, targets of a fleeting nature but of great importance, such as a unit of the German fleet, in which case an air operation would have to be devised at short notice.

The proposed directive was discussed at the first meeting of the Combined Chiefs of Staff held at the Chateau Frontenac on 12 September. The British proposals underwent some penetrating



criticism from General Arnold who asked four questions. Firstly, was it necessary to separate the control of the Strategic Air Forces from General Eisenhower's headquarters, secondly why had no mention of communications been made in the priority of targets, thirdly what would happen if General Spaatz and the Deputy Chief of Air Staff were to disagree over a matter of policy; fourthly, he reminded Sir Charles Portal of the great bomber force at their disposal, consisting of some 5,246 aircraft, and inquired whether the proposed system of command would make the best use of it? Other members of the U.S. Chiefs of Staff asked whether General Eisenhower would get adequate heavy bomber support in the event of an emergency on the western front.

In defence of his proposals, Sir Charles Portal said that with regard to the first question all the apparatus for intelligence concerning both targets and the G.A.F. and for the interpretation of results of raids were concentrated in England and were conveniently close to the centre of command in London. In answer to the second question, he considered that communications had largely become targets for medium and fighter bombers rather than for the Strategic Air Forces.<sup>(1)</sup> In the unlikely event of disagreement between the two commanders the matter in dispute would be referred to himself and to General Arnold. Finally, he believed that the new scheme of command would obtain better results than if the heavy bombers were to remain under General Eisenhower and he was convinced that in the event of a crisis in the land battle the Supreme Commander must have and would have all the bombers that he needed.

General Arnold was soon converted to the British point of view, possibly because he sympathised with the British Air Staff's desire to regain control over Bomber Command and possibly because he foresaw that the stature of General Spaatz as the senior American air commander in Europe would be increased. A few amendments were made to the draft directive in the ensuing discussions and the Combined Chiefs of Staff approved it in full on 14 September. On 16 September a directive was sent to the Deputy Chief of Air Staff, Air Marshal Bottomley and General Spaatz which set out the new system of command. They were instructed to direct operations against the various systems of objectives in the order of priority established by the Supreme Commander and that when they considered changes to be necessary, they were to inform Air Chief Marshal Portal and General Arnold. They were also made responsible for co-ordinating the operations of the Strategic with the Tactical Air Forces in the European and Mediterranean theatres.

Meanwhile discussions were taking place between Air Marshal Bottomley and General Spaatz on the form of the new directive which they were going to issue to the bomber force commanders. In the instructions issued by the Combined Chiefs of Staff there was some uncertainty over the priority of targets. Attacks were to be directed, it stated, 'in the order of priority now established by the Supreme Commander.' At SHAEF the general opinion was that

Ibid  
174th Mtg.

A.H.B./  
ID7/233B  
(Pt. II)

A.H.B.  
ID4/23B

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(1) Considering that the heavy bombers had played such an important part in the French transportation plan and were to do so again in the bombing of communications in Western Germany, it would appear that the C.A.S. failed to recognize the significance of transportation attacks.

the bombing should be directed against targets which would show quick results before the end of the year. The bombing of the German transportation system, hitherto un-mentioned by the Combined Chiefs of Staff, should normally have high priority. The planning staffs of the Air Ministry, U.S.ST.A.F. and SHAEF set about examining the feasibility of this proposal. Another problem which arose when shaping the directive was the fact that General Spaatz was a commander in the field whereas Air Marshal Bottomley was a staff officer and only the representative of the Chief of Air Staff. This was overcome by sending a separate covering memorandum to the Commander-in-Chief Bomber Command on behalf of the Chief of Air Staff. By 25 September the wording of the directive had been approved by the Chief of Air Staff and the Deputy Supreme Commander.

On that day Air Marshal Bottomley and General Spaatz sent the new directive to the Commanding Generals, Eighth and Fifteenth Air Forces and the Commander-in-Chief, Bomber Command. They were informed that 'the overall mission of the Strategic Air Forces remains the progressive destruction and dislocation of the German military, industrial and economic systems and the direct support of land and naval forces'. They were to attack the following system of objectives.

'First priority

- (i) Petroleum industry with special emphasis on petrol, including storage.

Second priority

- (ii) The German rail and water borne transportation systems.
- (iii) Tank production plants and depots, ordnance depots.
- (iv) Motor Transport production plants and depots'.

In his covering letter to Air Chief Marshal Harris, the Deputy Chief of Air Staff stated that he was to meet promptly the requirements of the Supreme Commander for assistance in the land battle, and he delegated to him the responsibility of co-ordinating operations with the Tactical Air Force whenever heavy bombers supported the ground forces. He also required him to take part in operations against enemy shipping when necessary and in this event he was to co-ordinate operations with the Air Officer Commanding-in-Chief Coastal Command. When there were targets of great importance but of a fleeting nature (such as German naval units) special orders would be issued.

The new directive was received at S.H.A.E.F. at first with disquiet and greatly surprised both General Eisenhower and General Spaatz, as they believed that their views coincided with the American Chiefs of Staff. But General Eisenhower, after being assured by General Marshall that he could call upon the heavy bomber forces whenever required, rapidly accustomed himself to the change. The reaction of Air Chief Marshal Harris will be discussed presently, but it may be said that he wrote to General Eisenhower warmly thanking him for his help and encouragement while serving under SHAEF and informed him that he and Bomber Command would continue to give him unfailing support.

A.H.B./  
IIH/241/3/550  
Encl 22A

'Crusade in  
Europe'  
P. 337

Formation of the Combined Strategic Target Committee

See Diagram 7

A.H.B./  
II F2/17

Shortly after the change in command Air Marshal Bottomley and General Spaatz agreed to form a Committee which would advise them on the right priority for strategic targets. This was, in fact, an expansion of the Joint Target Intelligence Committee which had advised the Air Staff on Pointblank targets before direction of the Strategic Air Forces had been transferred to the Supreme Commander and it was designated, after a suggestion by General Spaatz, the Combined Strategic Target Committee.<sup>(1)</sup> It was formed on 13 October and held its first meeting five days later at the Air Ministry.

General Spaatz insisted that the number of members should be kept to the minimum and that Army and Navy representatives should be called in only when required. The members of the Committee were drawn from the Bombing and Intelligence Directorates of the Air Ministry, U.S.ST.A.F., the War Office, the Ministry of Economic Warfare, the Economic Advisory Branch (Foreign Office,) the Enemy Objectives Unit of the U.S. Embassy, the Railway Research Service and S.H.A.E.F.

A.H.B./  
II H/241/3/610

The Director of Bomber Operations, Air Ministry and the Director of Operations U.S.ST.A.F. were to take the chair in turn at Committee meetings. The duties of the Committee were as follows. It was to recommend on the suitability of targets and the priority which should be established between the various target systems. It was to advise when there was need for a major change in the current directive and it was to review proposals submitted by the Navy or SHAEF which involved the employment of heavy bombers.

The Committee issued on behalf of Air Marshal Bottomley and General Spaatz weekly priority lists of strategic targets which were classified in the current directive. It became responsible for issuing all target priority lists and in this task it was advised by combined working committees on oil, naval targets, the G.A.F., transportation. Armoured fighting vehicles and other target systems which required examination. Bomber Command was represented at Committee meetings by a member of its Operations and Intelligence Staffs.<sup>(2)</sup>

Reaction of the Commander-in-Chief, Bomber Command to the new directive.

A.H.B./  
IIH/241/3/550  
Encls 24A,  
25A, 28A,  
32A-33A.

Air Chief Marshal Harris did not like the new directive. His relations with the Supreme Commander during the period of control by SHAEF had been entirely amicable and he was unwilling to return to what he considered to be the irksome supervision of the Air Ministry. He therefore seized the first opportunity to criticize the new system. On 15 October changes were made in the command and control of

- (1) This committee had met at the Air Ministry at fortnightly intervals and in addition to Air Officers, representatives from the Admiralty and War Office were in attendance.
- (2) A demonstration of a typical meeting of the C.S.T.C. was held at the exercise held by the Air Ministry in 1947 to study the Combined Bomber Offensive and may be found in the Second volume of the Report, Exercise Thunderbolt, page 115

the Tactical Air Forces on the continent. The Air Commander-in-Chief, Air Chief Marshal Leigh Mallory had been chosen for an important post in South East Asia and this made it convenient to disband the A.E.A.F. in favour of a more centralised organization. The Supreme Commander now took over command of the Tactical Air Forces and delegated the supervision of their operations to Air Chief Marshal Tedder.

In the directive issued by SHAEF announcing this change of command it stated that executive responsibility for the control of the Strategic Air Forces had passed to the Deputy Chief of Air Staff and the Commanding General U.S.ST.A.F. and that requirements for heavy bomber operations in support of the ground forces would be passed to these two officers by the Deputy Supreme Commander. The Commander-in-Chief Bomber Command sensed that his authority as a commander in the field was being under-mined. He was uncertain as to whether he was to take orders both from Air Marshal Bottomley and General Spaatz and from Air Chief Marshal Tedder and whether the former two officers did actually have executive control of bombing operations. He asked the Air Ministry to elucidate his position in the chain of command. The Air Ministry in its reply merely gave a resume of the directive. Policy for the operations of Bomber Command was to be issued by the Deputy Chief of Air Staff on behalf of the Chief of Air Staff. Air Chief Marshal Harris remained unimpressed and requested a clarification of the system of control. This was contained in two questions. Firstly, was he taking orders from the Chief of Air Staff or from his Deputy and General Spaatz in their own names? Secondly, were these instructions to be limited to general strategic directives or were they to be specific instructions for the attack of a particular target at a particular time? Moreover, the Deputy Chief of Air Staff had delegated to him the duty of co-ordinating operations in which Bomber Command was concerned with the Tactical Air Forces. He submitted that an officer junior to him in rank could not delegate a duty which was essentially a responsibility of the force commander.

The Air Ministry assured Air Chief Marshal Harris that the directive was issued on behalf of the Chief of the Air Staff, that it would not be issued in the name of any particular staff officer and that these directives were to take the form of general instructions. It admitted that the tactical direction of bomber operations was the sole responsibility of the Commander-in-Chief and he would be given latitude to fulfil his task. This reply satisfied Air Chief Marshal Harris who requested that the original memorandum issued by SHAEF should be amended so as to make it clear that he was directly responsible to the Chief of Air Staff.

#### Changes in the system of Air Command

The disbanding of A.E.A.F. on 15 October and the formation of Air Staff SHAEF under the Deputy Supreme Commander has already been briefly mentioned in the preceding paragraphs. Air Staff SHAEF exercised a fairly loose control over the Tactical Air Forces and was the agency through which requests for heavy bomber support to the Armies in the field were passed. The system of control was now more simple than hitherto for the reason that there was only one Air Commander responsible for tactical air operations, who was, at the same time, in a position to request at first hand, support from the strategic bomber forces. In the case of Air Chief Marshal Leigh Mallory, the Air Commander-in-Chief had control only over the Tactical Air Forces and had to submit requests for

See R.A.F.  
Narrative  
Lib. of N.W.  
Europe, Vol. V  
Chap. 1, P. 11  
et seq.

heavy bomber support to Air Chief Marshal Tedder.<sup>(1)</sup> Nevertheless there was a gulf between the Air Ministry in London and SHAEF at Versailles. For example General Spaatz, Commanding General U.S. ST. A. F., and responsible for strategic air operations together with the Deputy Chief of Air Staff, usually lived at his advanced headquarters, also located at Versailles and was thus closer in touch with events at SHAEF than was Air Marshal Bottomley. The lack of an overall air commander who would supervise tactical and strategic air operations in north-west Europe was often acutely felt.

The Air Commanders conferences which had become a regular feature at Headquarters A. E. A. F., first at Stanmore and later at Versailles, were continued under the new regime, the meetings being held at SHAEF<sup>(2)</sup> From October onwards they were held weekly, the Chairman being usually the Deputy Supreme Commander. Officers attending were the Deputy Chief of Air Staff (occasionally), the Commanders-in-Chief of Bomber and Fighter Commands and the Tactical Air Force Commanders; also present were members of Air Staff SHAEF headed by the Deputy Chief of Staff (Air), Air Marshal J. M. Robb, and various Air Ministry staff officers. In order to facilitate the exchange of target information between SHAEF (Air) and Bomber Command on the occasions when the heavy bombers were required to give close support to the Allied Expeditionary Force, an advanced detachment of Bomber Command was located at SHAEF under Air Vice-Marshal R. D. Oxland and later under Air Vice-Marshal C. R. Carr. It was intended that this detachment should maintain a close liaison with SHAEF (Air) and be well acquainted with the day to day air situation on the continent. A member of this Staff, usually Air Vice-Marshal Oxland or Air Commodore L. W. Dickens, Deputy Senior Air Staff Officer Bomber Command, attended the daily Air Staff Meeting at SHAEF presided over by the Deputy Supreme Commander or Air Marshal Robb, at which decisions, concerning tactical air operations, were taken.

#### Proposals for Special Air Action against German Targets

On 25 September the survivors of the airborne troops dropped at Arnhem were withdrawn across the Lower Rhine and so ended any possibility of a rapid thrust into Germany that winter. Elsewhere along the western front the American advances had been halted and bad weather and poor communications had brought about a stalemate. The Supreme Commander now decided to throw all available resources into opening the port of Antwerp in order to relieve the heavy strain on communications and to build up supplies for future offensive operations. The clearance of the Scheldt was the key operation for October and it absorbed a large part of the strategic bomber effort.

The principal objectives in General Eisenhower's strategic plan for the autumn were the Ruhr and Saar industrial areas which were of great importance in Germany's war economy and therefore had to be taken into account when

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- (1) Air Defence Great Britain meanwhile reverted to its old title of Fighter Command and returned to Air Ministry control.
  - (2) SHAEF Forward including the Air Staff moved from Versailles to Rheims at the end of February 1945.

the Allied Air Staffs were determining the course of the autumn bombing offensive. The stalemate in ground operations at the end of September gave rise to a number of discussions on the most suitable target system. Senior Allied air officers had already agreed at SHAEF, before the new directive was issued, that oil should rank as first priority and the German railways and major canals as second priority, with emphasis on the Ruhr area.

A.H.B./  
IIS/112/1/100(G)  
Encl. 9A

Meanwhile, proposals for special air action to break the deadlock on the Western Front were put forward at an important Air Commanders meeting held at Versailles on 29 September. The discussion clearly revealed the difference between British and American conceptions of strategic bombing. The British Air Staff, represented by Air Marshal Bottomley, favoured a mass attack by the strategic bomber force against a concentrated industrial area such as the Ruhr, a blow which was intended to destroy both the major target systems such as oil and transportation and, of equal importance, the morale of the civilian population.<sup>(1)</sup> The Americans, on the other hand, had never approved of large scale strikes against morale such as Operation Thunderclap and they were chary of risking their bombers over heavily defended areas such as the Ruhr. General Spaatz, representing this point of view, had therefore proposed that plans should be made for a series of widespread attacks against German targets which had hitherto escaped the bombing. The meeting decided that the planning staffs should work out a scheme which would be considered in conjunction with the plan for an air attack on civilian morale already in the hands of the Combined Chiefs of Staff.<sup>(2)</sup>

A.H.B./  
IIS/112/1/100/9  
(C) Encl. 3B

See Chap. 3  
p. 68

A plan known as Operation Hurricane I was subsequently produced by the British Air Staff which won the approval of the Deputy Supreme Commander, the Commander-in-Chief Bomber Command and General Spaatz (the latter with reluctance). It was assumed in Operation Hurricane that oil would continue to be the primary objective. But attacks on tank and motor transport production and advance depots were unlikely to prove decisive. Attacks on railways over a wide area were also likely to be of less value than they were during the successful transportation bombing in France earlier in the year. Compared to the French, the German railway system was far more complex and therefore more difficult to put out of action; the flak and fighter defences were more powerful than those in France. The interdiction of canals and railways leading into the Ruhr might be invaluable but it had the disadvantage of leaving the productive area of the Ruhr untouched and it would not provide scope for the 75,000 tons of blind bombing effort which was available to the Allies that autumn.

A.H.B./ID4/23B

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- (1) See also D.B. Ops. Paper Outline Plan for the Employment of the Strategic Bomber Force in support of the Land Battle during the Final Phase. A.H.B./II/70/218). But the plan was criticized by A.C.A.S.(I) because of the insistence on morale attacks (see Ibid).
  - (2) Another point raised at the meeting was the increasing demands made by the ground forces for heavy bomber close support. The Deputy Supreme Commander decided that they should be cut down to the minimum.

The purpose of Operation Hurricane, then, was a combined heavy bomber attack on the Ruhr in which Bomber Command would operate both by day and by night and the Eighth Air Force by day - a concentration of bombing both in time and space. The Tactical Air Forces would attack transportation on the outskirts of the industrial area simultaneously. The planning staff estimated that it would be possible for 2,500 heavy bombers to drop 12,000 tons in the space of one or two hours. The Eighth Air Force was to attack synthetic oil plants and 16 benzol plants while Bomber Command was to discharge its bombs on the undamaged areas of the great industrial cities. In conjunction with operations in the Ruhr the Fifteenth U.S. Air Force was to raid benzol plants in the Saar and the towns of Stuttgart, Karlsruhe and Saarbrücken were to be bombed on H2X. Operation Hurricane was to demonstrate to the German civilian population the great air superiority which the Allies possessed and it was believed possible that the heavy raids might induce a state of panic ending in large scale evacuation thereby multiplying the administrative problems of the Army at the front which was only some fifty miles distant from the heavily populated industrial area. The operation order for the Strategic Air Forces was issued on 13 October.

The plan for the American devised Operation Hurricane II was that the maximum number of aircraft should attack precise targets in Germany on the first occasion on which visual bombing conditions pertained all over the country. Oil plants were to be the principal targets and Bomber Command was to concentrate in the Ruhr-Rhineland district. The operation was to be co-ordinated with the Tactical Air Force's offensive against rail communications.<sup>(1)</sup>

The possibility of launching Hurricane I like Hurricane II depended entirely on the weather. A strong surface wind to disperse the industrial haze and reduce the effectiveness of artificial smoke screens was required for an accurate attack on the Ruhr. A northerly wind was necessary to allow the bombers to attack downwind without having to cross the length of the Ruhr defences before reaching their targets.

As the Deputy Commander-in-Chief Bomber-Command remarked, it was unlikely that such conditions would prevail at that time of year.<sup>(2)</sup> In this he proved to be correct for the operation which had been planned for 15 October was postponed at the last moment because of bad weather over the target area. The Fifteenth Air Force had also decided to cancel its part in the operation because of poor weather. Nevertheless Operation Hurricane was executed in a modified form on 14 and 14/15 October when 2,000 R.A.F. heavy bomber sorties were directed at Duisburg in the space of twenty-four hours. On 23/24 October another powerful attack was made, this time on Essen, which was followed up by a second attack on the same target thirty-six hours later.<sup>(3)</sup>

A.H.B./  
IIH/241/3/611

- (1) This operation later developed into Operation Clarion - a widespread attack on communications by all Air Forces which, owing to weather conditions, was not executed until February 1945. (See Chap. 9).
- (2) To which Air Chief Marshal Harris replied 'Meanwhile we will get on with the war'.
- (3) These operations will be described in Chapter 6.

Operation Hurricane was eventually cancelled on 18 January 1945. By then other schemes were being matured.

The Oil Offensive

Although the British and United States Air Staffs might argue over the relative merits of concentrated as opposed to widespread attacks on communications, they both agreed that oil should remain the first priority of the various target systems, subject only to requests by the ground forces for close support. During September it was believed that the enemy's oil production had been reduced to 23.5 per cent of the pre-attack level. At their first two meetings on 18 and 25 October and members of the Combined Strategic Target Committee stressed the importance of maintaining the offensive against the oil industry. This would compel the enemy to draw on his reserves and would gradually exhaust the large stock which he had built up over a period of years. They emphasised the fact that a shortage of oil affected the enemy's transportation system just as much as attacks against railway centres.

In fact, the oil situation in Germany was as bad as the Allies believed it to be. On 5 October Speer wrote to Hitler and gave him the estimated quantities of fuel which could be produced in November and December. He showed him that although several plants were working again at the beginning of September the Allies stopped all fuel production completely between 11 and 19 September.<sup>(1)</sup> Speer then gave a list of six oil plants including Politz, Leuna and Brux, all of which with the exception of the last named were going to resume work within the next ten days. But in order to safeguard them it would be necessary to build up a force of at least 1,000 fighters to meet the expected attack. Speer continued, 'If this is not carried out the most we can count on will be the production quantities given for continuation of air attacks!

As shown above the enemy's repair system under the able direction of Edmund Geilenberg was extremely resilient. Moreover plans were going ahead with dispersing the oil industry and this made it exceedingly difficult for Allied intelligence to locate the targets. The enemy was also exploiting to the utmost his skill in the concealment of oil plants by camouflage and smoke screens. The withdrawal from the occupied countries into the Reich also meant a strengthening of local air defences. Yet another important factor to be taken into account was that in the winter months ahead, bad weather would cut down the number of Allied raids and give the enemy an opportunity to build up stocks. Therefore, notwithstanding the success of the summer's operations, an intensification of the oil offensive was considered to be highly necessary.

Signals from the Combined Strategic Target Committee giving priority list of oil targets during October continued to stress their importance. In a signal on 2 October they recommended that opportunity should be taken of every fine spell of weather to make visual attacks. On 6 October they

(1) There were three reasons for the sudden fall in production. The Roumanian oil fields had been captured by the Russians in August, thus enabling the Fifteenth Air Force to concentrate on oil targets in central Europe. The long awaited spell of fine weather in the second week of September provided opportunities for visual attacks.

A.H.B./IIG/  
86/6  
and ID/12/144

See App.9

Flensburg  
Docs.  
NID/PAL/725  
PG.25940  
p.12

A.H.B./  
ILJ/241/3/616  
(A)

noted that several refineries in Germany and Austria were in action again and that the total output of oil would be twice as much as in September unless checked. They advised, firstly, that blind bombing technique should be employed so as to reduce the number of targets requiring attack by visual methods. Secondly, the weight and density of raids should be increased which would put plants out of action for a larger period and make repeat attacks less frequent. Of special importance were the Bergius plants; Politz, Hamburg, Bohlen, Leuna, Zeitz and Lutzkendorf in eastern Germany and Nordstern, Wesseling and Bottrop Welheim in the Ruhr. These plants should be re-attacked regardless of whether air reconnaissance reports were at hand to demonstrate the extent of damage caused. (1) Petrol and oil depots supplying fuel to the German Army were also recommended for attack. They were not suitable targets for heavy bombers with the exception of railway facilities adjacent to the plant. Storage tanks were often constructed under ground and were not vulnerable to air attack. The Tactical Air Forces were to co-operate by attacking oil tanks and transport in the vicinity of the oil plants.

The Round Up Signals

A.H.B./IIH/241/3  
596

After the issue of the new directive, three sets of weekly strategic priority signals were sent to Bomber Command, apart from the requests from SHAEF for close support operations. They were oil, G.A.F. targets and ordnance depots, motor transport and armoured fighting vehicle assembly factories, the last three being known by the code name Round Up. The Round Up signal was first issued on 7 October and contained a list of 'filler' targets which were only to be attacked in the event of there being a surplus number of aircraft from the squadrons dispatched against oil targets. The destruction of these targets would make it difficult for the enemy to supply equipment to the ground forces.

Most of the objectives suggested were small factories situated either in, or in the vicinity of towns and Headquarters, Bomber Command considered that it was more appropriate to draw up a list of targets connected with all types of strategic targets which were to be bombed when conditions (both weather and availability of aircraft) were favourable. It soon realised that these targets would cover a very wide area and a large number of associated towns. The Operations Branch therefore sought the advice of the Directorate of Bomber Operations. The latter explained that the Round Up signals were intended primarily for the United States strategic bomber forces from which they would be able to select secondary targets. The list of G.A.F. targets was sent to Bomber Command for purposes of information in the event of further attacks on the G.A.F. being required. The Directorate re-affirmed that the top priority visual targets were oil and Army support and that

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(1) That this was necessary is proved by Speer in his letter to Hitler on 5 October: 'By changing his method of attack, which so far has always been timed shortly after the restarting of the plants, allowing us thus always a few days of production, to a time shortly before the restart of work, the enemy could, without further ado bring the aviation fuel production completely to a stop. (Flensburg Docs. Vol. III).

the remaining effort was to be allotted to Operation Hurricane I together with towns in the Ruhr and Rhineland. In the event of unfavourable weather preventing the attack of primary targets, important industrial areas were to be bombed using blind bombing techniques. The Commander-in-Chief Bomber Command instructed that, although the G.A.F. and Round Up targets were not the primary concern of Bomber Command, attacks, executed under the above named conditions, might be made on towns associated with Round Up targets. This type of target was removed from the current directive to Bomber Command on 8 November.

The Problem of Long Range Fighter Escort

The arrival of the Allied Expeditionary Force on the border of the Reich was not considered at the time to be a solution to all the tactical problems of Bomber Command. On the contrary, on the Allied side, there was still a healthy respect for the potential capabilities of the G.A.F. The Commander-in-Chief, Bomber Command was aware that the German night fighter force was still in good fettle and had not yet suffered serious losses. As for day operations, he believed that the reason for the continued immunity from attack which Bomber Command had so far enjoyed was due, in the main, to the fact that it was sheltered by the operations and feint attacks of the Eighth Air Force. The problem, in the autumn of 1944, was how to use to the best advantage the favourable situation which the Allied Armies had brought about by the occupation of France, Belgium and a large part of Holland. The tactical advantages of this situation were reviewed in a paper written on 8 October by the Director of Bomber Operations, in which he drew attention to the enemy's loss of his early warning system and the withdrawal of his fighter defences to the German frontier. He suggested that the combined bomber offensive could be intensified, firstly, by providing advanced landing and refuelling facilities for R.A.F. fighter escorts; secondly, by providing facilities for U.S.A.A.F. fighters and, thirdly, by making available heavy bomber bases for one or two Halifax Groups.

A.H.B./  
ID4/23B

Ibid

The Commander-in-Chief Bomber Command was convinced that the latter proposition was impracticable. In the first place communications on the continent were still in a chaotic state after the Allied bombing which would make it impossible to maintain a bomber force in northern France with any degree of efficiency. The heavy bombers would also be separated from their base and factory facilities which would merely aggravate the problems of maintenance. The airfields themselves were inadequate, in that accommodation and proper lighting equipment were lacking while the air defence system in the zone occupied by Allied forces was considered by Sir Arthur Harris to be extremely vulnerable.

He submitted to Sir Charles Portal on 13 October four suggestions by which the Air Ministry could best help Bomber Command to take full advantage of the new situation. First, he wanted the two Mosquito A.I. Mark X Squadrons, at present under Fighter Command, (1) transferred to the control of No. 100 Group for night intruder work and requested that more of his own Mosquito squadrons should be equipped with A.I. Mark X; secondly, he believed that with the oncoming short

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(1) These squadrons were still being employed on Crossbow Operations.

winter days his daylight operations would be restricted by the 'refusal of our day fighters escort to take off or land in the dark'; thirdly, he wanted a larger force of long range day fighters made available, unless his Command was to 'take a tremendous beating'. He proposed the fitting of built-in long range tanks into the Mustangs and suggested that steps should be taken to increase the range of the Spitfire. Finally, he once more drew attention to the inadequacy of his heavy bombers' armament and complained of the lack of progress in the production of the .5 turret. He said, in regard to the latter, 'we shall achieve nothing until someone in really high quarters takes a big stick to it'.

Ibid

The Chief of Air Staff, in reply, stated that as far as the Mosquito squadrons were concerned, he wanted Sir Arthur Harris to wait and see whether the arrangement whereby these squadrons were controlled by Fighter Command and worked in conjunction with No. 100 Group would prove satisfactory.<sup>(1)</sup> He also promised to see that the production of the .5 turret was hastened. He did not see eye to eye with Sir Arthur Harris on the question of long range fighter escort. To begin with, he was aware that the Operations Staffs of Bomber and Fighter Commands had already consulted each other on the problem of day fighter escort, but he had been informed that the distance at which the Spitfires were required to operate to escort Bomber Command to the target area was too far, even if the fighters were equipped with 90 gallon drop tanks.<sup>(2)</sup> The Mustang squadrons had, in fact, been training in night flying but, as they were also required for daylight operations, it would be sometime before they became proficient. He understood that it would take four months to fit built-in long range tanks into the 170 Mustangs of Fighter Command.

A.H.B./  
ID/4/84 and  
IIH/241/3/591 (A)  
Encls. 21A-29A

Sir Arthur Harris felt that the Chief of Air Staff had missed the point of his argument. He wanted all the Spitfire squadrons in Fighter Command to be able to take off and land in darkness so that Bomber Command could attack targets both in the early morning and late in the evening. At the moment his Command was handicapped by being compelled to bomb at mid-day when weather conditions were not always favourable.<sup>(3)</sup> It was, therefore, not enough to train only the Mustangs in night flying.

In a further exchange of letters from 19 to 31 October, the Chief of Air Staff stressed that it would be quite impossible to operate the Spitfire in the hours of darkness because there would be no margin of safety for night landings.

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- (1) This measure will be discussed in a later paragraph.  
(2) A misunderstanding had arisen between Bomber and Fighter Commands; the latter believed that the heavy bombers were to operate at a distance of 280 miles from the United Kingdom. Secondly, they thought that the bombers operating by daylight were to withdraw so as to leave enemy territory by last light which would mean that the fighter escorts would fly 150 miles in darkness. In fact, the object of Bomber Command was to have complete freedom to bomb at anytime between first and last light. This would entail considerable feats of fighter training and organization.  
(See A.H.B./IIH/241/3/591 (A) Encl 25A-B and Min. 42)  
(3) Convection cloud was usually at its thickest at this time of day.

Even by day, there was only just sufficient fuel to cover 280 miles. Sir Arthur Harris then suggested that it might not be impossible to modify the Spitfire so as to increase its range, and quoted a test carried out by the Americans, in which a Spitfire fitted with interior tanks flew 1,300 miles. The Chief of Air Staff explained that the American modification was unsuitable for operational aircraft, but that he had already taken steps to increase the range of Fighter Command's Spitfires by other means.(1) The alternative was to provide airfields on the continent on which fighter aircraft could land and refuel. This was not a simple matter as there was much congestion of aircraft of the British and American Tactical Air Forces on airfields in the forward area due to the lack of all-weather airfields and damage caused by the enemy on their withdrawal into Germany.

On 26 October the Chief of Air Staff asked the Deputy Supreme Commander to provide two airfields on the continent on which five Spitfire squadrons could refuel and rearm on occasions when Bomber Command operated by day east of the Ruhr. These airfields were to be placed preferably between 4° and 5° East but Fighter Command had stated that they would accept airfields between 3° and 4° East and North of 50° North. Both Air Chief Marshal Tedder and Air Marshal Coningham (Commanding 2nd T.A.F.) were anxious to fulfil Bomber Command's requirements, although, as was natural, they held that the demands of the Tactical Air Forces for forward airfields should be met first, and they were also well aware of the dangerous congestion of aircraft on airfields in Belgium and Holland. Arrangements were made for two airfields in Belgium (Lille/Vendeville, Lille/Nord and also Cambrai/Epinoy) to be available for Fighter Command in the immediate future. Although they were far from ideal, the Commander-in-Chief Fighter Command considered that they were good enough for his purpose. However, the need for these airfields did not at once arise as the majority of Bomber Command daylight raids were directed against the area of the Ruhr. Sir Arthur Harris considered that nothing could be done until the spring when it would be possible for the Tactical Air Forces to use grass strips and that even with these extra facilities the number of airfields would be inadequate.(2)

The question of defence against the increasing strength of the German night fighter force was also discussed at this time. No. 100 Group did not have sufficient aircraft (there were seven operational Mosquito squadrons in the first week of October) to cover large scale heavy bomber raids. The Air Officer Commanding No. 100 Group, Air Vice-Marshal E. B. Addison, estimated that with the nine squadrons promised for his Group it would be possible to fly about 90 sorties on any one night, a number totally inadequate for, say a thousand bomber raid. If Bomber Command losses were not to become excessive, a further 160 sorties per night, making a total of 250 sorties on any one night, would be necessary. This total which might be required for approximately ten nights in each month was only obtainable if other R.A.F. Commands were called upon to assist.

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- (1) 70 gallon tanks were to be fitted to the existing Spitfire Mk.IX/XVI starting in the first week in December. An extra 62 gallon tank was to be fitted to the improved Spitfire MK.IX/XVI and this was due to begin in January 1945.
  - (2) See also A.M. Coningham's views on airfields in the forward area (A.H.B./IIH/241/3/591 (A) Encl. 31A)

A.H.B./  
IIJ/241/3/582  
(A)  
Encls. 30A-40A

Consultations took place between Air Vice-Marshal Addison and Air Marshal Hill (Air Marshal Commanding Air Defence Great Britain) on 4 October. They reached provisional agreement on five points. Air Defence Great Britain was to turn over some six squadrons to the primary role of Bomber Support. These aircraft were to be equipped in the same way as the Bomber Command A.I. Mark X squadrons and pilots were to be trained in high and low level intruding. The bomber support plan was to tie in with the bombing operations for the night; No. 100 Group would allocate to A.D.G.B. an appropriate share of the tasks and detailed planning would be carried out by the latter headquarters. No. 100 Group was to continue to supply the bulk of effort on non-bomber nights, but on occasions when there were large scale raids A.D.G.B. was to provide the maximum effort. A second conference took place on 9 October at which staff officers from No. 100 Group and A.D.G.B. discussed the proposals in greater detail.

The Commander-in-Chief Bomber Command endeavoured to persuade Air Marshal Hill to place the squadrons allotted to bomber support under operational control of No. 100 Group but the latter did not concur as he believed that his headquarters was more suitably placed and equipped for the control of offensive night fighter operations.<sup>(1)</sup> After an exchange of correspondence the two commanders agreed to give a fair trial to the arrangements already proposed.

Naval Support.

Since 10 April 1942 a joint operational instruction known as the Tripartite Pact had defined the tasks of Bomber, Fighter and Coastal Commands when operating against enemy shipping in the English Channel and North Sea. The general commitment for Bomber Command remained, in spite of numerous revisions, to assist in attacks on enemy shipping in home waters when requested by Coastal Command. Advanced bases had been set up in Scotland from which heavy bombers could, on occasion, operate against shipping in the North Sea. Bomber Command's commitment for attacks against enemy shipping at sea was cancelled on 27 May 1944, during the preparatory bombing phase of Operation Overlord, when the role of the heavy bomber force was limited to the attack, during the hours of darkness, of ships in harbour and to minelaying operations.

On 30 September Headquarters Bomber Command requested that at least part of the organization for the attack of shipping at sea might be released and asked whether it was necessary to maintain in full the advanced bases in Scotland. It considered that sufficient facilities could be maintained at Lossiemouth and Kinloss to meet any sudden requirement and that facilities at the three Coastal Command bases (Banff, Milltown and Tain) should be given up. Facilities which had been allotted to the Eighth Air Force in the same airfields should also be reconsidered. The Air Ministry agreed to these proposals on 27 October and instructed that, in future, facilities at Kinloss and

A.H.B./  
IIH/2+1/3/704  
(C)  
Encls. 73A-76A

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(1) Air Marshal Hill contended, quite correctly, that his command was always responsible for defence against air attack on the United Kingdom and for backing up defensive night fighter operations on the continent.

Lossiemouth were to be maintained to enable 36 aircraft of Bomber Command or 48 aircraft of the Eighth Air Force to operate from those bases should the need arise.

After the receipt of the first strategic directive, Coastal Command issued a revised draft of the Tripartite Pact, proposing that Bomber Command should revert to its old commitment for the bombing of enemy ships at sea. The Commander-in-Chief, Bomber Command refuted this and stated that the general principles of responsibility remained as at the beginning of Overlord. He added two more reasons; first, that aircraft of his Command were then equipped with the Mark XIV bombsight which was unsuitable for the attack of moving ships at high altitudes and second, that aircrews were not trained for that particular task. In December 1943 when the pressure of strategic bombing commitments increased, the Air Ministry had discontinued the training of specialised observers who had been attached to each squadron for ship bombing. Further, at that stage in the war the training of these personnel would only cripple the bomber effort. Bomber and Coastal Commands therefore agreed that the role of Bomber Command should continue to be restricted to the attack of important naval units in harbour and minelaying.

Bomber Command  
O.R.B.  
Overlord Supp.  
No. 2  
p.43

During this time the introduction of the Schnorkel device, which enabled U-boats to remain submerged for protracted periods and to maintain a higher submerged speed, had increased the difficulties of Allied aircraft in seeking out and attacking enemy U-boats at sea. This problem had become aggravated in the autumn with the lengthening nights and the increasing periods of non-flying weather. A weapon had been produced known as the Boom Boat Patrol, a small, fast motor boat with a one man crew which could be dropped by parachute over enemy waters. The boat carried a high explosive charge and was aimed at a suitable target by the occupant who then abandoned ship and took to a raft. At the request of the Admiralty Bomber Command had agreed to convert a few Lancasters to carry this weapon in order that an attack might be made with six Boom Patrol Boats at Trondheim and Stavanger against U-boats. This operation (Skylark) was to be carried out by No. 617 Squadron at the earliest opportunity. By the end of September all arrangements had been completed but weather conditions made it necessary to postpone the operation indefinitely. The project was finally cancelled on 7 April 1945.

Ibid

At the Air Commanders conference on 26 September attention was drawn to the fact that the new U-boat pens at Bergen and Trondheim were at an advanced stage of construction and that if they were not attacked soon, they would become invulnerable to bombing. The Commander-in-Chief Coastal Command recommended that Bergen should be the first target, as the U-boat pens were approaching completion, and there was known to be a concentration of U-boats in the harbour. The Combined Chiefs of Staff had also approved this operation and had instructed that Bomber Command and the Eighth Air Force should examine all possibilities. A conference was held between staff officers of the two Air Forces at which General Doolittle, Deputy to General Spaatz proved to be reluctant to bomb the target. The bombload carried by a Fortress or Liberator was too small and the weather at that time of year was so unreliable that it would be necessary to hold a force in readiness at the expense of the whole bomber effort. As far as Bomber Command was concerned, while the operation was tactically feasible, even the Tallboy bomb would have a limited effect. The Commander-in-Chief

A.H.B./IHH/241/3  
599  
(G)  
Encl. 12A and  
Min. 8

Bomber Command concluded that his bombers could only undertake harassing attacks which would have to be repeated at frequent intervals and that the results achieved would not be commensurate with the effort expended. But after further discussions with the Deputy Chief of Air Staff, Air Chief Marshal Harris agreed to carry out a series of harassing attacks against Bergen to delay the building of the pens.

See Chap. 6,  
p. 143

Supply Dropping Operations over Warsaw

R.A.F. Narrative  
Special Duty  
Operations in  
Europe  
pp. 112-119

On 1 August a Polish patriot force rose against the German occupiers of Warsaw, apparently at the instigation of the Russians. The Red Army was then approaching Warsaw, and it seemed possible that they could liberate the capital within a few days. The Russian advance, however, halted on the outskirts of the city for some unknown reason and the Poles were left to fight single handed against the enemy. The Combined Chiefs of Staff urged the Supreme Commander to undertake a supply dropping mission to the heroic Poles. As it was very difficult to reach Warsaw and return to base in one trip either from the United Kingdom or from the Mediterranean theatre it was proposed to land at Russian bases after completing the task.

No. 205  
Group O.R.B.

At this juncture the Russians emphatically denounced the Warsaw rising as being irresponsible and premature and refused to allow British or American aircraft participating in supply dropping operations to land on Russian soil. Strong representations from the British and United States ambassadors in Moscow as well as from the Prime Minister and the President failed to alter this stubborn attitude. At great cost to itself, No. 205 Group R.A.F. based in Italy, carried out seven supply drops by night between 14 August and 16 October and on 18 September the Eighth Air Force dropped supplies on Warsaw, the majority of which fell into enemy hands.

Bomber Command  
O.R.B.  
Entry 8865  
September 1944

Early in September the War Cabinet and the Chiefs of Staff considered the possibility of Bomber Command dropping supplies over Warsaw. Air Chief Marshal Harris believed that it would be impossible to make any attempt during the moon period (i.e. before 12 September) as losses might well be between 40 per cent and 50 per cent., and although technically it might be possible to carry out the operation in darkness (via the Baltic and subsequently landing in Italy) after 12 September, the casualty rate would still be in the neighbourhood of 10 per cent.

Ibid  
App. Ops. 87  
September 1944

The plight of the Poles in Warsaw grew worse and the Commander-in-Chief Bomber Command was requested to re-consider whether a supply dropping operation was feasible. While the Chiefs of Staff were aware of the hazards of the operation they appreciated that the political as well as the military implications of helping the Poles were of the highest importance. Air Chief Marshal Harris in his reply on 9 September reiterated that he could not dispatch a force during the moon period. Moreover he was not prepared to hazard his aircraft by dropping containers from a low altitude. He considered that if dropped from a height of 10,000 feet there was little chance of more than five to twenty per cent of the containers falling within Warsaw itself. He thought that the very small number of containers likely to reach the Poles as compared to the high losses likely to be suffered by the bomber aircraft would not justify the operation. After this statement no

SECRET

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further action was required of Bomber Command. On 2 October the Russians refused to permit a second supply drop to be made by U.S. ST. A. F. and a few days later the Germans crushed the insurrection in which 250,000 Poles were killed. The Russians did not capture Warsaw until January 1945.

CHAPTER 6

DIVERSE OBJECTIVES

BOMBING OPERATIONS 16 SEPTEMBER TO 1 NOVEMBER 1944

Force available for the autumn of 1944.

R.A.F. BC  
Consolidated  
Form 'G'

The strength of Bomber Command had continued to increase during the summer in preparation for the autumn and winter bombing of Germany. On 1 October taking fit aircraft only, there were 1301 heavy bombers, 115 light bombers and 112 aircraft engaged in bomber support. The type of heavy bomber most predominant was, of course, the Lancaster. The strength of the heavy bomber force was made up as follows. There were 40 squadrons of Lancasters I and III, 22 squadrons of Halifaxes III, three squadrons of Halifaxes VII and two squadrons of Lancasters X. The Stirling and the Halifax II and V had by now been almost superseded. Great progress had been made with the expansion of No. 100 (Bomber Support) Group which was composed of eleven operational squadrons, including five Mosquito squadrons, a Fortress, Stirling and a Liberator squadron. Apart from the aircraft mentioned above there were two Special Duty squadrons consisting of 41 aircraft.

The Task

Ibid  
p. 28.

It would have seemed logical that the removal of the strategic bomber force from the control of the Supreme Commander would have permitted the bombing of industrial targets in Germany to go ahead without distraction. But, the directive for the heavy bombers was too diffuse with three target systems as second priority, the situation on the western front was too uncertain, and, as already explained, ground offensive operations on a large scale could not begin until the port of Antwerp was free to Allied shipping. Bomber Command was constantly in demand for attacks on fortifications in the Scheldt. Thus Army support accounted for 12,366 tons, 16 per cent of the total effort, dropped by Bomber Command during the month of October. The strategic targets in the period of the first directive to the heavy bombers were largely confined to the Ruhr area, thereby involving only shallow penetrations for the main forces. The emphasis lay on town centres which received 42,246 tons, 74 per cent of the total tonnage. Yet oil plants which ranked as first priority in the strategic directive received only 3,653 tons (6 per cent of the total tonnage) and transportation (on second priority) only 522 tons (0.9 per cent), although the bombing of area targets caused much damage to communications and the benzol plants in the Ruhr. The enemy thus had a chance to repair the refineries which had been so battered in the second week of September.

Formation of the G.H. Force.

Bomber Cnd  
O.R.B.  
Entry 7943 (b)  
July 1944.

A fresh development in bombing tactics during the month of October was the first operation by No. 3 Group employing G.H. technique which made accurate bombing possible in over-cast conditions. This was an attack on Bonn, less than fifty miles from the Allied front, which took place on 18 October. The re-equipment of the Group with G.H. began at the end of March 1944, but at the outset only No. 218 Squadron was fitted with the device. The purpose of this squadron was to act as a small pathfinder force for the rest of the Group. But complications arose when No. 8 (Pathfinder)

Group wanted to control the activities of the G.H. squadron. The Commander-in-Chief Bomber Command, however, believed that the Air Officer Commanding No. 3 Group should be responsible for the training and operation of his own force and so decided that No. 218 Squadron would be employed separately, although No. 8 (Pathfinder) Group might occasionally assist No. 3 Group when the tactical situation demanded it.

On 13 April No. 3 Group received a new directive stating that the main function of No. 218 Squadron would be to mark or assist in marking any targets within G.H. range for the other squadrons in the Group. This would be done either in conjunction with Oboe marking or with straightforward G.H. marking. Headquarters Bomber Command was to deal with questions relating to G.H. marking, training or technical matters, and at the same time No. 3 Group was to maintain a close liaison with the Pathfinder Force. The directive added that while the primary role of No. 218 Squadron would be to mark targets when necessary, its aircraft would continue to be detailed for bombing and mining sorties, should they not be required for their primary role.

Tests with the G.H. equipment carried out by No. 218 Squadron during the summer showed that under normal conditions there was little difference between blind bombing with G.H. and visual attacks on Oboe markers. While having several disadvantages, the G.H. technique had a high percentage of serviceability and, as it required no target indicator markers, the system could be used irrespective of visibility conditions over any target within range. Moreover with the liberation of France and Belgium, mobile G.H. ground stations could be sited just behind the front line and there was a good prospect that the necessary range, coverage and high degree of accuracy required for the bombing of tactical targets would be maintained. By the middle of July there was sufficient G.H. equipment for three squadrons until production of G.H. in large quantities began in October. Squadrons were re-equipped in the following order: Nos. 218 and 149 (Stirling) Squadrons (re-equipped with Lancasters) and No. 514 (Lancaster) Squadron. Nos. 115 and 75 (Lancaster) Squadrons were to be re-equipped with G.H. after the first three squadrons were ready for operations.

A conference on G.H. bombing was held at Headquarters No. 3 Group on 2 October which was attended by the Air Officer Commanding No. 3 Group, Air Vice-Marshal R. Harrison, and members of Headquarters Bomber Command. Types of formation for day and night operations were discussed. During G.H. bombing trials, difficulty had been experienced in assembling formations as the G.H. aircraft were mixed between both squadrons and bases. The most practical method of assembly was that the two satellites should rendezvous together at a pre-arranged Gee-fix time, orbiting in an anti clockwise direction. They would then be met by the G.H. leader.

The Air Officer Commanding No. 3 Group expressed a preference for using his force on daylight operations with adequate fighter cover and he was particularly keen to attack Bonn and Worms. He considered that small formations flying in company were preferable to a gaggle for daylight operations. In the latter case individual aircraft found difficulty in approaching a target while other aircraft were converging on different tracks at the same time.

At that date 61 aircraft were fitted with G.H. and a further 75 bombers were due to be available by the end of

Bomber Cnd  
O.R.B., Apps  
Vol. 3  
Ops/91  
Oct. 1944.

of October. Thus by the beginning of November No. 3 Group would be able to operate over 100 G.H. equipped aircraft.

Bomber Cmd.  
O.R.B.  
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Ops/95  
Oct. 1944.

On 6 October Headquarters Bomber Command issued a directive to No. 3 Group authorising its commander to use the maximum number of aircraft for G.H. bombing by day and by night. The Group was to operate as a separate force only when cloud conditions did not permit visual identification of ground markers or targets. The concentration of aircraft over a target by day was to be 100 aircraft in the space of six minutes and, by night, 100 aircraft in four minutes. The concentration by day could be reduced if adequate fighter cover was available, while by night it could be reduced to ten aircraft per minute against lightly defended fringe targets. There was to be no restriction on the size of the force which could operate by day against any one target. At night it was impractical to operate a force of less than 50 aircraft against a single target. A list of targets was attached to this directive. Eight, which included the towns of Duisburg, Neuss, Cologne, Leverkusen and Dusseldorf, were placed at a distance of between 30 and 50 miles from the front. Sixteen targets were situated between 50 and 100 miles from the front and included the towns of Dortmund, Gelsenkirchen, Coblenz, Munster, Mainz, Frankfurt, Darmstadt and Mannheim. The Air Officer Commanding No. 3 Group was authorised to plan and execute G.H. operations, with the proviso that his plan was approved by Headquarters Bomber Command before the aircraft took off.

Counter Measures against the enemy's interception of radar transmissions

The effect of the advance to the German border on strategic air operations has already been described in a previous chapter. It completely altered the tactical situation for the following four reasons:-

- (i) The enemy's loss of his early warning system along the French coast.
- (ii) The loss of his G.C.I. organization with the result that it was impossible for him to plot a raid for more than about 100 miles each way.
- (iii) The withdrawal of his night fighter squadrons to airfields deep in Germany which were less well equipped than those in occupied territory.
- (iv) His night fighter control system had been completely disorganized.

It was only to be expected that the enemy would discover other means of intercepting the bomber force. The most obvious method was to make use of the various radar transmissions which were made from the bombers, for the purpose of plotting the bomber stream and in order to home night fighters on to individual bombers. The three main sources of radar transmission were Monica, H2S Mark II, H2S Mark III and in very small numbers, Automatic Gun Layer (Turret) A.G.L.(T). The enemy could use these transmissions to plot the bomber stream while it was still at a great distance from the target area thereby overcoming the disadvantages which the withdrawal of the radio location system had caused him.

However, a number of countermeasures had been introduced to prevent the enemy plotting the bomber stream by intercepting

A.H.B./IIH/241/  
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transmissions. In the first place the Gee Chain had been extended to provide reliable cover far into Germany. There was therefore no need to use H2S until approximately 50 miles from the German border, the point at which the bombers would appear on the enemy's new radio location chain. It was also unnecessary to use either Monica or A.G.L.(T) as the bombers were able to fly over friendly territory to the enemy frontier.

The Germans were known to have invented two instruments with which they could home into the bomber stream. One of them was called Flensburg which homed on to Monica and the other was called Naxos which homed on to H2S. But the British had already captured the Flensburg device(1) and after exhaustive experiments Bomber Command discovered that it was possible for the Flensburg to home onto a bomber stream in which a number of aircraft were carrying Monica and also to home onto individual aircraft equipped with the same device. It was necessary for this reason to discontinue the use of Monica until it could be modified to prevent the Flensburg homing onto it. Although the enemy might find it possible to use SN2 to home on to individual aircraft from a distance of ten miles, the use of Type M.B. Window counteracted this aircraft interception equipment and, provided it was used properly, could make the S.N.2 useless. It was rather doubtful as to whether the Naxos device could home on H2S, Mark II. The rate of loss of H2S, aircraft as compared with non-H2S, aircraft on similar targets was scrupulously watched and at that date it was slightly less than that of the latter. The difference was insignificant and although H2S, might allow a few fighters to enter the bomber stream it would not assist them to home on to an individual bomber.

The sum of this information was contained in a directive issued by Headquarters Bomber Command on 13 October. It ended by emphasising the extreme importance of every aircrew adhering to the instructions regarding radar silence,(2) routeing, window dropping, timing etc. Provided that these instructions were strictly observed the enemy's radar organization on the ground would be thrown into confusion and his night fighters in the air would be hard put to it to home onto and intercept the bombers.(3)

Attacks on the Ruhr industrial towns in October 1944

During October some eight major raids both by day and by night took place against industrial towns in the Ruhr while three very heavy attacks were made against the city of Cologne. This was achieved at small cost to the bomber force. For example in daylight operations over Germany only 44 aircraft (0.9 per cent) were lost in the course of the month. Strong fighter cover was provided and none of the

O.R.S. (B.C.)  
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- (1) On 13 July a pilot of a Junkers 88 landed by mistake in the U.K. equipped with Flensburg and an A.I. device known as S.N.2. (See A.H.B./IIE/76, p.53 et seq).
  - (2) Radar silence was first observed on the night 28/29 July.
  - (3) See also R.A.F. Signals History Vol.VII, pp.165-167. An example of good radio discipline was the attack on Cologne on 13/14 October when the bombers were not picked up until they had dropped their bombs. Also the attack on Dortmund and Bremen on 6 October.

raids required deep penetration into enemy territory. At night, bombing operations were the most successful of the war from the point of view of losses, for only 75 (0.7 per cent) aircraft failed to return. Here again it should be noted that there were few deep penetrations into enemy territory. The enemy's ground control organization which had broken down during the Allied advance to the German border had not yet recovered and failed to make proper use of the fighter aircraft at its disposal. Even when deeper penetrations were made to Brunswick and Nuremberg no bombers were lost to enemy fighters and in one heavy night attack on Cologne not a single aircraft was lost.

There was another important reason for the reduction of bomber losses and that was the increasing scale and complexity of bomber support operations and radio counter measures carried out by No. 100 Group, and it was now possible to manoeuvre the Mandrel Screen so as to cover the approaches to any part of the German frontier.(1) The tactics evolved during the summer have already been described and may be summarised as follows:

Ibid

- (i) Low flying on outward routes for as long as possible.
- (ii) Covering the early movements of bomber forces by the Mandrel jamming screen.
- (iii) Routeing main forces as far as possible over liberated territory.
- (iv) Radar silence during the first part of the outward journey.
- (v) Employment of small 'spoofer' forces dropping Window to simulate larger forces of heavy bombers.
- (vi) Despatch of high and low level night fighter patrols, the former to escort the bomber stream and patrol the areas where enemy fighters were considered likely to assemble, the latter to attack fighter airfields and aircraft about to land.

The first four of the above-named factors were intended to deprive the enemy entirely of early warning while the last two were designed to confuse his plotting, to deceive his controllers as to the direction taken by the main force and to destroy his aircraft.

Bomber Cmd  
Night Raid  
Rept. No. 734

The first large scale raid on a Ruhr town in the period under review took place on 6/7 October. The main attack was against Dortmund and a smaller force bomber Bremen. The operation was unusual in that both forces had traversed much of their routes before twilight, but in spite of this the enemy fighter controllers appeared to be unaware of imminent raids and only 13 out of 949 aircraft (1.4 per cent) were shot down. The Dortmund force crossed the French coast near the mouth of the Somme at 1818 hours. It spent an hour crossing France flying at a low level and approached Dortmund from south of Cologne. As soon as it had crossed the German border a Window force and Bomber Support Mosquitoes made a feint against the Mannheim area. This diverted the fighters based in that region and no more than eleven attacks were reported against the main force. In the north the

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(1) See R.A.F. Signals History, Vol.VII, pp. 179-180.

bombers destined for Bremen made a direct low level approach almost to the mouth of the Weser which deceived the fighter controllers with the result that no enemy fighters were seen over Bremen until the attack had been in progress for ten minutes.

Severe damage was done at Dortmund to industrial and transport facilities and all the through-running tracks of the main passenger station were cut. The municipal power station was badly damaged and altogether 70 per cent of the fully built-up area was destroyed. At Bremen large areas of the town centre which hitherto had escaped the bombing were devastated and factories and engineering works were hit.

On the night of 9/10 October 435 aircraft of Bomber Command flew to Bochum in the Ruhr, which produced one third of the total output of coal obtained in the Ruhr, but their bombing was scattered because of cloud and damage was confined to the south-west outskirts of the city. Several steelworks and factories were hit. At the same time Mosquitos made a feint attack against Wilhelmshaven in which both the marking and the bombing were concentrated. This operation had the effect of distracting the enemy fighter controllers and night fighter attacks against the main force did not materialise until it was on the return route. Only six aircraft (1.4 per cent) were lost.

Bomber Cmd  
Night Raid  
Report No. 736

But it was a big daylight attack on 14 October, followed up by a night raid that evening on Duisburg, that most closely resembled the concentrated air attack on the Ruhr planned by the British and U.S. Air Staffs (Hurricane). Duisburg stood in a key position at the junction of the Rivers Ruhr and Rhine and there was a concentration of industry in an area which measured seven miles long by three miles wide.

A force of over 1000 heavy bombers set out in the early morning of the 14th against this city. Nos. 1 and 3 Groups were allotted the more northerly aiming points and Nos. 6 and 4 Groups the more southerly. Among the targets were included the Thyssen Steel Works. Nos. 1 and 6 Groups attacked simultaneously, followed by Nos. 3 and 4 Groups after a period of 15 minutes. Two separate routes leading to and away from the target were chosen to avoid collisions and manoeuvring for position when bombing the respective aiming points. They ran roughly parallel to each other at a distance of 25 miles apart of Ostend, Ghent and Antwerp, after which the streams converged on Eindhoven and thence eastwards on Duisburg. The Pathfinders were divided between the two columns. The bombing was done between 0835 and 0856 hours. A total of 14 aircraft, 1.3 per cent of the whole force, was lost and all the evidence suggested that they were shot down by flak in the defended area around the target. Cover was given on the outward route by ten squadrons of Spitfires, and six Mustang Squadrons covered both the target area and the withdrawal of the bombers. Weather conditions were poor for flying but no trouble was incurred on this account.

Bomber Cmd  
Int/Tactics  
No. 25/44

That night Duisbrug was bombed by two forces composed of a total of 1005 aircraft. The secondary operation consisted of an attack on Brunswick by No. 5 Group operating in its role of an independent force. The aircraft sent against Duisburg were separated by a two hour interval and bombed at 0129 and 0325 hours respectively. Oboe ground marking with emergency sky marking was used in both attacks. Only six aircraft were lost from the two forces of which five were in the first wave. Weather conditions had improved during the night operation and

Bomber Cmd  
Night Raid  
Rept No. 741

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the target area was well marked, thus making the subsequent bombing highly concentrated. Just over 9,000 tons of bombs were dropped in all these operations. Duisburg was severely damaged after these two day and night attacks and 16 out of the 36 rated industries were damaged. Gas and waterworks were hit and wide spread destruction was caused to railway facilities. On the following day no signs of activity were seen in the goods yards or on the through lines by reconnaissance aircraft. The inland dock area (on the Rhine) was also hit and barges were sunk. Altogether 1,292 acres of the town were believed to have been devastated. The damage at Brunswick was considerable. The old town, particularly in the north-west, was levelled to the ground by the raid and factories and railway facilities were heavily damaged.

A.H.B.6  
Trans

In the night's operations the enemy's fighter defences proved to be a complete failure, largely because of the skilful counter measures evolved by Bomber Command. According to G.A.F. records only 80 fighters flew against the raiders of Duisburg and Brunswick, the first plot of the bomber force was not made until two minutes after the time of attack. Aircraft carrying Window flew with the Brunswick force as far as the Rhine and then made a feint attack on Mannheim accompanied by Mosquitos. Yet another force of 135 aircraft made a diversionary sweep on Heligoland. Ahead of it, Window droppers suggested that an attack was about to be made on Hamburg which Mosquitos had already bombed before midnight. Mosquitos struck at Berlin and caused a further distraction after the raid on Brunswick. Apart from all these activities, intruders strafed airfields in northern Germany.

Bomber Cmd  
Night Raid  
Report No. 749

The next large scale raid on the Ruhr took place nine nights later - on 23/24 October when 1055 aircraft were despatched to Essen, out of which 955 reported attack on the primary area. Oboe ground marking technique with emergency Wanganui was used. The bombing took place through thick cloud and consequently the attack was rather scattered at first, but later became concentrated, and a strong red glow was seen under the clouds. There was little fighter opposition as the main force was well screened by Mandrel and Carpet(1) aircraft while Window droppers threatened the Frankfurt - Mainz area and only eight aircraft (0.8 per cent) were lost. During the night secondary forces bombed Berlin and other towns in western Germany.

Bomber Command  
Int-Tactics  
No. 266/44

In the series of attacks on this city the bombing tactics were reversed in comparison with the raid on Duisburg for the night attack was followed up by a daylight raid about 48 hours later. On the afternoon of the 25th a force of 771 bombers attacked Essen while a secondary force of 243 aircraft bombed the Meerbeck refinery at Homberg also in the Ruhr. This operation, too, was entirely successful and only four out of the 1021 aircraft (0.4 per cent) were lost and they were victims of flak. There was ample fighter cover although poor weather prevented a few fighters from performing their escort duties before the return journey began. A total of 8,221 tons was dropped in the two raids and when photographic cover was obtained on 28 October, it was clear that there was widespread and severe destruction. The Krupps works, in particular, sustained heavy damage; nearly 200 buildings were badly hit

Bomber Command  
Night Raid Report  
No. 749.

(1) A counter measure against the enemy's Wurzburg (radar) system.

and two of the largest shops covering over 140,000 square yards were destroyed. To quote from the Bomber Command Operational Research Section report 'At least 13 other factories two gas works, two power stations, a tramway depot, and four railway stations were also affected and residential property was widely devastated.'

Cologne was the next city to suffer a number of heavy attacks which occurred on the 28th, the 30/31st and 31 October/1 November. This city had not experienced a heavy attack since July 1943. The first attack in daylight was carried out in two phases against two aiming points by 733 aircraft, but by the time of the second attack cloud had drifted over the city. The whole raid lasted for half an hour and enemy fighters did not attempt to interfere. Five aircraft were lost from Flak in the vicinity of the target area.

Bomber Command  
Int/Tactics  
No. 269/44

On the first night raid a force of over 900 bombers raided Cologne but found it covered with thick cloud. They crossed the Channel south of Ostend, then flew to a point south-west of Brussels and came into the target area south of Aachen. Oboe and H2S skymarking technique was used. Bomb flashes suggested that the attack was concentrated and aircrews could discern a red glow beneath the cloud. There was little fighter opposition as the enemy's airfields were covered with dense cloud and fog. The controllers were confused by two Window forces which threatened Karlsruhe and an area north of the Ruhr at the same time as the main force was approaching Cologne. No aircraft was lost but three were damaged in landing accidents.

Bomber Command  
Night Raid  
Rept. No. 755

Thick cloud once more covered the target area on the third attack (493 aircraft) which again took place at night. Damage was mainly confined to the western suburbs. Unusual tactics were used in this operation. A Mandrel Screen was set up from north to south a short distance behind the front line. Window droppers and Bomber Support Mosquitos approaching from a northerly direction made a feint attack on Cologne which led the enemy to believe that a further attack would not be made. The real force then emerged from the Mandrel Screen accompanied by Window droppers which feigned a major raid on Frankfurt. Fighters were sent to a point just east of Coblenz about 15 minutes before the first markers went down on Cologne. It thus happened that no bomber aircraft was attacked by fighters over Cologne and only one bomber was lost (to flak).

Ibid  
Report No. 756

Adequate photographic cover was not obtained until 18 November. Great damage was then revealed in the western districts. Some of this was, however, caused by an attack made on the previous night. In the three attacks 9,158 tons of bombs were dropped. The districts of Klettenberg, Lindenthal and Ehrenfeld were devastated, especially the last, where a number of industries were affected. Marshalling yards were hit but the steel mills were unharmed and little damage was done to the city centre.

#### Effects of the Ruhr Attacks on the German Economy

The heavy raids on cities in the Ruhr had serious repercussions on German industry which affected the whole of Germany; in particular it brought about a coal crisis regarded as the most serious since the beginning of the war. Speer ordered a special session of the Central Planning Office to survey the consequences for armaments and war production.

Economic and  
Financial Branch  
Field Informa-  
tion Agency,  
Technical Control  
Commission for  
Germany B.A.O.R.  
Report No. 62  
p. 18 et seq

Some idea of the catastrophe can best be gained by reading the correspondence of Speer to members of the Nazi hierarchy such as Hitler, Goering, Goebbels, Bormann and Keitel. On 6 November writing to Bormann, Speer summed up the situation: 'The continuous enemy air activity in the Ruhr is having results which are of great significance to the entire armaments and war production industry. In addition to bombing attacks on the production centres in the Ruhr, planned attacks against the installations of the Reichsbahn are of decisive importance in the present difficult situation. While the air attacks on production centres will cause a serious decline in the total production of the Reich, successful continuation of attacks on the communication system will be capable of resulting in a production catastrophe of great significance for the continuation of the war.' Similar words were written in an appeal for help to Field Marshal Keitel, Chief of Staff O.K.W.

A.H.B.6  
Trans No. VII/38

Industries most affected were coal, iron and steel which in turn reacted on gas and electricity supplies. Most serious of all was the drop in coal production. Speer stated that in the last week of October in the Ruhr, the daily output of coal fell to 237,000 metric tons compared to 371,000 tons in 1943 and 351,000 tons in September 1944. Winter stocks of coal for the Reichsbahn for the period between 10 September and 5 November had sunk by 813,000 tons almost half the total of estimated requirements, although as Speer pointed out, the serious transport crisis in the Ruhr did not start until the beginning of October.

Steel production in the Ruhr for the month of October fell to approximately 700,000 metric tons, 400,000 tons less than the corresponding figure for 1943. The net output of steel for the whole of Germany was half of that produced during the first six months of 1944. Electricity supplies had been reduced by 26 per cent and five power stations were out of action. Besides this the lignite mining area on the west bank of the Rhine had been seriously affected by the bombing of the Goldenberg power station. Meanwhile gas supplies had fallen by 50 per cent between August and the beginning of October. This was expected to cause a loss of between three to four million cubic metres until at least the end of December. The shortage affected not only the civilian population but iron and steel production.

The railway system in and around the Ruhr was seriously disorganized. Ten railway stations including Essen, Hamm, Cologne and Munster were put out of operation and 46 other railway stations were heavily damaged. There was a shortage of goods wagons and in the last week of October only 7,786 wagons were available compared to 18,700 in October 1943 and 14,600 in September 1944. Speer was also worried by the air attack on the Mittelland - Dortmund - Ems canal system which bore most of the coal and iron ore from the Ruhr to central Germany(1) and which was out of action between 26 September and 22 October after Bomber Command attacks. Further strikes were made on 26 October and 4 November. Shipping on the Rhine had also been impeded by the bombing of the Mulheim bridge at Cologne.(2)

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- (1) According to Speer the total carrying capacity of the canal was 1,500,000 metric tons.
  - (2) The work of the Eighth Air Force.

The inability to get coal out of the Ruhr to the rest of Germany had led to a serious shortage on railways, in gas works and steel plants. For example on 7 November the railways in the Hanover, Kassel and Munster areas had stocks for only three to five days. On 15 October 37 per cent of all gasworks in Germany had supplies for less than two weeks.

Thus although Operation Hurricane was never executed the results of three weeks air operations against the Ruhr fully justified the British Air Staff's belief in a concentrated attack on a single industrial area. Speer himself admitted in December 1944 that it was only during the latter half of 1944 that the German economy was seriously affected by systematic air attacks - 'now the enemy is actively engaged in attacking energetically, again and again, those sensitive spots which are of decisive importance to us.' Air Chief Marshal Harris also concluded after the war that this second 'Battle of the Ruhr' while lasting a shorter time than the first had been far more decisive in its results.(1)

Attacks on Ports

The reader will recall that in August Bomber Command had made a series of damaging attacks against the ports of Emden, Bremen, Kiel, Stettin and Königsberg. In the month of October a further night attack was made on Bremen and two raids took place in Wilhelmshaven. A force of 253 aircraft bombed Bremen on 6/7 October, the night of the big raid on Duisburg. Clear weather assisted visual identification of the target and great damage was inflicted on the Neustadt district, hitherto unscathed by bombing. Further devastation was caused in the Altstadt district so that at the end of this attack there was little left of importance in this city which ranked second to Hamburg among the ports of northern Germany. The Focke Wulf Flugzeugbau and two factories producing armoured fighting vehicles were hit in this raid. As a result these targets were removed from the G.A.F. target priority list.

Bomber Cnd  
Night Raid  
Report No. 734

Wilhelmshaven was bombed in daylight by some 200 aircraft on 5 October. This was the first Bomber Command attack on the town for eighteen months. Although the enemy had received 40 minutes warning of the raid no attempt was made to oppose the bombers. Thick cloud hid the target and the attack was unsuccessful. The target was therefore re-attacked on 15/16 October. A force of over 500 aircraft was dispatched to the port but again poor weather (10/10ths cloud) was encountered. In spite of it damage was done to the Kriegsmarinewerft Workshops, barracks and buildings at the seaplane station were hit. From this attack seven bombers (1.4 per cent) were ~~lost~~ lost.

B.C. Int/Tac/  
No. 248/44

Bomber Cnd  
Night Raid  
Report No. 742

First Operations by the G.H. Force

During September and the early part of October G.H. ground stations were established just behind the western front. Tracking stations were established at Florennes and Commercy in Belgium and releasing stations at Laroche and Commercy.

Bomber Cnd  
O.R.B.Apps,  
Vol. 3, RAD 118  
G.H. Operational  
Sum Oct. 1944.

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(1) See 'Bomber Offensive' Chapter 11, pp. 237-242. For further details of the effects of the bombing of the Ruhr See Chap. 11 of this narrative.

The first attack by No. 3 Group using G.H. equipment was against the city of Bonn and it took place in daylight on 18 October. This was the first British raid against the city. A force of 128 aircraft took part of which 41 were equipped with G.H. The force flew in formations of three each led by a G.H. equipped aircraft. Visibility was good over the target area but only 20 aircraft bombed on G.H. Of the 21 G.H. failures 12 were due to a technical fault at the releasing station which went out of action just before H Hour (1100 hours). The attack was accurate and aerial photographs revealed that the centre of the city on the west bank of the Rhine was burned out over an area of 1,600 by 700 yards. A district on the east side of the river also suffered damage. In the course of the operation cover was provided by 14 Spitfire and Mustang squadrons.

Ibid

Aircraft using G.H. equipment were employed in the main force raids on Duisberg and Essen. In the attack on Duisberg they used their equipment to assist in visual bombing and in the Essen raid they bombed blind. In the latter attack 14 out of 18 G.H. aircraft were successful. Four other attacks were made on G.H. during the month. They took place against Neuss, Leverkusen, Wesseling and Bottrop, the last two being oil targets. At Neuss the formation flying of the force was very ragged and the majority of the navigators were too hasty in turning before the starting point for the G.H. run. The result was that wide turns were needed to get on to the required track and in several cases aircraft reached the target before gaining the tracking circle. In general it was considered that the results of the G.H. attacks were very satisfactory and that crews became more proficient with experience.

Support to the Ground Forces - Walcheren Island

The opening of the Scheldt estuary was the major commitment for the Twenty-First Army Group after the Battle of Arnhem. The First Canadian Army was made responsible for the ground operations which were to take place in three phases; first, the clearance of the south bank of the Scheldt including the area around Breskens where the enemy had formed a pocket of resistance; second, the eviction of the enemy from South Beveland and thirdly the capture of the island of Walcheren. Ground operations began in the first week of October but progress was unavoidably slow because of the difficulty of crossing the flat marshy terrain which was common to this area. Here all the advantages lay with the defenders. On 16 October Field Marshal Montgomery decided to stop the offensive operations of the Second British Army between the Meuse and the Rhine and concentrate all his resources on clearing the approaches to Antwerp. A number of new dispositions were made by his ground forces.(1)

Bomber Command was concerned in the first phase of the Scheldt operations because there were a number of heavy guns at Fort Frederick Hendrik in the Breskens area which required elimination. They were too well protected for aircraft of

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(1) For a more detailed account of the situation on the western front and the air-ground operations then in progress, see R.A.F. Narrative, 'The Liberation of North West Europe, Vol. V. Chapter 1.

2nd T.A.F. to put them out of action and a series of attacks were made by Lancasters and Mosquitos of Nos. 1 and 8 Groups on 11 and 12 October. Bombs were also directed at the guns at Flushing on the south coast of Walcheren which were firing at Canadian troops across the Scheldt estuary. The first attack on the Breskens area was made in the afternoon and the second took place between 0756 and 0812 hours. In these two days 1,648 tons were dropped for the loss of only four aircraft. The Army had not yet learned how difficult it was to neutralise from the air such a small target as a battery, even after experience in the Normandy beach head, and the guns at Flushing, after a short interval, continued to direct harassing fire against troops on the mainland. The batteries were therefore re-attacked by Bomber Command on 21 and 23 October.

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No. 253/44  
- 254/44

In the meantime planning had been in progress for the subjection of Walcheren Island (Operation Infatuate). The island which was about nine miles in length and about the same distance in breadth was in a key position, for as long as the enemy held it they could dominate the mouth of the Scheldt. No effort had been spared with the construction of fortifications which consisted of a series of strong points, radar stations and long range guns which were concentrated on the western side of the island. At the same time, from the point of view of the defence, the island suffered from a severe disadvantage for the interior was largely below sea level and massive dykes had been built by the Dutch around the coast to prevent the sea coming in. The essence of the air plan was, therefore, the reduction of the coastal and the flak batteries and the flooding of certain areas of the island by breaking down the sea wall with heavy bombs.

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Both these commitments were to become the concern of the Strategic Air Force although the Tactical Air Force was to play a highly important part in attacking radar stations, ammunition dumps and defended localities. The first conference of Naval, Army and Air Officers at which the operation against Walcheren was discussed was held on 23 September at First Canadian Army Headquarters. The Canadian Army Commander suggested flooding the island by breaching the sea wall with heavy bombs. Air Commodore L.W. Dickens Deputy Senior Air Staff Officer Bomber Command, Advanced, representing his Commander-in-Chief, said that he could not guarantee success but affirmed that Bomber Command was capable of making the effort single handed. After weighing the advantages and disadvantages of this scheme, which would have such serious repercussions on the local population, the conference agreed that the flooding should take place with the sanction of the Supreme Commander. This was given on 30 September.

The Canadian Army Commander then said that he wanted Walcheren to be a 'Second Pantelleria' and believed that heavy bomber attacks against the island's defences should start at once. Indeed, preliminary attacks on the batteries had already been begun by Bomber Command on 17, 18 and 23 September. But the Air Commander-in-Chief, mindful of the comparatively small amount of damage done to the batteries in the Normandy beachhead, insisted that it would be more profitable to bomb the gun positions two or three days before the assault was launched so that the gun crews would not have a chance to recover. This contention was accepted by the Army and planning for the operation was carried out by No. 84 Group R.A.F. in conjunction with First Canadian Army. Added

Ibid

importance was given to the air plan for Walcheren by the Supreme Commander, who had made it known that he wanted the strength of all available Air Forces to be used against the island's defences, in particular the forces of Bomber Command.

On 2 October the Dutch population of Walcheren were warned by means of radio and leaflets that the flooding of the island was imminent and the first attempt to breach the sea wall was made on the 3rd. The operation was planned to take place in two phases. The aircraft in the first phase were to drop 4,000 and 1,000 pound bombs on the dyke and in the second phase, 15 minutes later, aircraft of No. 5 Group including No. 617 Squadron, were to operate with Tallboy bombs (12,000 pounders). West Kapelle, the most westerly promontory of the island, was chosen as the target area. The sea wall here was 204 feet thick at its base, sloping upwards to a thickness of 60 feet at the top. A force of 259 aircraft from Nos. 1, 3, 5 and 8 (Pathfinder) Groups took part. Altogether there were eight waves of 30 aircraft. Bombers in the first phase succeeded in breaking open the dyke to a width of 120 feet. The aircraft of No. 617 Squadron carrying the Tallboy bombs were therefore recalled. The operation began at 1254 hours and by 1500 hours air crews observed the sea pouring in through a gap in the wall. These reports were later confirmed by reconnaissance aircraft of 2nd T.A.F. Moderate flak was encountered by the bombers, most of which came from the direction of Flushing. The G.A.F. did not attempt to interfere. By 7 October the floods were spreading towards the centre of the island and threatened to cut it in half. Further attacks were made against the sea wall in other parts of Walcheren, east and west of Flushing on the southern side, and at Veere on the eastern side of the island on 7 and 11 October. A final attack was made at West Kapelle on 17 October with the object of widening the breach to enable amphibious vehicles to pass through in the course of the assault. In all 2,665 tons of bombs were dropped on the sea walls of Walcheren.

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Oct. to Dec.  
1944, No. 11.

It must be borne in mind that the British Air Staff and the Air Staff at SHAEF did not look favourably on the prolonged heavy bomber attacks in support of the Army operations in the Scheldt because they were diverting aircraft from the heavy attacks on towns in the Ruhr and Rhineland, then in progress, and which have already been described. On 24 October the Deputy Supreme Commander speaking on 24 October at an Air Commanders Meeting, forbade further heavy bomber raids on the Walcheren dykes and instructed that fighter bombers were to attack the Walcheren defences whenever it was at all practicable.

See p. 130

Bombing operations against the Walcheren batteries and strong points prior to the assault which was timed for 1 November began on 28 October and continued until the 30th. Bombing was carried out by Nos. 1, 3, 4, 8 Groups and, on one occasion, by No. 5 Group. They flew a total of 745 sorties and dropped 3,348 tons on the defences. On several occasions bombers flew as low as 3,000 feet and once at a level of 1,800 feet to make their bomb run, but although the concentration of flak in the Scheldt was notorious, losses to aircraft during operations in the three day period did not amount to more than four aircraft.

B.C./T.S.  
30717/16

Unfortunately the weather made it impossible to continue the bombing up to D-Day minus one. It was therefore inevitable that certain batteries should come to life when

the landings were being made. In the event, rocket carrying Typhoons of the 2nd T.A.F. were able to silence the guns at West Kapelle at the crucial period of the assault.(1) Bomber Command aircraft did not intervene again in Operation Infatuate. Their effective attempt to breach the sea wall and the extensive damage caused to batteries was an invaluable contribution towards the success of the operation. Resistance on Walcheren Island persisted until 8 November and considerable mine sweeping operations were necessary to clear the Scheldt, so that it was not until 28 November that the first convoy sailed into Antwerp. During the operations against the Walcheren dykes and batteries and other targets in the Scheldt estuary, from 17 September to 30 October, Bomber Command had flown 2,219 sorties and dropped 10,219 tons of bombs.

Other Army Support Operations

Bomber Command was involved in three other Army operations. Of these, one was at the request of Twenty-First Army Group. After the Battle of Arnhem Field Marshal Montgomery had started to plan an offensive in which the Second British Army would occupy the Rhineland and close to the west bank of the Rhine at Wesel. This operation (Gatwick) had to be cancelled because of the, then, more important commitments in the Scheldt estuary, but not before 700 heavy bombers had dropped 3,600 tons of bombs on the towns of Emmerich and Cleve in the Rhineland south-east of Nijmegen on 7 October. Another task for Bomber Command was to set alight the Reichwald Forest where the enemy held a number of dumps and installations. This operation was cancelled.

B.C./S.32106

A.M.W.R. Sum  
of Bomber Cmd  
Ops Oct 1944.

The remaining two operations were undertaken at the request of the American Armies. The first of these was the breaching of the Kembs dam situated on the Rhine below Basle. The Americans anticipated that, if the enemy was allowed to open the sluices, they would make the Rhine impassable as far down as Strasbourg. If the dam was blown in the immediate future the river would have subsided by the time the Americans were ready to cross it and the flooding would also cut off the German forces west of the river. With the experience of the dyke breaching at Walcheren behind it, Bomber Command agreed to take on the target and No. 617 Squadron succeeded in hitting the dam in a daylight attack on 7 October.

B.C./S.31490/1

The final operation was a raid on Saarbrucken in the southern sector which was a key communication centre for the enemy. The city was believed to be a base for re-fitting and re-equipping troops in reserve while newly organized units, fresh from Germany, were being outfitted with ordnance, vehicles and other equipment. The town at the time stood only 20 miles from the Third U.S. Army front. Two forces of bombers attacked Saarbrucken on the night of 5/6 October. For the early stages of the journey crews were briefed to fly at below 2,500 feet and to maintain radio silence. The first force was detailed to bomb the marshalling yards but the target was covered with cloud and thick haze. The Master Bomber ordered aircrews to abandon the mission after several abortive attempts at marking the target. The second force which was instructed to raid the town found the target clear of cloud

B.C./S  
31943

Bomber Cmd  
Night Raid  
Rept. No. 733

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(1) See R.A.F. Narrative The Liberation of North west Europe Vol I, Chap. 1, pp 24-25.

and made an effective attack. The Eighth Air Force delivered a follow-up attack on 14 October. After these raids the old town was annihilated and the important steelworks of Vereinigte Hutten was destroyed. A number of administrative buildings were badly hit and it was estimated that 50 per cent of the fully built-up area was raised to the ground. Only three aircraft (1.4 per cent) were lost.

First Attack on the Dortmund-Ems Canal in 1944.

A.H.B./II/79/3  
p. 180 and  
U.S.S.B.S.  
Effects of  
Strategic Bombing  
on German Comms  
Chap. V.

The Germans made much use of their inland waterways for the carriage of goods from one part of the country to another. Of these the most important were the Rhine, the Dortmund-Ems and the Mittelland Canals. The Dortmund-Ems Canal flows from the Ruhr northwards into the River Ems and thence to the North Sea. The Mittelland Canal which joins the Dortmund-Ems Canal near Rheine provides a channel for waterborne traffic from the Ruhr to eastern and central Germany. Goods moving from the Ruhr were largely coal and coke produced by the Ruhr heavy industries and cement and building materials. Traffic moving into the Ruhr consisted mainly of food stuffs and raw materials. Some idea of the importance of these canals in wartime may be gained by the following statistics. In 1943 despatches of coal eastwards from the Ruhr along these two canals amounted to some 24,000 tons per day and from January to August 1944, a similar total was carried.

A.H.B./IIH/241/3  
602(A)

The Dortmund-Ems Canal was most vulnerable to air attack between Datteln and Rheine. This stretch was a bottleneck through which all the traffic from the Ruhr to the North Sea and to eastern and central Germany had to pass, particularly at the viaduct where the River Glane flows under the Dortmund-Ems canal at Ladbergen, about 15 miles south of the junction with the Mittelland canal. There is another viaduct at Gravenhorst, a mile and a half to the east of this junction which carries the Mittelland Canal over the River Aa. At Ladbergen the canal divides and crosses the Glane by two parallel aqueducts. Both here and at Gravenhorst the canal level is higher than the surrounding countryside and runs through earth embankments. The British Air Staff had recognized, since 1939, the extreme vulnerability of these two points to air attack and the subsequent dislocation to German industry should they be destroyed, and tentative plans were made to block them. (1) The effects would be broadly twofold. Firstly, the coal, coke, iron ore and heavy goods passing to and from the Ruhr would be disrupted and, secondly, it would mean that much of the traffic would have to be carried by rail; this would involve great delay and congestion on the railways, already much overworked, and which were in any case incapable of handling the bulky goods usually carried by barge.

No. 617  
Squadron O. R. B.

Bomber Cmd  
Night Raid  
Report No. 722

The task of bombing the viaduct at Ladbergen was given to No. 5 Group and operating as an independent force 141 aircraft attacked the viaduct on the night of 23/24 September with 510 tons of H.E., including six 12,000 pound bombs. The canal was breached in several places and both sides of the safety gates and the two passages were damaged. Water was drained from the aqueduct over the River Ems, south of Ladbergen as far north as Bevergern, a distance of six and a half miles. Twenty-nine barges were stranded along this

(1) On 12/13 August 1940 the canal was breached by Hampden's of Bomber Command in a low level attack. A further attack was made on 15/16 September 1943 but without success.

See Chap. 8  
p. 178

stretch and twelve more lay high and dry to the north of the bypass. Navigation was not resumed until 21 October. By that time further instructions had been issued to No. 5 Group to block the two canals and four more attacks were made in November. These raids together with similar operations by the Eighth Air Force(1) kept the canal system almost continuously closed until its occupation by the Allied ground forces in the spring of 1945.

The Oil Offensive

A.M.W.R. Sum.  
of Bomber Cmd  
Ops, Sept-Oct,  
1944

The period of the first directive to the Strategic Air Forces did not witness any greatly increased effort against oil targets by Bomber Command and this offensive was maintained by the Eighth Air Force which made 21 attacks against oil targets and dropped 7,619 (short) tons and also by the Fifteenth Air Force which dropped nearly 2,000 (short) tons. From 25 September until 31 October Bomber Command had dropped 4,979 tons of bombs against six oil targets, all situated in the Ruhr.(2) These attacks were made in daylight and the main reason why so few operations were devoted to reducing oil production was the long drawn out battle in the Scheldt Estuary which required the British heavy bombers to deal constantly with enemy gun positions. The operations were carried out by Nos. 4 and 6 Groups with the assistance of the Pathfinder Force. The last two attacks in October were delivered by No. 3 Group using their new G.H. equipment. The following plants were attacked, Scholven-Buer, Sterkrade, Wanne Eickel, Homberg (Meerbeek) Wesseling and Bottrop. All of these plants had been raided by Bomber Command during the summer and several which had been severely damaged were still in process of reconstruction. Furthermore they were, at the same time, also being subjected to attacks by the Eighth Air Force. As already shown the German fuel shortage described by Speer in his communications to Hitler was acute, particularly in September, and the industry only partially recovered from these blows during October. The continuation of attacks served to delay still further the task of reconstruction.

See Chap. 5  
p. 118

In the last week of September two raids were made on the synthetic oil plants at Bottrop/Welheim and Sterkrade. The first attack was made in poor weather and in the second visibility was so poor that the aircraft were instructed by the Master Bomber to bomb alternative targets. As already mentioned, the hydrogenation plant at Bottrop had been out of action since July and the raid on 27 September still further delayed its return to normal production. In a contemporary report it was estimated that production would reach 40 per cent in three weeks time. On 6 and 12 October attacks took place on Scholven Buer, Sterkrade and Wanne Eickel. Good visibility was experienced by the aircrews and direct hits on the plant were believed to have been made. On the 25th, 243 aircraft of No. 6 Group bombed the Meerbeck plant at Homberg and here the bombing was believed to have been rather scattered. In fact, this attack was superfluous as the plant was still recovering from the heavy damage inflicted by Bomber Command in July and very little oil was being produced at the

See Chap. 4  
p. 95

U.S.S.B.S.  
Report No.118  
Exhibit G5, p.6

Bomber Cmd  
Int/Tacs  
No.249/44 and  
254/44

U.S.S.B.S.  
Report No.125  
Vol.1 Exhibit  
DDa, p.17

- (1) The Minden aqueduct, which carries the Mittelland Canal across the River Weser, was bombed on 26 October and navigation on both the canal and river ceased until the beginning of November.
- (2) A total of 13 attacks was made and 4,000 tons were dropped in September alone.

Bomber Cmd  
O.R.B.  
Apps. Vol.3  
RAD 118  
Oct. 1944.

time. Reconstruction work was, however, once more set back. Of the two G.H. attacks by No.3 Group, that against Wesseling would appear to have been the most effective. In spite of a heavy flak barrage a good concentration of bombs ~~were~~ put down and a large column of black smoke rose above the clouds.

Naval Support

Bomber Cmd  
Int/Tacs  
No. 247/44

At the end of September Bomber Command had agreed to raid the U-boat pens and the harbour at Bergen, Norway, then believed to be sheltering a concentration of U-boats. The pens were still in course of construction and it was necessary, therefore, to make the attack as soon as possible. The first raid took place on 4 October when 136 Lancasters and Halifaxes drawn from Nos. 6 and 8 Groups bombed the targets in good visibility. Very little opposition came from the enemy ground defences and none from the air, although a squadron of Mustangs from No. 11 Group was giving cover. The operation was divided into two phases; the first was directed against the submarine pens which were quickly enveloped in smoke and the last aircraft aimed their bombs onto the centre of the smoke cloud. Aircrews believed that there was at least one direct hit on the roof of the shelter. The second phase consisted of bombing the submarines in the basin. According to contemporary German

AMCD 12/1946 and  
Adm T.S.D./F.D.S.

reports this attack was most effective. Four U-boats were sunk together with 3,935 tons of shipping including a merchant vessel. A total of 12,871 tons of shipping was damaged. A second attack on the U-boat pens at Bergen was made on 28/29 October but 10/10ths cloud was encountered and only 51 out of 244 aircraft were able to bomb the targets. The Master Bomber ordered the remaining aircraft to abandon the mission. Three aircraft were lost from the operation. No visible damage was caused to the submarine pens but the enemy reported one lighter sunk and damage to a vessel of 2,960 tons.

Adm T.S.D./F.D.S.

Minelaying

Bomber Cmd  
Quarterly  
Review No. 11  
p.20

In October minelaying operations were directed at sea-borne traffic between Germany and Norway, particularly in the area of the Kattegat. By this time Swedish shipping had been withdrawn from German charter and Swedish ports were closed to German vessels. The Ministry of Economic Warfare reported that, since the end of July, there had been an increase of over 40 per cent in the relative shipping densities in the Kattegat and Oslo Fjord area and this became a very worthwhile target for Allied aircraft and sea mining. Troop transportation from Norway to Germany was seriously affected and not infrequently ports were closed and sailings postponed. During the first fortnight of October a convoy of troop transports totalling 19,000 tons escorted by two destroyers and four R-Boats sailing down the Kattegat were delayed for 48 hours. Mining operations in Oslo Fjord also caused dislocation to merchant shipping. Better weather was experienced in the second half of October and a greater number of mines were sown by Bomber Command. The ports of Oslo and Drammen were closed on several occasions and the main swept channels in the Kattegat either closed or used only for escorted traffic.

Bomber Cmd  
Night Raid  
Report No. 733  
Adm T.S.D./F.D.S.

On the night of 5/6 October nine Mosquitos of No. 8 Group laid mines in the Kiel Canal, at that time much used by shipping. They were rewarded by the sinking of 291 ton vessel on 13 October which blocked the canal at Brunsbuttel

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A.M.W.R. Sum,  
of Bomber Cnd  
Ops Oct. 1944

and temporarily stopped traffic through the waterway. (1) In October the number of sorties despatched and mines laid were as follows:-

<u>A/C Despatched</u>	<u>A/C Effective</u>	<u>No. of Mines laid</u>	<u>A/C lost</u>
257	232	1,333	9

Ferrying Supplies to Belgium

One valuable task performed by Bomber Command in this period did not involve coming into contact with the enemy. After the breakout from the Normandy beachhead and the speedy advance into Belgium and Holland, the Allies found that their movements were being seriously restricted by a shortage of supplies, particularly ammunition and petrol, as there were insufficient ports in operation on the French coast to maintain the Armies and the approaches to Antwerp port had not yet been cleared. The Supreme Commander had decided that the main effort of the Allied Expeditionary Force should take place in the northern sector, to push on through Holland and to cross the Rhine north of the Ruhr. All available supply resources were diverted to the Northern Group of Armies under Field Marshal Montgomery and this entailed a temporary cessation of activity on the Third U.S. Army front. A further difficulty arose over the question of air transport which the Army hoped would accelerate the carriage of supplies to the forward troops. At the same time elaborate airborne operations were being planned; one, Operation Linnet, the object of which was to drop airborne troops in the Brussels area and which did not materialise because of the speed of the advance and the second, Operation Market Garden - the unsuccessful attempt to cross the Lower Rhine at Arnhem. Thus, during a critical period transport aircraft were grounded for airborne operations.

This deficiency became much more marked after Operation Market Garden had begun and all available transport aircraft were required for re-supplying the airborne forces. It was decided therefore that Bomber Command should provide 70 Halifaxes of No. 4 Group to carry petrol into Belgium for Twenty-First Army Group and the Commander-in-Chief, Bomber Command instructed that ferrying was to begin on 24 September. Weather conditions made it necessary to postpone this date until the following day when 70 Halifaxes flew with petrol to Brussels/Melsbroek airfield. For the next eight days a daily run was made by these aircraft, during which time they averaged 72 sorties per day and a total of 582 sorties for the period. They carried a total load of 432,840 gallons (1,438 tons).

On 1 October SHAEF informed Bomber Command that the situation on the British front was not so serious as to require further deliveries of petrol by heavy bombers, and requested that ferrying operations should not continue after 2 October. Upon conclusion of the air lift Air Marshal Coningham, Commanding 2nd T.A.F., wrote a letter of appreciation to Bomber Command thanking them for the efficient way in which it had been carried out.

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(1) A plan for laying mines in the Rhine between Koblenz and Bonn by Mosquitos was abandoned owing to a shortage of suitable mines (A.H.B./IIS/112/1/100/9(C), Encls 19A, 27A)

CHAPTER 7

DISPUTES OVER BOMBING POLICY IN NOVEMBER

AND DECEMBER 1944

U.S. Proposal to end the European War by 1 January 1945

Early in October 1944 General Marshall, Chief of Staff to the U.S. Army, visited the western front to see for himself how operations were progressing. At that date the campaign had become a deadlock. The enemy had staged an amazing recovery after his severe defeat in France and was reinforcing the German frontier defences. Unknown to the Allies he had already begun to prepare a counter-offensive which was to take the British and American high commands by surprise. Meanwhile General Eisenhower had directed that the main effort of the Expeditionary Force should still take the form of a thrust north of the Ruhr. At the same time he allowed subsidiary offensives to go forward south of the Moselle. The chief problem of the Allies was still one of supply and major operations could not take place without the facilities of the great port of Antwerp whose approaches were still held by the enemy. For the whole of October Field Marshal Montgomery's forces were engaged in clearing the Scheldt estuary and General Bradley's Army Group, attempting to reach the west bank of the Rhine opposite to the Ruhr, was deeply involved around Aachen where the enemy had thrown in powerful reinforcements. It had become clear, to those who studied the situation in the west at this time, that it was not going to be a simple matter to penetrate beyond the Rhine.

General Marshall returned to America imbued with a sense of urgency and on 21 October the United States Chiefs of Staff held an informal meeting with the British Joint Staff Mission at Washington. Addressing them, General Marshall said that he believed that every effort should be made to finish the war in Europe by the end of that year. He felt that if the Combined Chiefs of Staff agreed to this decision, the air effort, which had brought the enemy's oil production to a level at which it was unlikely to increase within the next three months, could now be concentrated against the German Army in the field and would bring about a decisive defeat of the enemy on the western front. He admitted that this measure would mean abandoning all 'long term interests (i.e. industrial targets) to look after themselves' but that this would be to the advantage of the ground forces which would virtually have the heavy bomber force at their beck and call. He affirmed that a really great effort should be made in the course of the next five or six weeks to defeat Germany before the bad winter weather set in.

A.M. File  
C. 39441/49  
Encl. 23A.

Accordingly on 23 October the U.S. Chiefs of Staff submitted a draft directive to the Combined Chiefs of Staff and requested that they should give it their approval at an early date. This proposal stated that the Supreme Commander should be instructed to conduct operations with the object of finishing the war by 1 January 1945. From the point of view of the Air Forces, the significant passage in this proposed directive was that the strategic bombers should be employed in 'all out tactical operations wherever and whenever the advance of the ground troops can thus be facilitated.'

Ibid  
Encl. 25A.

British Views on Bombing Policy

A.H.B./ID4/38A

This proposal was entirely at variance with the views held by the British Air Staff. They believed that the blows struck against the oil industry were doing more than anything else to hasten the end of the war. They believed that, if left unattacked, the rate of oil production would rise from the low September level of 23.5 per cent of the pre-attack output to 37.5 per cent in October and to 47.5 per cent of the pre-attack output in November if the bombing was relaxed. Intelligence from all agencies showed that the oil offensive had seriously dislocated the enemy's air, land and sea operations and the British Chiefs of Staff considered it would be folly if the successes achieved by these operations were to be thrown away at the very moment when it appeared that they were exercising a decisive effect upon the course of the war. Commenting on the signal of the Joint Staff Mission describing General Marshall's plan, the Assistant Chief of Air Staff (Operations) concluded, 'We should resist any tendency to divert our effort from oil'.

A.H.B./  
ID3/601/(C)

On hearing of the U.S. proposal the Chief of Air Staff wrote at once to the Deputy Supreme Commander, Air Chief Marshal Tedder, informing him of the latest development. He was certain that it was right the Air Forces should support the Army at opportune moments, for example, when they were launching a big offensive, but that it would be wrong to commit the Strategic Air Force to the land battle at times when this was not essential and it would also have a demoralising effect on the Army which would expect such air operations to be laid on as a matter of course. He believed firstly, that it would be bad policy to divert the heavy bombers from the oil offensive and, secondly, that it was not practicable to adopt a short term transportation plan similar to the pre-D-Day bombing programme to dislocate the German railway system.

Ibid

The Deputy Supreme Commander agreed with Sir Charles Portal's first contention. He had, himself, been greatly concerned over the Army's increasing reliance upon support from the heavy bombers and he cited the fruitless attacks on the Walcheren batteries. The Army had become accustomed to request heavy bomber support whether the target was a feasible one or not. He, too, considered that oil targets should rank as first priority, but believed that a time factor should be introduced and that the object of the raids should not be to destroy every synthetic oil plant but to stop production, thus plants which had been severely damaged would only require 'policing', i.e. minor attacks, to ensure that repair work did not reach too advanced a stage. In contrast to the Chief of Air Staff he was more concerned over the value of transportation targets. (1)

Ibid

See App.8

Air Chief Marshal Tedder expounded his views on bombing policy in a lucid paper entitled 'Notes on Air Policy to be adopted with a view to a rapid defeat of Germany' which he wrote on 25 October at Versailles. This was an important statement as it contained the germs of the bombing policy which was adopted by the Anglo-U.S. Air Staffs for the last six months of the war. He believed that the strategic offensive behind the enemy's front and the land invasion of Germany should be complementary to each other. He did not hold the view that

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(1) See Sir Charles Portal's views on transportation attacks Chap.5, p.111

the war would be shortened either by pitting the heavy bombers against German industry and political targets in an independent offensive, or by harnessing them as an auxiliary force in support of the Armies. The main objective of the Army was known to be the Ruhr and its commanders wanted the Air Forces to stop the enemy's supplies and reinforcements from crossing the Rhine to the western front. The only strategic contribution towards this object had hitherto been the attacks on oil targets, the breaching of the Dortmund-Ems Canal and various precision attacks on ordnance and motor transport depots. He did not think that the strategic bombing attacks against oil, cities, factories, etc. in Germany, fitted into a comprehensive pattern but resembled, rather, 'a patchwork quilt'. In his opinion communications were the one common factor to the whole of the German economy and affected equally industry, administration and the fighting services. Moreover, the dispersal of industry due to the strategic bombing offensive made good communications all the more essential to maintain.

Experience gained in the recent fighting in France and Belgium had proved that the heavy air attacks before D-Day had severely dislocated the French railway system and that they had been more devastating than had been anticipated. In Germany all loss of traffic was detrimental to the war effort and Air Chief Marshal Tedder estimated that the enemy would experience greater difficulty than in France in getting labour to repair the damage. Moreover, in Germany, the care which until then had been taken to avoid incurring civilian casualties would not be necessary. The best single target was the Ruhr. Here the Strategic Air Forces would bomb railway centres, oil targets, the canal system and centres of population while the Tactical Air Forces would be able to continue their interdiction of railway lines, cutting bridges and destroying locomotives more effectively. A co-ordinated campaign against the railway system of western Germany would produce a chaotic situation which would affect simultaneously the battle on the western front and the whole German war effort.

Ibid

Air Chief Marshal Tedder's paper demanding a concentration of air power against civil and transportation targets, with special emphasis on the second, was a direct challenge to the principles held by the Commander-in-Chief, Bomber Command, which the latter was not slow to take up. His opinions on bombing policy differed both from those of the British Air Staff and those of the Deputy Supreme Commander. Air Chief Marshal Harris maintained that it was the strategic bombing offensive against industrial area targets rather than the land battle which was hastening the end of the war although at the same time his force had influenced the land campaign to a large extent. For example, the British Army in France had been unable to make a major break through without the support of the heavy bombers. He disagreed with Air Chief Marshal Tedder that strategic bombing was ineffective merely because the targets attacked were widespread. On the contrary the major oil plants in the Ruhr and industrial towns had, in fact, been heavily bombed but he had been prevented from maintaining the pressure because of the varied calls for support from the Army, the Admiralty and certain technical bodies.

Air Chief Marshal Harris then went on to suggest that any bombing policy must depend primarily on tactical considerations as well as on the weather. Heavy casualties would be incurred if the same type of target was bombed night after night in the same area. It was necessary to carry attacks

to unexpected regions in order to make the enemy spread his defences. Another essential was the planning of diversionary attacks in support of a main force raid. Thus, for example, having put the Dortmund-Ems Canal out of action the next logical target was the Rothensee ship lift but it could not be bombed without making a heavy and simultaneous attack on neighbouring cities such as Magdeburg and Halle. In short, the Commander-in-Chief exposed himself to the criticism that he was still relying on evasion tactics to enable his bombers to reach the target area. And this was at a time when air superiority had unmistakably been established in the west and just when bomber losses were steadily decreasing.<sup>(1)</sup> Furthermore, he tended to overstress the effect of weather on operations because the G.H. technique and the use of Fido, which attempted to disperse fog at airfields, were both helping to reduce this obstacle although they never actually overcame it.

The other reason for the lack of a comprehensive target system was that there were 'too many cooks engaged in stirring the broth'. Air Chief Marshal Harris enumerated these as follows: the Admiralty, which insisted that the Tirpitz should be sunk and, because it suspected a new threat against Allied shipping by the schnorkel-equipped U-boat, was demanding that heavy bomber operations should be directed against U-boat assembly centres; then there were the ball-bearings experts and the Special Operations Executive which was trying to 'sell' the project known as Braddock.<sup>(2)</sup> Bomber Command had, therefore, to steer a course, quite apart from considering the weather and the tactical situation, between these conflicting requirements and, in addition, a constantly changing directive.

The root of the trouble was that a unified air command which would co-ordinate all air operations in Europe did not exist. Air Chief Marshal Tedder controlled no more than the Tactical Air Forces on the continent and could only request heavy bomber support for strictly tactical tasks. The Deputy Chief of Air Staff and General Spaatz were agents for the Combined Chiefs of Staff, but were largely guided in their policy for the heavy bombers by a committee, or series of committees (the Combined Strategic Target Committee) composed of airmen, soldiers and civilians.

Nevertheless the views of Air Chief Marshal Tedder were to win recognition in spite of opposition from the British Air Staff. He had already (on 23 October) instructed the Combined Planning Staff of the British and U.S. Strategic Air Forces in London to prepare a plan to isolate the German Army west of the Rhine from its main source of supply, in particular the Ruhr and the Frankfurt - Mannheim area. He hoped that a railway paralysis would be achieved similar to the pre D-Day bombing of rail targets in France and Belgium that spring. He expected that the bombing would not only produce an economic chaos but would reduce effectively military supplies to the western front. The Combined Strategic Targets Committee deliberated on this proposal between 24 and 26 October. They also considered it in the light of

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- (1) From October to December 1944 out of 47,903 sorties dispatched only 395 bombers (.8 per cent) had failed to return.
  - (2) The idea was to stimulate insurrection within the Reich by dropping large quantities of specially prepared incendiary bombs to be used by the civilian population against the Nazi administration.

A.M. File  
C. 39441/49  
Encls. 26A,  
27A - 27C and  
A.H.B./ID4/38  
Pt. I.

General Marshall's proposal to abandon attacks on industrial targets in favour of all-out support of the ground forces.

Mr. E. D. Brant, the chief railway expert who had advocated the French transportation plan, said that SHAEF did not realise how small was the number of daily supply trains which were required to supply the German front line. Intelligence officers worked out that the 35 equivalent German divisions on the western front would only require 40 train loads per day. The railway system was so extensive in western Germany that it would be virtually impossible to stop such a small number getting through. If a line of interdiction was established on the Rhine 14,000 visual sorties would be required to destroy the 43 road and rail bridges and 14 pontoon bridges spanning the river, and that was providing the weather held and that enemy defences such as flak and smoke were not strengthened. The only vulnerable area was just behind the German front, west of the Rhine, where the railway system was weakest. All agreed that, in view of the bad weather to be expected at that time of year and the complexity of the German railway system, it would be impossible to cut off supplies to the enemy front within 90 days.

The planning committee then set out to discover whether it would be possible to paralyse the railway system by attacking carefully selected railway centres. Mr. Brant concluded that some 30 to 35 railway centres in the Ruhr and surrounding district and five rail centres in the Frankfurt area would require heavy attacks on the scale of the raid on Juvisy in France that spring. It would be necessary to damage seriously at least 30 rail centres before serious dislocation arose. He did not believe the Air Forces could accomplish this at that time of year and, in his opinion, paralysis would not be achieved until the late summer of 1945. (1)

On the other hand both the British and American intelligence and target selection agencies agreed that the oil offensive was undoubtedly frustrating enemy operations. These restrictions were in proportion to the enemy's current oil output. As the enemy was exerting every effort to restore oil production any relaxation in Allied air attacks on oil plants would be reflected in a proportional increase in his operational activity. The planning staff therefore concluded that the best contribution that the Strategic Air Forces could make towards the winning of the land battle was to continue with, and, if possible, intensify the oil offensive.

On the afternoon of 27 October the Deputy Supreme Commander presided over an important conference at Versailles, the purpose of which was to decide upon future bombing policy. Both Air Marshal Bottomley and General Spaatz were present together with staff officers

SHAEF Air  
(Hist. Rec.  
and Diary)  
Oct. 1944  
APP. 5A and A.H.B./  
IIS/112/2/5  
(Vol.1)

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(1) The Committee calculated that during November and December there would be no more than three clear days and four clear nights per month for visual bombing.

from Air Ministry, U.S.ST.A.F., SHAEF, and the Railway Research Service. Air Commodore Dickens alone represented Bomber Command.(1) The Deputy Supreme Commander took this opportunity to elaborate his theme that communications targets were the common denominator to a bombing policy whilst allowing for the fact that oil should remain the primary target. He criticized the planning staffs on the grounds that they had only made incidental provision for a general attack on transportation. Nor did he believe that the raiding of oil targets should absorb all the visual bombing effort. He quoted as an example the Eighth Air Force which, when attacking oil targets, often diverted up to 50 per cent of its strength to other targets for tactical reasons. He expounded his theory that supply had been the crucial factor both for the Allies and the enemy throughout the war and quoted Rommel's retreat in the Western Desert, the German defeat in Tunisia and the deadlock which the Allies were then experiencing on the western front. They should aim at dislocation of traffic rather than isolation and he believed that heavy attacks on the Ruhr should continue, together with raids on rail centres east of the Ruhr such as Osnabruck, Hamm, Schwerte and Soest.

Air Marshal Bottomley and General Spaatz finally decided that the existing directive to the Strategic Air Forces should be revised so as to place communications targets on second priority after oil and to suspend attacks on ordnance depots, motor transport and armoured fighting vehicle plants. Meanwhile Bomber Command was to continue to attack built-up areas but that marshalling yards and railway centres should be chosen as aiming points as far as possible.

On 31 October the British Chiefs of Staff sent their considered reply to the American proposal to end the war in 90 days. They said that they intended to support the present strategy of General Eisenhower and were convinced that a premature committal of resources would merely prolong the war. As far as the Strategic Air Force was concerned the greatest contribution it could make towards victory was, firstly, to intensify operations against the German oil industry and prevent the reconstruction of oil plants and secondly, to dislocate the railway system in the Ruhr.

General Spaatz and Air Marshal Bottomley, in the meantime, had revised the directive to the Strategic Air Forces.(2) A copy of the new directive was sent by General Spaatz to General Arnold for approval on 28 October. General Spaatz appeared to be satisfied with its revision and said that the modified directive would secure the maximum co-ordination of the Tactical and Strategic Air Forces in their contribution to the operations of the ground forces and that it would facilitate direct attacks by the heavy bombers in support of the Armies, such as the St. Lo type of operation. General Eisenhower, he stated, also supported the new policy.

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- (1) It is strange that neither C.-in-C. Bomber Command nor even his chief representative at SHAEF, Air Vice-Marshal Oxland, was present at this conference.
  - (2) This was done in consultation with Air Chief Marshall Tedder on the night of 27/28 October at Versailles.  
(See SHAEF Air Hist. Record and Diary Oct: 1944.

A.H.B./IIS/112/1/  
100(G)  
Encls. 59A-60A

On the 29th Air Marshal Bottomley asked that the Deputy Supreme Commander should approve the formation of a Working Committee (Communications) in the Combined Strategic Target Committee to deal with the planning of attacks on transportation, the selection of rail targets and to adjust priorities as the campaign went forward. He suggested that the Committee should contain representatives from SHAEF, the Air Ministry, the War Office, the Enemy Objectives Unit and the Railway Research Service.<sup>(1)</sup> Every week the Combined Strategic Target Committee including representatives from SHAEF (Air) and SHAEF (G.2) would consider reports of the Working Committee and weekly priority signals would then be issued. Air Chief Marshal Tedder concurred with this proposal.

Issue of the Second Directive to the Strategic Air Forces in Europe

A.M. File  
C. 39441/49  
Encl. 30A

The revised directive was issued by Air Marshal Bottomley and General Spaatz on 1 November. In accordance with their decision at the Versailles conference on 27 October there were now only two priorities. First remained the petroleum industry and second the German lines of communication. Operations of the Strategic Air Forces based in England were to take place as far as possible against the Ruhr. In the event of bad weather, or when the tactical situation prevented the bombing of priority targets, the Strategic Bombers were to raid important industrial areas using blind bombing technique when necessary. Targets chosen were as far as possible to be connected with oil and communications. Now that air superiority had been achieved, the G.A.F. and its supporting industry was no longer a primary objective, but 'policing' attacks were to be made when judged necessary.

A.H.B./  
IIH/241/3/599(G)  
Encl. 19A

In a letter accompanying this directive sent to Bomber Command, Air Marshal Bottomley drew the attention of the Commander-in-Chief to the 'industrial, administrative and transportation systems of the Ruhr' which were ripe for attack and emphasised that their destruction would affect both the enemy's economic system and his operations on the western front. He reminded Air Chief Marshal Harris that Operation Hurricane I 'was designed with these factors in mind'.<sup>(2)</sup> The Commander-in-Chief was also instructed that in the event of his force operating in a tactical role he was to consult with the Deputy Supreme Commander who had, since the issue of the first directive, taken over the task of co-ordinating both tactical and strategic air operations connected with the land battle.<sup>(3)</sup> Copies of

(1) Composition of the Committee when formed was as follows:  
Chairman Mr. H. D. B. Wood

Representatives -		
Air Ministry	B.Ops A.I.3(c) A.I.3	Economic Advisory Branch (F.O. and M.E.W.). Air Cover Interpretation Unit. Enemy Objectives Unit.
War Office	Tn1(c) M.I.14(c)	Railway Research Service.
SHAEF G2 U.S.ST.A.F.		

(2) The C.-in-C. Bomber Command wrote a pencil note on his copy of the directive in the margin opposite this phrase, 'and with the weather out of mind' - a footnote to his criticisms of A.C.M. Tedder's paper already discussed.

(3) On the disbanding of A.E.A.F.

the new directive were also sent to the Commanding General Mediterranean Allied Air Forces and the Commanding General Eighth Air Force.

Policy for the Oil Offensive: Disagreement between Chief of Air Staff and Commander-in-Chief Bomber Command

A.H.B./  
IIH/241/3/616(A)  
Encl. 52A

At the beginning of November the Combined Strategic Target Committee concluded that a greater tonnage of bombs should be dropped on the oil plants in central and eastern Germany. They foresaw that, during the winter months, the heavy bombers would not always be able to make fresh attacks against oil plants which had recently been repaired, with the result that the enemy would be able to extract a considerable amount of oil from them before they were put out of action again by Allied bombers. Taking advantage of these respites the enemy had been able to increase his output during October. Therefore during the next three months the Strategic Air Forces must seize every opportunity of inflicting long term damage on major oil plants even though they might not have resumed production at the time of attack. They advised that future policy should be to complete the destruction of all major oil producers.

It was for this reason that Bomber Command with its greater potential capability for destruction as compared with U.S.ST.A.F. was instructed on 3 November to attack the more distant Bergius plants at Leuna and Politz in eastern Germany as well as the crude oil refineries at Harburg near Hamburg. The synthetic oil plants in the Ruhr were, for the time being, still retained on the oil target list. They were the Bergius plants at Bottrop Welheim, Wesseling, Scholven and the Fischer Tropsch plants at Sterkrade, Homberg, Wanne Eickel and Dortmund.

Although Bomber Command was to devote 24.6 per cent of its total tonnage during November to oil targets, the hostility of its Commander-in-Chief to the oil offensive became increasingly evident to the British Air Staff and also to at least one commander in U.S.ST.A.F. (1) The Chief of Air Staff was therefore anxious to convert Air Chief Marshal Harris, the exponent of area bombing, to the war-winning possibilities of the oil plan. Sir Charles Portal did not doubt that the Commander-in-Chief Bomber Command would not loyally carry out the orders of the Air Staff, but at the same time he believed that additional impetus would be given to British heavy bomber operations if the Commander-in-Chief was convinced that the oil plan was going to defeat Germany. Sir Arthur Harris, for his part, continued to object against bombing what he called 'panacea targets'; he had no faith in the Ministry of Economic Warfare's ability to assess damage to oil targets and he was certain that for tactical reasons the bombing of precision targets was wrong. He held that the German war economy would recover if cities were left alone. After a series of letters had passed between the two commanders Air Chief Marshal Harris remained obdurate in this belief.

A.H.B./ID3/  
601(C)

The issue was first raised when Air Chief Marshal Harris wrote on 1 November to the Chief of Air Staff to justify his bombing policy after the censure passed on it by the Deputy Supreme Commander. In it he gave eight reasons why his force bombed Cologne on the night of 31 October/1 November; they

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(1) See 'The Army Air Forces in World War II', Vol. III, page. 645.

were mainly concerned with the weather and tactical considerations. The Chief of Air Staff, after close examination, came to the conclusion that several of them were not valid and, realising how much importance Sir Arthur Harris attached to the bombing of cities, felt that this might have influenced him unduly when choosing between the priorities laid down in the current directive. Moreover, on the night of 4/5 November, Bomber Command had attacked Bochum which, while it was an important industrial area in the Ruhr, and as such was covered by the directive, contained no oil target. Sir Charles Portal expressed his anxiety over the alarming recovery of German oil production and foresaw that, unless the enemy's oil supplies were reduced, the Germans would gain a strong position in the air and so unduly prolong the war.

Ibid

Sir Arthur Harris maintained that he entirely agreed with the Chief of Air Staff that oil was an important factor in the defeat of Germany. Nevertheless he claimed that he was trying to get the best 'overall effect of the available sorties in the prevailing weather', and he did not want to bomb so precise a target as an oil plant unless he was sure of being able to hit it using Oboe or G.H. technique. He enquired whether the policy of the Air Staff was to inflict complete destruction on the oil plants. If this was so he doubted whether Bomber Command would be able to stand the additional loss of aircraft at a time when it had to expend so much effort on other target systems. Also to be considered was the reduction in the number of fresh bomber crews arriving in his Command which had to be measured against the increased bombing effort against Germany that autumn. Sir Arthur Harris suspected the estimates of German oil production made by the Ministry of Economic Warfare and asked what methods they employed.

The Chief of Air Staff assured Air Chief Marshal Harris that the Combined Strategic Target Committee made certain that the bombers would not be wasted on unnecessary raids and that, provided he observed the priorities, there was no reason why this should occur. At the same time the Commander-in-Chief's views on the assessment of targets would be appreciated by the Combined Strategic Target Committee. Sir Charles Portal claimed that the methods of assessing target damage were accurate and that the Air Staff had been advised by prominent British and American oil technicians. Their deductions were supported by evidence discovered in the recently captured Roumanian oilfields. He urged Sir Arthur Harris to concentrate his attacks on oil and other industrial targets in the Ruhr. He dismissed the view that the bombers would suffer heavy losses, for since 1 September Bomber Command casualties over the Ruhr had only averaged 1.3 per cent. This area should be attacked before the enemy had had time to improve his early warning system.

A.H.B./IIH/  
241/3/616(A)  
Encl. 56A

Meanwhile, on 13 November, the Deputy Chief of Air Staff had written to the Commander-in-Chief, Bomber Command explaining why it was so essential that his force should attack Leuna and Politz; (1) that better opportunities

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(1) Bomber Command had informed Air Ministry on 6 November that it was impossible to attack these two targets by daylight and that heavy night attacks would entail prohibitive losses.

existed for night attacks than for those in daylight. Heavy concentrated raids against these two oil plants should achieve long term damage and there was no reason to suppose that losses to flak should be greater than those experienced over the Ruhr, Stettin and Berlin. Politz was one of the most important petrol producing plants in Germany and it was out of range of the Eighth Air Force during the short winter days. (1)

Operations against the oil plants in western Germany had, by the beginning of December, been judged successful, and the synthetic oil plants in the Ruhr were consequently suspended from the weekly priority list of oil targets. Only benzol plants in the Ruhr remained to be bombed. On 14 December the Combined Strategic Target Committee indicated that future policy should be to bomb the synthetic oil plants in central and eastern Germany exclusively. They calculated that the enemy would lose over 40 per cent of his current output of all products and approximately 70 per cent of all his current output of motor and aviation fuels. They believed that the enemy had consumed his oil reserves, while the Hungarian oilfields were in imminent danger of being seized by the Russians. If these plants were destroyed the oil shortage in Germany would be more acute than it had been in September.

A.H.B./IIH/  
241/3/616(B)  
Encl. 3A.

Sir Arthur Harris continued to be sceptical of the value of air operations against the oil industry. Writing to the Chief of Air Staff on 12 December he claimed that an effort of 9,000 sorties per month(2) would be required to destroy all the synthetic oil and benzol plants, crude refineries and finishing plants in Germany (a total of 42 targets). This figure included the probable amount of unsuccessful and partially successful raids and repeat attacks required to keep the plants inactive. He used this hypothesis to support his argument that bombing policy was mainly influenced by the weather. The oil plants in eastern Germany could only be attacked by his force at night but in doing so they would probably be able to operate only on three or four nights per month and this would clearly not permit 18 night raids of 350 aircraft per month even if two or three attacks were made on each clear night. In view of the limitations of weather and the lack of G.H. and Oboe cover, the Eighth Air Force would have to take on most of the deep penetration targets.

A.H.B./ID3/  
ID3/1773A

Ibid

The Chief of Air Staff assured Sir Arthur Harris that the Eighth Air Force would share with Bomber Command all commitments in eastern and central Germany. He explained that the greater proportion of the enemy's total oil output came from a limited number of plants. The immediate task of the heavy bombers was 'to put out and keep out of action the eleven synthetic oil plants in central Germany'. The three Strategic Air Forces could accomplish this, provided they seized every available opportunity. If this task was achieved during the winter 'strategic bombing would go down to history as a decisive factor in winning the war.' He feared that, if Sir Arthur Harris did not show enthusiasm over oil, 'the prize may yet slip through our fingers' in the same way that, if more determination had been shown in attacking ball bearing plants, greater results would have been achieved.

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- (1) Bomber Command attacked Leuna on 6/7 December and Politz on 21/22 December.
  - (2) This total was divided into 2,600 sorties by day and 6,400 by night, the figures were drawn from a paper written by Bomber Command O.R.S.

Ibid

This letter drew from Sir Arthur Harris on 28 December an impassioned outburst against the Ministry of Economic Warfare and he inveighed against its 'amateurish ignorance, irresponsibility and mendacity'. He did not believe that it knew what stocks of oil the Germans had available and pointed out that there were other methods of moving transport apart from petrol. He condemned 'panacea' targets including Operation Pointblank and considered that when the bombers failed to hit a precision target the bombs were wasted, whereas in an area attack another industry would be damaged or the houses of workers would be destroyed. He recalled his warning, made before D-Day, that the German war economy, given five months respite, would recover and he pointed to the German counter-offensive in the Ardennes as being proof of a reinvigorated economic system.

Ibid

Sir Charles Portal in his reply, defended the Allied Intelligence system and thought that the Germans would find it very difficult to construct new plants without Allied agents learning of their whereabouts. Further, the best evidence of the effectiveness of the oil plan could be found in the enemy's vigorous reactions, against Allied raids, by their concentration of flak and smoke screens round important oil plants. The G. A. F. was uncomfortably restricted by the fuel shortage and, provided that pressure against oil targets was maintained, it would be unlikely to stop the bombers getting through. Area attacks had been useful in so far as they had been a means of bringing the offensive to Germany, but it was known that in four or five months cities had recovered their industrial output. If the U.S. ST. A. F. had also been employed on area bombing he doubted whether the Allies would have gained ascendancy in the air before Overlord. It was only the advance to the German frontier that had given a new lease of life to area bombing.

Ibid

The argument between the Chief of Air Staff and Air Chief Marshal Harris continued along these lines until 25 January. Sir Arthur Harris advanced four reasons for not agreeing with the policy of the Air Staff. Firstly, he did not consider that enough attention was given to the capabilities and limitations of his Command and that he was not consulted on major changes of policy. This attitude was strongly influenced by his personal antipathy to the Director of Bomber Operations, Air Commodore S. O. Bufton. In his opinion there was no firm direction of the bomber offensive and operations were dictated by the 'climate, Air Ministry, SHAEF and enemy reactions in that order'. He suggested that he should meet the Chief of Air Staff more frequently for discussions and that there should be a Strategic Air Force commanders meeting once a month which would include, besides himself, Generals Spaatz, Eaker and Doolittle.

Secondly, he remained convinced that area bombing was the only effective strategic policy and that the Allies had the opportunity during the next three months to destroy the central and eastern industrial areas in Germany. He held that it was wrong to change the plan 'after the three years of effort put into.....the alternative policy'. Thirdly, he condemned every type of 'panacea' target and was convinced that bombing such targets had not affected the German economy. He quoted as example, Molybdenum, the Mohrie and Eder dams and the 'locomotive war'. He implied that the Germans were always able to take effective countermeasures in the way of dispersing their industry and strengthening their air defences. Fourthly, he insisted that his

personal disbelief in the oil plan had no effect whatever on the operations of his command and that his staff was concerned exclusively with the tactical and technical problems of bringing the bombers onto the required target. If, however the Chief of Air Staff thought it best in the interests of the 'prosecution of the war and the success of our arms', he was prepared to resign from his command.

Ibid

Sir Charles Portal claimed that the commander of a bomber force had no time to appreciate the number of economic and military factors involved when creating a bombing policy. He was fully occupied with the organization of his command, ensuring that his force reached the target and insisting that the best equipment was made available for his air crews. Sir Charles Portal was ready to listen to any suggestion which might improve the relationship between the Air Ministry and Bomber Command. He approved the proposal of a bomber commander's meeting but said that it would have to be arranged by General Spaatz and Air Marshal Bottomley, he himself could not preside over such a meeting, being the agent of the Combined Chiefs of Staff in company with General Arnold.

He said that the answer to Sir Arthur Harris' imputation that the oil plan was a failure lay in the irrefutable evidence that there was, in fact, an acute shortage of fuel in Germany, and since the start of the Russian offensive on 12 January 1945, the situation was steadily growing more serious. Sir Arthur Harris had said that the heavy bomber was being used defensively and not offensively by preventing the G.A.F. from opposing the Allied Air Forces. But he could not understand why Sir Arthur Harris should regard it as offensive to destroy the enemy's industry and thus produce shortages while he considered it to be a defensive policy to destroy the sources of oil, without which armaments could not be used, nor the war effort of the country be carried on. He realised that henceforward they must agree to differ but, at the same time, he did not doubt that Air Chief Marshal Harris would loyally execute the policy decided upon and he hoped that he would continue to command the force which had done so much towards defeating Germany and which had brought fame to the Royal Air Force.

A.H.B./IIH/  
241/3/616(B)  
Encl. 9A.

The German counter offensive in the Ardennes which began on 17 December caused an inevitable diversion of effort from oil targets but this was offset by a series of outstanding operations by the Fifteenth U.S. Air Force in the last fortnight of December against plants in southern Germany, Poland and Czecho Slovakia such as Blechhammer, Moosbierbaum, Brux and Linz. But the enemy was undoubtedly experiencing an acute fuel shortage. The Ardennes offensive had only been made possible by strict rationing and the building up of stocks over a period of weeks. The impetus of the advance was to depend on the capture of Allied fuel dumps. Thus, on 4 January the Combined Strategic Target Committee estimated that, provided recent operations had been fruitful, the number of active oil plants in Germany might have been reduced to four or five, these being Bohlen, Ruhland, Zeitz, Lutzkendorf and Magdeburg. But they foresaw that repeat attacks would probably have to be made against Brux, Politz, Leuna and Blechhammer South.

Ibid  
Encl. 12A

The preoccupation of the Strategic Air Force with the Ardennes Battle through the latter half of December and early January had given some respite to the oil plants and by 11 January it was reckoned that German petrol production had begun to rise again. The Combined Strategic Targets Committee anticipated that production at Leuna and Politz

would shortly be resumed and also at Blechhammer South and Brux. These latter targets were potentially of greater importance than those still in production because of their larger potential output. Nevertheless at that date 70 per cent of the total supplies of enemy oil still depended on nine targets.

Policy for the Attack of Communications Targets

The first task of the newly formed Working Committee (Communications) of the C.S.T.C. under Mr. Derek Wood (M.E.W.) was to draw up a plan of attack on transportation by the Strategic Bomber Force. This plan was discussed at the fourth meeting of the C.S.T.C. held on 8 November. It was also the first occasion on which the Operations and Intelligence Staffs of Bomber Command and the Eighth Air Force were represented. This enabled the bomber force to learn something of the formation of bombing policy while the C.S.T.C. had the benefit of operational advice.

A.H.B./  
II/86/6

The new transportation plan was designed to provide the maximum aid to ground operations in the west and to assist as far as possible the offensives on the Eastern and Italian fronts, and it was to exert pressure on the enemy's war production by interfering with economic traffic. During the preparation of the plan, full consideration was given to the analysis of the results of attacks on communications in France and Belgium, and the differences between the German and French railway systems were also taken into account. One of the most important deductions from the analysis was that attacks on a railway system should be concentrated within a limited area. For this purpose, and with the object of giving the maximum support to the ground forces, the Committee recommended that attacks should be directed as far as possible into the belt lying between the Rhine and longitude 10° East which runs through Hamburg, Hannover, Wurzburg and Ulm. This belt was to be divided into nine zones, each zone containing sufficient targets to ensure that communications would be paralysed within it. The priority of attack for each zone was to be determined by the current situation on that part of the front nearest to it and by its relative importance in the enemy's war production. Within each zone nodal railway centres were to be bombed with the object of destroying servicing facilities and imposing delay on the movement of traffic. Only a small bomber effort would be available for the attack of targets east of longitude 10° East after allowing for the number of aircraft despatched against oil targets, but the dislocation of traffic in the oil target areas of Leipzig - Magdeburg and Oppeln - Gleiwitz, the former being the most important industrial area in Germany after the Ruhr, would also be valuable.

See Map No.8

Fighters of the Eighth Air Force on return from escort missions, were to make low level attacks on moving trains which were to be their primary transportation objective. These attacks were to be concentrated as far as possible in the western belt so as to increase the chances of delaying important military traffic.

In the target list top priority was given to the Dortmund-Ems and Mittelland Canal system, including the Rothensee ship lift, so as to block the canals until they were frozen over, together with the Bielefeld and Paderborn viaducts which carried the main trunk lines from central

Germany into the Ruhr. Navigation on the Rhine and Elbe was to be hindered by mining. (1) The most important zone for rail targets was the north-eastern approaches to the Ruhr. While transportation targets within the Ruhr would be attacked in the course of Operation Hurricane, particular attention was to be given to the railway outlets of the Ruhr which connected it with the industrial centres in north eastern and central Germany. Key rail traffic centres were to be bombed in the area bounded by Schwerte, Hamm, Munster, Osnabruck, Bremen, Hannover and Soest inclusive. Next in importance was the Frankfurt-Mannheim area and eight major traffic centres were detailed for attack. Following it, in order of priority, were the Cologne-Koblenz, Kassel, Karlsruhe-Stuttgart, Magdeburg-Leipzig, Upper Silesia, Vienna and Bavarian zones.

This policy was incorporated into the first communications target priority signal issued by the C.S.T.C. on 11 November and which was sent out weekly, in addition to the priorities for oil and G.A.F. targets. The Round Up signals giving priorities for ordnance depots, armoured fighting vehicle and motor transport targets were henceforward discontinued. On 17 November the policy was modified slightly for Bomber Command: area attacks on the Ruhr were to take on a higher priority than operations against transportation objectives with the exception of precision attacks by the specialist force. This was done because it was so difficult to make an accurate attack on a small precise target at night.

At the meeting of the C.S.T.C. on 8 November the representatives of Bomber Command asked that towns which were associated with oil and communications should be subjected to area attack and requested that a list of targets be allotted to Bomber Command in the form of a special directive. It was pointed out to them that 16 of the communications targets in the priority list had already been earmarked as being suitable for area attack and that whatever effort Bomber Command had to spare from operations against precise targets should be despatched against these cities. The Deputy Chief of Air Staff would have to decide whether a separate directive should be issued.

The Air Ministry did not favour this proposal. But, at their meeting held on 15 November, the C.S.T.C. agreed to prepare a list of area targets which were primarily associated with the two top priority objectives and which also took into account their general economic importance. This list of targets was issued by the C.S.T.C. on 22 November. They stated that when weather or tactical conditions prohibited attacks against communications the Strategic Bomber Force was to bomb these important industrial areas using blind bombing technique if necessary. Objectives were divided into two categories; first, those targets west of 10° East, the destruction of which would have repercussions on the battle west of the Rhine and, secondly, targets east of 10° East the bombing of which would have less effect on the ground battle. Within the western belt priority was to be given, firstly, to industrial areas associated with the oil industry and, secondly, to leading communications centres. (2) The communications system

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(1) See Chap. 6, p. 144

(2) Targets which were already in the priority list for communications objectives. A table showing the effort made against these targets will be found in Chap. 10, p. 228

B.C./S.32131/3  
Encl. 1A.

Ibid  
Encl. 2A

A.H.B./  
IIG/86/6 and  
II/70/218

Ibid

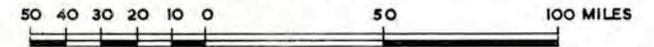
# PLAN OF ATTACK ON GERMAN COMMUNICATIONS 7 NOVEMBER 1944

## LEGEND

- PRIORITY AREAS
- RAILWAY TARGETS
- WATERWAY TARGETS
- VIADUCTS



## SCALE



in the eastern area was too complex to be affected by area bombing and there were, in addition, many important cities so far untouched. Targets were therefore to be attacked not merely because of their importance as communications centres but because of their contribution to the enemy's war economy.

Berlin was excluded from this list. While eminently suitable for area attack, a great expenditure of effort was required to achieve the necessary destruction. Major operations against Berlin were to be reserved for a later stage in the war when an all-out attack against the capital might induce the German people to capitulate.

In the western belt 14 targets were chosen including Harburg, Hannover, Ludwigshafen (these three targets associated with oil), Hamm, Munster, Koblenz, Karlsruhe, Osnabruck, Bielefeld, all with the exception of Bielefeld associated with targets in the communications directive. There were eleven targets in the eastern belt, including Magdeburg, Breslau, Chemnitz, Nuremberg Halle, Munich, Erfurt (these associated with communications targets) and Dresden, Leipzig, Danzig and Dessau.

Doubts over the value of the German Transportation Plan

From the beginning the C.S.T.C. was unenthusiastic over the merits of the new transportation plan.<sup>(1)</sup> The most ardent supporters of this plan were to be found at SHAEF while the majority of the members of the C.S.T.C. were keen advocates of the oil plan. By the end of November attacks on the enemy's railway system were not showing satisfactory results. On the 29th, for example, Mr. I. N. Pincus of the Enemy Objectives Unit stated that recent examination by the Allied Central Intelligence Unit had revealed that in 20 attacks on rail centres, only partial destruction had been caused at four centres, and that in all cases damage did not amount to more than 50 per cent. In the following meetings other members drew attention to the fact that the enemy's aircraft production had increased by at least 100 per cent and the German operations in the Ardennes showed that the enemy was able to equip, train and move new armies to the front with impunity.<sup>(2)</sup> The C.S.T.C. was sure that the weekly summaries of attacks on communications issued by SHAEF were over-optimistic and believed that their deductions were based 'on day to day gleanings of intelligence than on a sound appreciation of the position as a whole'.<sup>(3)</sup> It believed that although oil was nominally first priority, because of the Deputy Supreme Commander's enthusiasm for transportation attacks and his power of diverting heavy bombers to direct support on an overriding priority, oil was in fact taking second or third priority.

Ibid

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- (1) Also the view of D.B.(ops). See A.H.B./II/70/218.
  - (2) The Germans had transported 22 divisions and three brigades by rail for the Ardennes Offensive in a period of one and a half months over Western German railways. (A.H.B./IIS/108/1, p.14).
  - (3) For example, SHAEF quoted a German official as stating that unserviceable locomotives in Germany then amounted to 42% of the Reichsbahn locomotive strength in 1939. According to the C.S.T.C. it was only 25% - not a high figure considering the weight of attack in 1943 and 1944 and when compared to the British rate of unserviceability which was 18% (No.7 I.D.B.Ops).

The internal cause of the difference of opinion between the C.S.T.C. and S.H.A.E.F. seems to have been mainly one of approach, for while the air planners in England were viewing the problem in the light of a restricted offensive against the lines of communication affecting the battle zone, with the stated object of isolating the armies from their sources of supply, SHAEF (Air), even though they were concerned with the operational policy of the tactical as well as the strategic air forces, were disinclined to plan on the basis of so clearly defined an objective as the 'isolation of the battle field'. Experience had already shown that, in spite of the crippling attacks to which the French railway centres had been subjected, the destruction of the railway bridges over the Seine and the Loire, and the more or less continuous offensive patrols by fighters and fighter bombers along railway tracks and roads, the Normandy area was never 'isolated' in the restricted sense that the enemy was unable to maintain a flow, however slow and however difficult, of reinforcements and supplies. It was largely for this reason that SHAEF advocated a more general type of attack on the railway system in which major emphasis was placed upon the widespread destruction of rail centres.

Ibid

The enemy counter offensive in the Ardennes which began on 16 December made an increase in operations against German transportation inevitable, as soon as fine weather enabled the heavy bombers to go out in strength. On 27 December, at the height of the Ardennes Battle, the C.S.T.C. held a lengthy discussion on transportation. The chairman Colonel A. Maxwell (U.S.ST.A.F.), said that communications were being attacked at the expense of other important target systems and that although the transportation plan had been adopted as a means of concluding the war by the end of the year, it had not prevented the enemy from mounting a counter-offensive.

Mr. O. L. Lawrence (Ministry of Economic Warfare) said that the C.S.T.C. had been compelled to adopt this policy as 'an act of faith' and that they had had no opportunity to assess what might be the results of such attacks beforehand. Other members of the Committee suggested that it would be wiser to concentrate the Strategic Bomber Force against oil targets. Colonel Maxwell therefore instructed the Working Committee (Communications) to hold an inquiry on transportation attacks in conjunction with members of SHAEF. They were to discover first the effort involved, second, the results which might be anticipated and, thirdly, what length of time must elapse before results were realised.

Ibid

This report was discussed in detail on 17 January. The committee agreed that the results achieved by bombing communications had been local and military and that it had not affected the German war economy as a whole. They agreed that, in the time available, it would be impossible to dislocate the transportation system of Germany; results could only be obtained in certain selected areas. The committee concluded that the transportation plan could only affect the enemy's industrial production if a heavy scale of attack was sustained over a period of many months. But useful short term results would be obtained if attacks were concentrated within a limited area and were directly related to ground operations.

The consensus of opinion was that better results were being gained by the attack on the oil industry and that in spite of the fact that from 1 October to 15 January the ratio of attack between communications and oil had been four to one and, during December alone, six to one in favour of communications, the bombing of oil targets had achieved a greater economic

effect. The Committee recommended that pressure against oil targets should be applied for the next two months so as to increase the gap in German oil production, after which it would be possible to devote more effort to other target systems.

Further Attempts to hasten the end of the European War

Operations on the Western Front throughout the month of November continued to be disappointingly slow. Bad weather was holding up the progress of the Allied Armies in all sectors. In the Aachen area the Twelfth U.S. Army Group under General Bradley was endeavouring to close to the Rhine opposite Cologne, but it quickly encountered strong German opposition and, while inflicting many casualties, failed to make substantial advances. This offensive had been preceded by a combined attack by Bomber Command and the Eighth Air Force (Operation Queen) on 16 November against enemy positions, but by the end of the month U.S. troops had still not reached the line of the River Roer, one of their principal initial objectives. On 21 November General Spaatz and Air Marshal Bottomley instructed the C.S.T.C. to discover the best way in which the Strategic Air Forces could assist 'in obtaining an early and decisive defeat of the German Army west of the Rhine on the assumption that this defeat will be on or before 1 January 1945'.

A.H.B./  
IIG/86/6  
6th Meeting  
22 Nov. 1944.

The Committee submitted their report on 23 November, They reviewed the three types of operation by which the Strategic Bomber Force could assist the Army, first, by attacks against the oil industry, second, by bombing communications and, third, by giving close support. They still maintained that the first method was the most effective one and that it was essential to continue to attack the active synthetic oil plants and refineries in central and eastern Germany on the highest priority until 15 December. They proposed the following policy: first, visual attacks were to be made against these plants together with at least two blind bombing attacks on Leuna and Politz as soon as possible and, secondly, the benzol plants in the Ruhr were to be destroyed, failing an effective plan for interdiction immediately behind the Western Front.

A.H.B./  
ID4/38

They agreed that the bombing of communications would have to be concentrated in a far more limited area if it was to show results in the time given and must take place in relation to major ground operations. In this case it should be confined to the area, Rhine, Osnabruck, Paderborn, Aschaffenburg, Darmstadt. The Committee suggested that aircraft employing G.H. and Micro-H should make experimental attacks on the Rhine bridges between Wesel and Koblenz. If they were successful the Strategic Bomber Force should try to destroy nine rail and 12 road bridges along this stretch of river. The effort released from the oil offensive and from the more distant communications targets should be concentrated against 24 targets in the belt west of the Rhine. The fighter escorts were to attack transportation in the same area.

Close support operations, they suggested, should take three forms, first, heavy and concentrated attacks on the lines of Operation Queen, second, attritional and harassing attacks against known areas of concentration at any time, and, finally, harassing attacks sustained by day and by night over a limited period on selected sectors of the front. These operations were to take place in the Aachen sector where

they were to be confined within an area extending from the front line to a depth of five miles.

Ibid

This plan led to another important conference held at SHAEF on 5 December with the object of discovering how the heavy bombers might help the Armies to force an early decision on the Western Front. Sir Arther Tedder presided over the meeting, which was attended by General Eisenhower and all the Strategic and Tactical Air Force Commanders. General Spaatz defended the oil plan and said that there were still ten oil targets which required 'policing' attacks if German oil production were not to mount to 400,000 tons by the end of December. He also supported the Army Staff of SHAEF in their requests for attacks on communications targets to continue. As he saw it, the problem was to decide how the available bomb tonnage could best be balanced after the attack on oil. General Vandenberg, the Commander of the Ninth U.S. Air Force, was in favour of the maximum support by heavy bombers in the Cologne-Aachen sector, and thought that the bombing of towns and villages behind the front would give better results than a line of interdiction on the Rhine. Air Chief Marshal Tedder said that this type of operation might be the first stage of a more ambitious Operation Queen. But Air Chief Marshal Harris doubted whether the bombing of villages would be of value and said that, in any case, it would require three days of good weather which they would be unlikely to get. The secret of close support operations was to bomb as close to the front as possible and for the ground forces to move forward as soon as the bombing had finished. There was no occasion on which the Army had advanced without assistance of this kind.

The Deputy Supreme Commander summed up the meeting as follows. The directive for the Strategic Air Forces was to remain unchanged with oil as first and communications as second priority. The heavy bombers would afford tactical support for specific attacks and, for that purpose Tactical Air Force and Army Group Commanders were to confer together. In particular, they were to investigate into the use of night bombing before an offensive was launched, as well as into the employment of heavy bombers to bomb towns and villages during the two or three days preceding a ground offensive.

But in less than two weeks time the Allies were no longer thinking in terms of the offensive; they were mustering all available reserves to stop the enemy from reaching the River Meuse.

#### Operation Clarion

Shortly after this conference General Spaatz proposed a new plan for widespread attacks on transportation which was radically different to the recommendations of the C.S.T.C. It seems to have been instigated by the American Air Staff in Washington and was in complete antithesis to the British theory of concentration of attack. The idea of widespread attacks on communications originated in the early autumn, when, it will be recalled, plans for an all-out attack on Germany were being discussed by the British and U.S. Air Staffs. Whereas the British believed that air action should be concentrated against the Ruhr, the Americans wanted to raid lightly defended targets, hitherto untouched, all over Germany, employing both Strategic and Tactical Air Forces. The British conception was adopted and became known as Operation Hurricane. But the theory of widespread air attacks persisted amongst the U.S. Air Staff and in the middle of December was resuscitated as Operation Clarion. The plan was

The Army Air Forces in World War II Vol. III pp. 639, 732-733.

See Chap. 5, p. 116

first seen by the Deputy Chief of Air Staff on 24 December.<sup>(1)</sup> The Americans contended that these operations would provoke unrest among German railway men and might involve mass desertions. They claimed that Clarion would immediately benefit ground operations and that it would force the enemy to resort to motor transport and thus cause an additional drain on his dwindling fuel resources. Further, U.S.ST.A.F. claimed that Clarion had the support of the Deputy Supreme Commander.

C39441/49  
Pt. I  
Mins. 42-43

See Chap. 8,  
p. 175

While the British Air Staff was unwilling to interfere with any plan made by General Spaatz for the tactical employment of his Air Force, they feared that these operations would prejudice the oil offensive, then in the balance, particularly as they felt that the Americans were not, at that time, applying the maximum pressure against oil targets.<sup>(2)</sup> They suspected that General Spaatz was being unduly influenced by the demands made by SHAEF for the attack on transportation targets affecting the land battle, due to the proximity of his headquarters to General Eisenhower. The Chief of Air Staff insisted that an assurance must be obtained from General Spaatz that he would not lose any opportunity to bomb oil targets because of this plan. He was sure that Operation Clarion was a chimera in comparison to the 'solid and decisive advantages of oil and communications affecting the land battle' and that if they attempted to carry out all three operations, together with a counter-air force plan, they would 'be guilty of a terrible dispersion of effort'. They would also lose their argument for converting the Air Officer Commanding-in-Chief Bomber Command to support the oil plan.

Ibid  
Encl. 44A

See Chap. 9  
p. 214

The Deputy Chief of Air Staff in a signal to Air Chief Marshal Tedder on 27 December informed him that the time was not suitable for Operation Clarion and that it was better to wait until there was no risk of its execution delaying the destruction of the oil plants in eastern and central Germany.<sup>(3)</sup> The plan was therefore laid aside until February 1945.

Employment of the Strategic Bomber Force in the Anti-U-boat Campaign

C. 39432/49  
Pt. I.  
Encl. 205A

Yet another distraction from the attack of the German oil industry was the U-boat organization which the Admiralty insisted should be placed on a high priority in the list of strategic bombing targets. At the close of October the Naval Staff circulated a warning that a new U-boat offensive was imminent. They thought it possible that the enemy would be able to operate a force of 140 U-boats that winter, which, even if it met with partial success, might hamper the maintenance of Allied forces on the continent, while if it succeeded in sinking a quantity of shipping, might perhaps halt the advance into Germany,

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- (1) Bomber Command was to provide a diversion over the Ruhr during this daylight operation.
  - (2) See also Diary of Operations Eighth Air Force, Appendix 11.
  - (3) Both A.C.M. Harris and General Anderson (Deputy to General Spaatz) opposed the plan, firstly, on the grounds of weather and, secondly, that they would run the risk of heavy casualties from German fighters. (See File B.C/S.32305).

thus prolonging the war and stimulating German morale. The Naval staff demanded that the Strategic Bomber Force should attempt to retard any preparations for such a threat by attacking U-boat construction yards in Germany and maintenance facilities in Norway. The Air Staff professed to be sceptical about this assumed threat and were unwilling to sanction any diversion from the attack of oil.

Ibid  
Encl. 207A

The practicability of employing heavy bombers against the U-boat organization was discussed at the meeting of the Anti U-boat Warfare Committee on 31 October. The Prime Minister who was presiding over the meeting, said that he was not alarmed by the possibility of such a threat and ruled that the Strategic Bomber Force should not be diverted from the attack of the oil industry for the present, but that, in the meantime, detailed plans should be made for bombing all elements of the U-boat organization such as production centres, prefabrication yards, assembly slips, depot ships and U-boat pens. The Chief of Air Staff directed that the whole problem should be reviewed by a committee in which U.S.ST.A.F., the Admiralty and the Ministry of Economic Warfare were represented. They were to discover the time taken for a U-boat to become operational, to investigate the effect of bombs on submarine shelters and the repercussions which the bombing of the U-boat organization would have on the current strategic target system (i.e. oil and communications). Plans were then to be drawn up on the assumption that the U-boat menace would materialise within the time specified by the Admiralty and that a diversion of the heavy bomber force would be permitted.

Ibid  
Encl. 208A

The Committee judged that the heavy bombers could most profitably be employed in the attack of U-boat assembly yards and U-boat operating bases. They worked on the assumption that the war against Germany would have ended by mid May 1945. Only a short time was therefore available because any attacks on assembly yards would be impracticable unless they were able to reduce the U-boat strength during the last two months of hostilities. All bombing would necessarily have to be concluded by 15 March. Moreover, two months were required to make a U-boat seaworthy and the bombers would have to inflict major damage by 15 January if they were to disorganize U-boat production at all. The weather also had to be taken into account because this kind of target normally required visual attack and it was reckoned that visual bombing would only be possible on three or four occasions every month. Unless the attack of U-boat production was given much higher priority only poor results would be achieved. Furthermore the Committee believed that the U-boat bases at Bergen and Trondheim were too far away for successful raids, judging from the poor results obtained that summer on similar bases in the Bay of Biscay which were much closer to the United Kingdom. It was also difficult to bomb through the dense smoke screens put up by the enemy. At the best, the raids might force the U-boats to operate from Baltic bases and would compel them to navigate the hazardous Skagerrak Channel.

Ibid  
Encl. 215A

Ibid  
Encl. 215B  
and  
Mins. 215-217

The Air Staff maintained in a note that, if such operations were to be of any value, U-boat targets would have to be placed on a much higher priority which would merely distract effort from oil. Any relaxation in this quarter would allow enemy activity to increase on all fronts and would cause a resurgence of the German fighter force. The Allied Air Commanders would thus be compelled to divert a number of heavy bombers to counter-air force operations to enable the striking force to reach the target area - an act which would, in itself, be an extra diversion from oil. They therefore concluded that

the Strategic Bomber Force should not be diverted from its main priorities until a point was reached when the Royal Navy and R.A.F. Coastal Command were unable to cope with a greatly increased U-boat threat.

C. 39441/49  
Pt. I.  
Encl. 37A-38A

A.H.B./IIH/  
241/3/599(G)  
Encl. 28A

Ibid  
Encl. 29A

In spite of this contention, the Anti U-boat Warfare Committee, which met on 19 December, decided that, in view of the number of new U-boats being commissioned especially those equipped with the Schnorkel device, the Strategic Bomber Force should attack final assembly yards, slipways and berths.<sup>(1)</sup> Such operations were to take place without detriment to the priorities contained in the current directive to the Strategic Air Forces. General Spaatz and Air Marshal Bottomley agreed upon a directive which was sent to Bomber Command and the Eighth Air Force on 23 December. Subsequently the C.S.T.C. issued a list of priority targets each week. They were to be attacked, either specifically by the marginal bomber effort, or incidentally to major strategic operations in the form of minor diversionary targets, or as targets of opportunity when conditions prevented the attack of main objectives. The first priority list was issued on 29 December and included three groups of targets, first U-boat assembly slips at Hamburg, Bremen and Danzig; second, E-boat bases at Ijmuiden, Waalhaven and Den Helder on the Dutch coast; thirdly, U-boat assembly yards at Kiel and Vegesack. In fact, no major attack on U-boat centres was made during this period by Bomber Command.

C. 39432/49  
Pt. I  
Encls. 219A-221A

C. 39441/49  
Pt. I  
Encls. 45A-47A.

It will be noted that E-boat bases were included in the list of targets. The Admiralty had been pressing for the attack of the E-boat pens at Ijmuiden and Waalhaven in Holland for some time as they were within easy range of the shipping routes to the port of Antwerp. The Deputy Supreme Commander decided that the destruction of these pens would directly influence the land campaign and Bomber Command was instructed to carry out attacks with its specialist squadrons. Further requests were made by the Admiralty for the attack of E-boat bases at Den Helder and Maassluis. The Deputy Chief of Air Staff asked Air Chief Marshal Tedder to state on what priority such targets were to be attacked in relation to close support targets and the other strategic priorities. Air Chief Marshal Tedder replied that they were to rank below close support, oil and transportation targets. Attacks might be made by supplementary forces not employed on higher priority targets. Two attacks on E-boat centres were made by Bomber Command in the course of December.

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(1) These U-boats were pre-fabricated, various sections being constructed at a number of dispersed factories.

CHAPTER 8

THE OFFENSIVE AGAINST OIL AND COMMUNICATIONS  
AND THE DIVERSION IN THE ARDENNES  
1 NOVEMBER 1944 to 18 JANUARY 1945

Growth of the Heavy Bomber Force

A.M.W.R.  
Sum of Bomber  
Command Ops.  
Nov. 1944 -  
Jan. 1945.

R.A.F.B.C.  
Consolidated Form  
'G'.

In the course of October the striking power of Bomber Command had been substantially increased by seven new Lancaster squadrons. Four more squadrons arrived in the course of the following two months. At the end of December there were 53 operational Lancaster squadrons on establishment.(1) By that time the Halifax III squadrons had been reduced by four making 17 squadrons of this type of bomber; there were three squadrons of Halifax VII; one additional Mosquito squadron had been added during the same period which made 10 Mosquito squadrons, two of which were equipped with Oboe. During the months November 1944 to January 1945, there was an average of 1,348 fit heavy and 138 light bombers on the establishment of the Command discounting No.100 Group. The composition of this Group remained constant apart from an increase of two Halifax Squadrons. By the end of December 1944, there were seven Mosquito squadrons, a Fortress, a Liberator, a Stirling, three Halifax III squadrons and No.192 Squadron. There was an average of 139 aircraft on establishment to No.100 Group, during the same period.

Losses to Bomber Aircraft

Bomber Command  
O.R.S. Repts.  
Nos.116, 119  
and 121

Losses continued to be kept down in these winter months both for day and night operations. By daylight, as well as by night, deep penetrations into enemy territory(2) were unusual and daylight fighter escorts were always adequate. Further, the first attempts made by the German day fighters to intercept the British heavy bombers were not conspicuously successful. More troublesome was the large number of aircraft receiving in daylight both serious and minor damage from flak. In November this amounted to 14.7 per cent but in December the figure was reduced slightly because nearly all the German targets were covered by cloud and in January flak damage amounted to only 7.4 per cent of the total number of aircraft despatched. From November 1944 to January 1945 during daylight operations over Germany, out of 76 aircraft missing, 38 were attributed to flak and five to fighter aircraft.

At night, losses were kept low by maintaining tactical superiority over the enemy and by making good use of the available radio counter measures. Apart from a brief rally over the Ruhr at the beginning of November, the enemy night fighter defences continued to be ineffective through December and January and several deep penetrations to eastern Germany, accompanied by small losses, proved the effectiveness of the tactical measures employed by Bomber Command. Confusion amongst enemy night fighters may have been caused by a more intensive effort to jam their aircraft identification equipment(3) The flak defences by night

(1) There were 49 Lancaster I and III and four Lancaster X squadrons.  
(2) Targets were usually situated in the Ruhr area.  
(3) For success of Serrate operations see R.A.F. Signals History, Vol. VII, p.182

also became less formidable as the year drew to its close, and it became evident that the enemy was restricting the fire of heavy flak batteries for the purpose of conserving ammunition. This substantially reduced the number of aircraft returning with flak damage. In November, 19 bombers were lost to flak over German territory and 47 were shot down by night fighters; in December, 18 were lost to flak and 24 to enemy night fighters. The following table illustrates the aircraft losses suffered by Bomber Command over the period November 1944 to January 1945.

<u>Night Operations</u>	<u>Month</u>	<u>No. of Sorties</u>	<u>Losses</u>	<u>Percentages</u>
	Nov.	9,734	102	1.0%
	Dec.	11,567	80	0.7%
	Jan.	9,626	121	1.3%
<u>Daylight Operations</u>	Nov.	5,264	42	0.8%
	Dec.	3,766	31	0.8%
	Jan.	1,344	11	0.8%

Commander-in-Chief Bomber Command's attitude towards aircraft losses and choice of targets

On 24 November the Commander-in-Chief Bomber Command wrote to the Chief of Air Staff urging him that the, then low, loss rate of his Command must be maintained and that in order to keep the figures down he should be given greater latitude in the selection of targets. Most of the high priority targets which he was expected to bomb lay in the Ruhr and this, he claimed, enabled the enemy to concentrate his night fighters in that area, regardless of any diversions and countermeasures that might be devised. The diversionary forces would have a greater chance of success if the targets were more widely dispersed. Apart from this, he felt that his aircrews were growing weary of bombing the same area night after night. Sir Arthur Harris also stressed the fact that the A.D.I. Science in a recent report on 'The Present Eclipse of the German Night Fighter' had pointed out that any small technical advance made by the Germans in their night fighter defence system might result in an increase in Bomber Command's losses. As the air gunners in a bomber were unable to cope effectively with the well armed and armoured enemy night fighter, it was necessary to increase the number of Mosquitos equipped with Mark X A.I. operating in No. 100 Group.

Sir Charles Portal, in his reply on 6 December, said that the Allied bombing effort was being directed in accordance with a short term policy, on the assumption that the war could be won by the early summer of 1945. They should, therefore, avoid attacking targets which would only give long term results and should concentrate upon the destruction of German oil production and communications behind the central sector of the western front. Even though fairly heavy losses had been experienced in the first week of November in the Ruhr, he thought that they would not be justified in cancelling the attack of such targets until the average losses continued to rise after a definite period of time. Moreover, the disadvantage of targets being concentrated in the Ruhr was offset to some extent by the enemy's lack of an early warning system. He reminded the Commander-in-Chief that the attack

A.H.B./  
II/70/272(E)

See Chap.5  
p.120

A.H.B./  
II/70/272(E)

See p.176

DATA FOR AIRFIELDS SHOWN

Unit	A/C	Location	Strength	Serv.
<b>S.S. FIGHTERS</b>				
Stab. J.G. 1	Fw. 190	Greifswald (Reich)	15	3
I/J.G. 1	Fw. 190	Greifswald	36	31
II/J.G. 1	Fw. 190	Tutow	63	55
III/J.G. 1	ME. 109	Anklam	59	45
Stab. J.G. 2	Fw. 190	Nidda (West)	3	0
I/J.G. 2	Fw. 190	Merzhausen	32	29
II/J.G. 2	ME. 109	Midda	58	41
III/J.G. 2	Fw. 190	Altanstadt	32	27
Stab. J.G. 3	Fw. 190	Störmede	5	3
I/J.G. 3	ME. 109	Werl	77	45
III/J.G. 3	ME. 109	Schachten	69	40
IV/J.G. 3	Fw. 190	Störmede	71	48
Stab. J.G. 4	Fw. 190	Rhein-Main	1	1
I/J.G. 4	ME. 109	Darmstadt-Griesheim	44	28
II/J.G. 4	Fw. 190	Mainz-Finthen	69	49
III/J.G. 4	ME. 109	Ebelsbach	49	25
IV/J.G. 4	ME. 109	Rhein-Main	68	39
III/J.G. 6	ME. 109	Schwerin (Reich)	63	60
Stab. J.G. 26	Fw. 190	Groven (West)	3	1
I/J.G. 26	Fw. 190	Groven	45	11
II/J.G. 26	Fw. 190	Kirchhellen	24	14
III/J.G. 26	ME. 109	Plantlunne	32	25
Stab. J.G. 27	Fw. 190	Hopsten	2	1
I/J.G. 27	ME. 109	Rheins	50	37
II/J.G. 27	ME. 109	Hopsten	59	42
III/J.G. 27	ME. 109	Hesepe	62	38
IV/J.G. 27	ME. 109	Achmer	76	36
Stab. J.G. 53	ME. 109	Donaueschingen	4	3
I/J.G. 53	ME. 109	Malsheim: Huchenfeld	39	25
II/J.G. 53	ME. 109	Neuhausen ob Eck	56	33
III/J.G. 53	ME. 109	Donaueschingen	46	22
IV/J.G. 53	Fw. 190	Vörden	63	5
Stab. J.G. 300	Fw. 190	Jüterbog-Damm (Reich)	5	5
I/J.G. 300	ME. 109	Bornhede	51	41
II/J.G. 300	Fw. 190	Löbnitz	59	48
III/J.G. 300	ME. 109	Jüterbog-Damm	56	45
IV/J.G. 300	ME. 109	Reinsdorf	55	48
Stab. J.G. 301	Fw. 190	Stendal	-	-
I/J.G. 301	Fw. 190	Salzwedel	56	45
II/J.G. 301	Fw. 190	Sachau	66	55
III/J.G. 301	Fw. 190	Stendal	61	55
			1,766	1,323
<b>High FIGHTERS</b>				
Stab. N. J.G. 1	ME. 110	Paderborn	3	1
I/N. J.G. 1	ME. 219	Handorf	53	16
II/N. J.G. 1	ME. 110, JU. 88	Düsseldorf: Paderborn (3 only)	51	20
III/N. J.G. 1	ME. 110, JU. 88	Werl	49	26
IV/N. J.G. 1	ME. 110, JU. 88	Dortmund	34	21
Stab. N. J.G. 2	JU. 88	Cologne - Ostheim	1	1
I/N. J.G. 2	JU. 88	Twente	53	15
II/N. J.G. 2	JU. 88	Yechta	32	10
III/N. J.G. 2	JU. 88	Güterloh	52	26
IV/N. J.G. 2	JU. 88	Copenhagen - Kastrup	39	35
Stab. N. J.G. 3	JU. 88	Stade	5	3
I/N. J.G. 3	ME. 110, JU. 88	Grove	49	29
II/N. J.G. 3	JU. 88	Schleswig: Runum	52	30
III/N. J.G. 3 (Stab + 7)	JU. 88	Stade	18	15
	JU. 88	Nordholz	15	12
	JU. 88	Ütersen	15	11
	JU. 88	Marx	38	27
IV/N. J.G. 3 (9)	JU. 88	Güterloh	4	1
Stab. N. J.G. 4	JU. 88	Langendiebach	32	16
I/N. J.G. 4	JU. 88	Güterloh	36	20
II/N. J.G. 4	JU. 88	Kassel-Rothwesten	32	17
III/N. J.G. 4	JU. 88	Stubendorf (Silesia)	58	26
IV/N. J.G. 4	ME. 110, JU. 88	Lübeck - Blankensee	72	28
Stab. N. J.G. 5	JU. 88, ME. 110	Schleissheim	4	2
I/N. J.G. 5	ME. 110, JU. 88	Gross Sachsenheim	51	35
II/N. J.G. 5	JU. 88	Schwabach Hall	25	23
III/N. J.G. 5	ME. 110, JU. 88	Kitzingen	46	34
IV/N. J.G. 5	JU. 88, ME. 219	Verneuchen (Berlin)	18	10
N. J.G. 10	ME. 110, JU. 88	Finow (Berlin)	13	9
St. N. J.G. 10 (Loss 1 & 3)	ME. 109, JU. 88	Biblis	10	7
I/N. J.G. 11	ME. 109	Passberg	10	7
II/N. J.G. 11	ME. 109	Born-Hangelar	10	7
III/N. J.G. 11	ME. 109	Jüterbog-Damm	34	24
			993	537

FIGHTER DEFENCES OF THE REICH  
25 NOVEMBER 1944



of oil targets in eastern and central Germany might provide an opportunity for creating a diversion and that there were also a number of industrial towns, including Breslau, Munich, Chemnitz and Dresden, which could be bombed when the weather was unsuitable for the attack of first priority targets. If, for tactical reasons, it was necessary to deploy large diversionary forces for the attack of an important target, such as Leuna, the Commander-in-Chief was fully justified in doing so. Nor did the Chief of Air Staff believe that the bomber crews would experience a fall in morale and quoted, as example, the continuous raids on marshalling yards in France during the preparatory phase in Overlord which led to a noticeable improvement in the accuracy of bombing attacks. The Chief of Air Staff held that high risks ought to be taken in order to finish the war as rapidly as possible and that 'our readiness to accept casualties must be determined only by the value of the strategic prize to be gained'. Finally, he informed the Commander-in-Chief that the latter would be allocated an additional five Mark XXX Mosquitos per month and would also have the benefit of five Fighter Command Mosquito squadrons which had been detailed for a bomber support role.

A.H.B./ID4/113

Four of these squadrons equipped with Mark X A.I. and one equipped with Mark VIII A.I. were in operation by the end of 1944 and were used for high level interception of enemy night fighters. Owing to the small output of Mosquitos Mark XXX (only 50 per month) three of Bomber Command's Mark VI squadrons were equipped with A.S.H. and Monica Mark VI as a temporary measure. But in spite of Sir Arthur Harris's requests the Fighter Command squadrons were not transferred to Bomber Command's control.

#### Operations of the Bomber Support Group

##### Night Fighter Operations

A.H.B./  
II41/44  
pp.12 - 15

Two new homing devices were introduced during this period in No.100 Group. One was called Serrate Mark IV which was intended to be a homer on the enemy's new A.I. - the SN2 discovered in the summer of 1944; it was first used operationally in January 1945. The other homing device was known as Perfectos, and was designed to combat the enemy's 'Egon' system used for controlling his night fighters. Perfectos, first fitted in Mosquitos equipped with A.I. Mark IV, was an airborne interrogator for the enemy's I.F.F. (Fuge 25A), it was fitted with a directional aerial system and served a similar purpose to Serrate with the additional advantage of being able to give indications of range. Operational trials with Perfectos took place in November 1944 but satisfactory results were not obtained until the equipment was installed in Mosquitos with A.I. Mark X<sup>(1)</sup> early in 1945.

In addition to their interception tasks, the night fighters of No.100 Group helped to confuse the enemy's early warning and inland plotting system by causing it to plot hostile aircraft over wide areas as well as compelling the enemy controllers to warn their own fighters of hostile intruders. Bombing operations were also carried out in support of Window dropping feints.

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(1) For further details see R.A.F. Signals History Vol.VII, pp.180-183. See also for views on value of Serrate and Perfectos on the bombing offensive.

The technique of night fighter support was improved by the production of larger quantities of A.I. Mark X. It was unfortunate that the equipment most suitable for bomber support should not have been available in any large numbers until the enemy night fighter opposition was in eclipse. Experience showed that it was most profitable to use A.I. Mark X on high level rather than on low level types of patrol. At first, patrols were flown over the target area after bombing, at possible assembly areas, and as escort at a distance from the bomber stream. The target area was found to be the most profitable area for patrols. In November 'clock' patrols at the target were initiated. The fighters were given positions round the target at a distance of six to ten miles and detailed to patrol the line between their position and the target during and after bombing to intercept enemy fighters coming in from all directions.

Another A.I. device, the Mark XV (A.S.H.) was used as a substitute for A.I. Mark X, as there was insufficient equipment of the latter kind for the whole night fighter force. First used operationally in December 1944 by three squadrons, it did not produce a large number of contacts.

The weather during November and December did not suit low level intruder work and low level intruder squadrons were trained to fly at high level, as well as at low level, to suit the prevailing weather.

From November 1944 to January 1945 Mosquitos equipped with A.I. Mark X claimed to have destroyed 63 enemy aircraft, those equipped with A.I. Mark IV, two aircraft; intruders without radar equipment shot down one enemy aircraft in the air and destroyed two on the ground.

#### Radio Counter Measures in No.100 Group

The heavy squadrons of No.100 Group continued their task of diverting the enemy's night fighter defences from the main bomber stream. Briefly, their tactics consisted of flooding the Ruhr area with Window at a time when it was being constantly attacked by Bomber Command, and when surprise was therefore far more difficult to achieve, and, secondly, the adoption of similar ruses when there was no bomber force over that area. By December 1944, Nos.214 and 223 Squadrons were equipped with Carpet (anti-Wurzburg) and Piperack (anti S.N.2) besides Jostle (anti H.F. and V.H.F.).(1) Mosquitos of No.192 Squadron began to operate as jammers. The intention was to jam the enemy A.I. in conjunction with Piperack and to stay over the target area for some time after an attack, covering the withdrawal of stragglers.

#### Introduction of Dinah to Main Force Aircraft

Dinah, an electrical jammer, which had previously been tried only in spoof and Window forces, was introduced into all main forces on 6/7 November and continued in use thereafter. The rate of discharge of the appropriate size of Window by Main Force aircraft was also increased. There appeared to be a slight decline in enemy night fighter efficiency after counter measures against SN2 were intensified, but it was difficult to attribute it to any particular cause.

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(1) See also R.A.F. Signals History, Vol.VII, for a more detailed account of this equipment.

Ibid  
pp.27 -28

Bomber Command  
O.R.S. Rept.  
No.116,  
para. 45 et  
seq.

A New Navigational Aid - SS and Homing Loran

Bomber Command  
O.R.B.  
Entry 8325  
July 1944

Negotiations had been in progress for some time for the provision of the American long range navigational aid, known as Loran, for Bomber Command aircraft. The Loran system was in many ways similar to Gee but was capable of giving result up to 12,000 miles. The equipment carried by an aircraft was interchangeable with Gee and two Loran chains were erected; one, known as the S.S. chain which was designed to provide fixes over most of the continent, and the other, known as the homing chain, to cover bases in the United Kingdom. Bomber Command considered that, as it was impracticable to install both Gee and Loran in the same aircraft, the homing chain must be provided on the Loran system. As there was, in the first half of 1944, a shortage of this equipment, it was considered advisable to delay the introduction and use of SS Loran until after the summer of 1944. Trials of the S.S. chain were carried out by Mosquitos of the Pathfinder Force in the early autumn<sup>(1)</sup> to discover its effectiveness and bomber crews were trained to use the Loran homing chain.

Ibid  
Entry 8991  
Oct. 1944

After these trials the Loran homing chain was found to be unsatisfactory as an alternative to Gee because of its severely restricted range and poor performance at low altitude at night. The results of a limited number of flights on the S.S. chain had shown reception to be good. For this reason, therefore, and because of the existence of Loran chains in other theatres of war where Bomber Command might be called upon to operate, Loran equipment was deemed to be an operational requirement, in addition to Gee, in all heavy bombers and Mosquito aircraft not fitted with Oboe or H2S. On 16 November Bomber Command informed the Air Ministry of its requirements for Loran airborne equipment. These were as follows: retrospective fittings were to be made to non H2S Mosquitos of Nos. 5 and 8 Groups, Pathfinder Force Lancasters, No. 5 Group Lancasters and heavy bomber support aircraft of No. 100 Group. Production line fittings were to be made in all non H2S Mosquitos of Nos. 5 and 8 Groups, all Lancaster and Lincoln production aircraft, all non H2S Halifax production aircraft. Loran equipment was subsequently fitted to all aircraft of No. 5 Group by 31 December 1944.<sup>(2)</sup>

Ibid  
Entry 9089  
Nov. 1944

Operations: Increased Weight of Attack on Oil Targets in November.

A.M.W.R.  
Sum of Bomber  
Command Ops.  
November 1944

Although oil was the first priority in the directive to the Strategic Air Forces, Bomber Command dropped 14,312 tons, against the German oil industry in November as compared with 27,696 tons against town centres, several of which were, admittedly, closely connected with the railway system of western Germany, and 4,892 tons against transportation. During the second half of December, it has already been explained that the German counter offensive in the Ardennes caused a diversion from oil and that month Bomber Command aimed 5,109 tons (10.4 per cent of the total tonnage) against oil targets, but two of these, Merseburg/Leuna and Politz in Eastern and central Germany were targets which had

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- (1) Loran was first used in a raid on Frankfurt on 12/13 September 1944.
  - (2) For reports on the efficiency of S.S. Loran see Bomber Command O.R.S. Reports Nos. S.195 and S.198.

been, since the beginning of November, on the waiting list for night attack. Although Bomber Command dropped a small tonnage in comparison with that dropped on area or transportation targets it had, nevertheless, greatly increased its effort against oil since September and October and, when compared with the operations of the Eighth Air Force during this period, Bomber Command discharged 660 tons as compared with 388 tons for every U.S.S.T.A.F. mission. Apart from the heavier bomb-load carried by the British, their blind bombing techniques were becoming increasingly effective and were doubling the number of opportunities to raid oil targets. By the beginning of 1945 the enemy acknowledged the fact that the night bombing attacks had become more destructive and more accurate than the daylight raids 'since heavier bombs are used and an extraordinary accuracy in attaining the target is reported'. The C.S.T.C. Working Committee (oil) stated in its report at the end of the war; 'Perseverance on the attack of the principal oil targets by blind bombing undoubtedly held in check the recovery, and at any rate in western Germany, succeeded in its object of inflicting decisive damage on important producers'.

Flensburg  
Docs. Vol.III  
Speer to Hitler  
19 January 1945

A.H.8/IA/21  
p.66

A.M.W.R.  
Sum of Bomber  
Command Ops.  
Nov. 1944

The heaviest raids against the oil industry were made in November by all three Strategic Air Forces which dropped a grand total of 36,081 (short) tons against this kind of target compared with 11,065 (short) tons in October. The oil targets selected by Bomber Command were all situated in or around the Ruhr. They were Homberg/Meerbeek, which was raided five times by heavy bombers and once by Mosquitos, Castrop Rauxel, Dortmund, Wanne Eickel, Harburg (near Hamburg), Sterkrade and Gelsenkirchen. Minor attacks were delivered by small forces of Mosquitos against the Benzol Plants at Osterfeld, Bottrop Welheim, and Duisberg. Several of these Mosquito attacks took place in daylight, the first time these aircraft had been used to carry out independent daylight attacks.

8th Air Force  
Monthly sum  
of Ops.  
Nov. 1944

The Eighth Air Force also attacked the synthetic plants in the Ruhr and bombed targets farther afield at Harburg, Misburg, Bohlen and Zeitz. It discharged a total of 15,884 tons on oil targets. The Fifteenth Air Force operating against oil refineries and storage depots in Southern Germany and Austria dropped 4,168 tons.

A.H.B./IA/21  
Table 21

Ten raids were carried out in daylight mainly by No.3 Group, using its G.H. equipment, but there were occasions when Nos.1, 5 and 8 Groups were involved. A total of 13,030 tons was dropped by Bomber Command in these Ruhr oil attacks. A total of 4,323 tons was dropped on the plant at Homberg/Meerbeek alone. The plant had already been put out of action by Bomber Command during the summer and the additional damage wrought during November caused the plant to be closed down and plans were made for dispersing the equipment. Castrop Rauxel which received one attack by day and one by night had also not resumed full production. After the raid on 21/22 November all attempts to repair the plant were abandoned and steps were taken to disperse undamaged equipment. No.5 Group (245 aircraft) was responsible for the attack on Harburg on 11/12 November. Here much destruction was achieved, particularly the asphalt treatment and storage area. This raid is also of interest because it was the first occasion on which S.S. Loran, the new navigational aid, was used in a large scale operation over north west Europe. Extensive

U.S.S.B.S.  
Rept. No.125  
Vol.1 p.1

Ibid  
Rept. No.122  
Vol.1, p.1.

Bomber Command  
Night Raid  
Rept. No.766

Bomber Command  
O.R.S. Rept.  
No.8.198

A.H.B./IIT/  
241/3/615(A)  
Encl. 58A

damage was also caused in plants at Dortmund and Wanne Eickel. By the end of November the synthetic oil plants in the Ruhr were judged to have stopped production.

#### Raids on Leuna and Politz

See Chap.7  
p.152. 8th A.F.  
Monthly sum of  
Ops.  
Nov.-Dec.1944  
Bomber Command  
Night Raid  
Rept. No.785

The outstanding attacks on oil targets in December were against Merseberg/Leuna in the Leipzig area and Politz near Stettin, both of which the British Air Staff had been urging the Commander-in-Chief, Bomber Command to bomb since the beginning of November. The Eighth Air Force had visited Merseberg/Leuna five times in November and on 6 December dropped over 1,000 tons on the oil plant. On that night 497 aircraft from Nos. 1, 3 and 8 Groups were despatched against Leuna and dropped 1,847 tons of bombs. The main force was covered by aircraft carrying Window which operated in the direction of Berlin. This ruse was supported by Mosquitos which bombed the German capital. Photographs of the target, including the damage caused by the recent attacks of the Eighth Air Force, showed that the oil refinery fertilizer and new plant sections at the south end of the plant had been seriously damaged. Only four aircraft (0.8 per cent of the total force) were lost. A further attack on Leuna was made by the Eighth Air Force on 12 December.

Ibid  
Rept. No.797

On 21/22 December 207 aircraft of No.5 Group<sup>(1)</sup> made for Politz in eastern Germany, last put out of action for a period of some three weeks by the Eighth Air Force on 7 October.<sup>(2)</sup> The bombing technique employed was No.5 Group Newhaven but the markers fell 300 yards north of the aiming point and only minor damage was caused. Four Lancasters from the main force made a feint attack on the aircraft assembly factory at Schneidemuhl nearby. The Politz force did not encounter much opposition either from the air or from the ground. The German fighter defences were more concerned with the possibility of an attack against Berlin while the oil refinery was protected by only 30 guns, one tenth of the number expected. Only three bombers (1.5 per cent) were lost. Bad weather was experienced over the home bases and 145 aircraft landed in Scotland on their return.

Bomber Command  
O.R.S. Rept.  
No.119  
para. 43

The small losses experienced in the night raids on Leuna and Politz proved that the anxieties expressed by the Commander-in-Chief Bomber Command were largely groundless. Bomber Command had, in fact, underestimated the effect of the bombing of oil targets on the German fighter defences. Conservation of fuel imposed stringent limitations on the defence of all but the most essential industrial areas like the Ruhr and the Rhineland. The interior of Germany was thus comparatively lightly defended.

A.H.B./ID3/1773A

- (1) The C.A.S. complained that insufficient bombers were despatched on this raid. Sir Arthur Harris considered that no other Group would have achieved the same results and that, on such small targets, mere numbers added to confusion. He did not expect to hit such targets outside G.H. or Oboe range more than once in three attempts. This argument was countered by the C.A.S., who quoted examples when twice the number of aircraft had been despatched against targets of a similar size.
- (2) The Eighth Air Force had also bombed Politz on 20 June and 25 August.

Other raids on the oil industry in December were made on Gelsenkirchen and the Benzol and Coking Plants at Scholven Buer, Dortmund, Osterfeld and Duisberg, in accordance with the Air Ministry instructions that raids on synthetic oil plants in the Ruhr should cease for the time being. The heaviest attack was directed against Scholven Buer which received a total of 1,625 tons. Aerial reconnaissance showed that the weight of the raids had fallen on the north-east part of the plant.

A.M.W.R.  
Sum of Bomber  
Command Ops.  
December 1944

Meanwhile the strategic bombers operating from the United Kingdom were occupied with the battle on the Western Front and it was the turn of the Fifteenth Air Force to maintain the pressure against such targets as Blechhammer, Brux and Oswiecim.<sup>(1)</sup> In the third week of January 1945, after the heavy bombers had been released from their commitments in the Ardennes, Bomber Command returned to the attack of oil plants in eastern and central Germany. This followed upon the recommendation of the C.S.T.C. and also after the lengthy correspondence between the Chief of the Air Staff and the Commander-in-Chief Bomber Command in which the former had suggested that a more intensive effort against oil should be made by Bomber Command. This time the operations met with a far greater measure of success. On 13/14 January No.5 Group made an independent attack on Politz. Blind bombing technique had been planned but weather conditions over Politz enabled this Group to use its low marking technique. The bombing, together with another raid on 8/9 February 'reduced the synthetic oil plant to a shambles. The whole target was saturated with bombs leaving a wake of wrecked buildings, shattered tanks and hundreds of feet of badly buckled piping'. It appeared from air photographs taken on 3 March that repair work had been abandoned and it was believed that the plant had to all intents and purposes been evacuated.<sup>(2)</sup> A circuitous route was taken by No.5 Group which approached the target from the south in order to make the enemy believe that they were about to attack Berlin. Only two aircraft were lost. In the raid on 8/9 February eleven out of 475 bombers were lost.

See Chap. 7  
p. 152

Bomber Command  
Night Raid  
Rept. No. 815

Bomber Command  
Night Raid  
Rept. No. 833

On the 14/15th in two attacks, 2,212 tons of bombs were dropped on Merseburg/Leuna, the first by No. 5 Group using controlled Newhaven technique and the second, four hours later, by Nos. 1, 6 and 8 Groups. Altogether 587 aircraft were involved in the operation. The second attack was the most successful and concentrated bombing was achieved. Eight aircraft were lost from the two attacks and that this figure was no greater was due to the elaborate counter measures devised by No.100 Group.

Ibid  
Rept. No. 816

On 16/17 January the first attacks were made by Bomber Command on Zeitz in the Leipzig area and Brux in Czechoslovakia, the latter another target which the Air Staff had been pressing upon the Commander-in-Chief for sometime. Zeitz was bombed by Nos. 1, 6 and 8 Groups and the northern half of the target suffered particularly. At Brux, which was bombed by No. 5 Group, practically every installation in the plant was hit or damaged. Although a large number of enemy fighters were up

Ibid  
Rept. No. 817

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- (1) In many ways this was the most remarkable series of sustained operations of the whole oil offensive. The immobilization of the Silesian synthetic oil plants was clinched four weeks later with their capture by the Red Army.
  - (2) But according to German documents (see Chap. 9. p.211) Politz was still in operation, although in a small scale, in March.

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only nine aircraft were lost from these two attacks. Heavier losses were suffered by a force which raided Magdeburg and from which 17 bombers failed to return. After these heavy attacks in December and January the final outcome of the oil offensive was never again in doubt.

Summary of Attacks on Oil Targets

Below is a summary of the oil offensive conducted by the three Allied Strategic Air Forces from October 1944 to January 1945.

	<u>No. of Attacks made</u>	<u>Short tons of bombs dropped</u>
<u>OCTOBER</u>		
Bomber Command .....	10	4,088
Eighth Air Force .....	18	4,462
Fifteenth Air Force .....	10	2,515
<u>NOVEMBER</u>		
Bomber Command .....	22	16,029
Eighth Air Force .....	32	15,884
Fifteenth Air Force .....	19	4,168
<u>DECEMBER</u>		
Bomber Command .....	17	5,722
Eighth Air Force .....	7	2,937
Fifteenth Air Force .....	33	6,226
<u>JANUARY</u>		
Bomber Command .....	24	10,114
Eighth Air Force .....	17	3,537
Fifteenth Air Force .....	5	2,023
<u>TOTAL</u>		
Bomber Command .....	73	35,953
Eighth Air Force .....	74	26,820
Fifteenth Air Force .....	67	14,932
	214	77,705

Flensburg  
Docs. Vol. III

The effects of the bombing of the German oil industry can best be illustrated by Speer's correspondence with Hitler. On 19 January Speer sent Hitler the figures of oil production for the months October to December 1944. The production of aviation spirit which had fallen to 18,000 tons in October, rose in November to 41,000 tons largely because bad weather hampered bombing operations. These figures justify the anxiety felt by the British Air Staff lest there be any undue diversion from the oil offensive. However, by December, production had dropped again to 25,000 tons. Petrol, which in October amounted to 57,000 tons, had fallen to 51,000 tons in December. Diesel oil, on the other hand, had increased from 66,000 to 75,000 tons. Speer stated that the synthetic oil industry in western Germany had ceased production in December, particularly at Scholven, Wesseling, Welheim and Gelsenberg. He stressed the fact that after each raid it became increasingly difficult to repair installations largely because reserves of machinery had either been exhausted or destroyed. The underground installations which were being built for the

production of aviation spirit were not yet ready to start production. Since fuel from underground plants could not be expected within the next few months the Wehrmacht was entirely dependent on surface installations. Speer stated that aviation fuel was especially vulnerable to attack as it could only be produced at four plants. 'The complete stoppage of Leuna, Politz, Blechhammer and Brux has had a lasting effect. In spite of strong A.A. cover, Leuna has been severely hit on several occasions. Fighter cover has never appeared in sufficient strength for an effective fighter defence against enemy air attack to be possible'. Speer concluded by warning the Fuehrer that future production of oil depended entirely on the adequate protection of the surface installations.

#### Attacks on Industrial Cities and Transportation Targets.

Bomber Command continued the offensive against towns in the Ruhr, begun in October. Altogether 18 attacks in the Ruhr and other parts of Germany were made, of which two were targets named in the list issued by the C.S.T.C. as being specifically associated with transportation. The losses to bomber aircraft remained on a low level and in night operations during November no more than 102 aircraft (1.0 per cent of the total number of sorties) were lost. The main reason was that penetrations were shallow and, because of the inefficient early warning system, the enemy fighter defences were unable to go into action quickly enough. The Pathfinder aircraft which flew in the van of the main force therefore experienced the minimum number of casualties. In October No. 8 Group lost only two aircraft in 564 sorties and in November 535 sorties were flown without any losses. Apart from weakening enemy defences, the activities of the Bomber Support Group were increasing and radio counter measures were becoming more effective.

In November heavy night attacks were made against nine targets in the Ruhr. They were Dusseldorf (4,491 tons), Bochum (3,341), Duisburg (2,127) tons, Neuss (1,926 tons), Freiburg (1,696 tons), Essen (1,203 tons), Oberhausen (1,186 tons), Munich (781 tons) and Koblenz (743 tons). Daylight attacks were made against five targets: Gelsenkirchen (3,351 tons), Solingen (1,829 tons), Munster (1,698 tons), Dortmund (1,633 tons) and Warne Eickel (1,280 tons).

For the first week of November the enemy reacted more strongly than usual against night raids. For example in the attack on Dusseldorf on 2/3 November 15 bombers were lost. Combats took place on the return route when Ju's 88, Me's. 110 and Me's. 109 were directed into the bomber stream. Bomber crews claimed the destruction of twelve enemy aircraft including eight alleged jet fighters.

Dusseldorf, in spite of the damage caused during the 1943 raids, had remained the leading commercial city of northern Germany and the seat of the general administrative departments of the iron and steel, heavy engineering and armaments concerns of the Ruhr and Rhine regions. In this attack heavy damage was inflicted on the northern part of the town.

Bomber Command suffered heavier losses two nights later in an attack on Bochum an important coal production centre in the Ruhr. This raid took place in conjunction with the breaching of the Dortmund-Ems Canal by No.5 Group. For the first time since August the bombers approached the Ruhr via the North Sea and Holland. The enemy controllers succeeded in plotting the spearhead of the Ladbergen force off Yarmouth and

Bomber Command  
O.R.S. Rept.  
No.116 para.26  
et seq.

Ibid  
para. 25

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
Nov. 1944

Bomber Command  
O.R.S. Rept.  
No.116 Para.27

Bomber Cmd.  
Night Raid  
Rept. No.758

Ibid  
Rept. No.760

tracked it for the last sixty miles over the North Sea. Fighters were awaiting the bombers as they approached the target area. A total of 24 aircraft were lost and nine others were wrecked from various causes. There might have been heavier casualties if the bombers had not been protected by 10/10ths cloud over Belgium on the return route. However the damage done by the attackers was extensive. This raid, together with that of 9/10 October, destroyed 92 per cent of the built up area of Bochum.

Bomber Command  
O.R.S. Rept.  
No.116 para. 17

A.H.B./IHM/44

In the second half of November the enemy lost control of the situation and bomber losses decreased again. In the last week of this month two attacks were made on Neuss and one each on Duisburg, Freiburg, Essen. In the second raid on Neuss a new method of Window dropping was introduced. The succession of heavy raids on the Ruhr offered little chance of concealing the main area of attack from the enemy. No.100 Group aircraft, therefore, fanned out over the whole area saturating it with Window which prevented the enemy controllers from obtaining a clear track of the bombers.

Bomber Command  
Night Raid  
Rept. No.776

Ibid  
Rept. No. 779

At Freiburg the bomber force aimed at the marshalling yard but instead severe damage was caused to the town centre and 59 percent of the built up area was destroyed. At Duisburg the force of 557 aircraft encountered 10/10ths cloud but the aircraft bombing on Oboe put down a good concentration of bombs. An important distillation plant and the main railway station were hit. In all these night attacks on the Ruhr in the last week of November only four aircraft were lost.

Ibid  
Rept. No.775

Ibid  
Repts. No.762  
and 769

Two attacks were made on more distant targets. On 26/27 November No.5 Group, using Loran navigational aids, made an attack on Munich, a target associated with transportation facilities. There was good visibility over the target area, the marking was accurate and the bombing well concentrated. Reconnaissance revealed that the main railway station had been damaged. No aircraft were lost. On 6/7 and 20/21 November accurate attacks were made on Koblenz.

Bomber Command  
Int./Tacs.  
No.278/44

Ibid  
No.286/44

Bomber Command  
Quarterly Rev.  
No.11 p.7

Ibid

No.3 Group continued to be responsible for the majority of daylight attacks against industrial areas with the exception of the attack against Gelsenkirchen on 6 November by Nos. 1, 4, 6 and 8 Groups, flying in gaggle formations, and a raid on Munster on 18 November in which Nos. 4, 6 and 8 Groups took part. The heaviest daylight raid in November was against Gelsenkirchen, a town which was associated with the oil industry. Twelve factories were heavily damaged and reports in the local press revealed that factories were idle up to three weeks after the attack. The steel manufacturing town of Solingen was bombed by No.3 Group on 4 and 5 November. In spite of poor weather the old town was largely razed to the ground and five industrial plants were damaged. Munster, a target associated with communications, was bombed on 18 November by No.3 Group and on 5 December Hamm, another communications centre, was visited by the same Group.

Bomber Command  
Int./Tacs. No.  
288/44

Bomber Command  
O.R.S. Rept.  
No. 119,  
para. 12.

(89446) 199

Enemy fighter opposition during these daylight operations was negligible. The first reactions to British daylight raids were made on 21 November but the fighter escorts prevented any interception and the bomber crews did not sight a single hostile aircraft. In the raid on 5 December two bomber formations were plotted continuously from half way across the North Sea and a warning was heard

passed to flak units that 200 fighters were to operate over the Ruhr-Homberg area. A fighter force of about half this size was sighted east of Wesel but only one heavy bomber was attacked.

By 27 November the C.S.T.C. had issued a list of area targets which were closely associated with the two top priorities, oil and communications, and which were also of general economic importance. Eight targets associated with railway facilities were bombed by night in the first two weeks of December, before Army support operations in the Ardennes began. They were Essen, Karlsruhe, Hagen, Duisburg, Osnabruck, Ulm, Heilbronn and Munich. At Essen further damage was inflicted on the Krupps works and business and residential property. A long detour was made to Essen but the counter operations of No.100 group were so good that although the enemy had warning for an hour before the attack began he was unable to decide along which route the bombers would approach. Four Gruppen of night fighters were airborne but their instructions came too late for them to attack the bomber stream. The enemy was similarly frustrated at Hagen in the Ruhr on 2/3 December when six Gruppen were despatched to intercept the bomber force, but they were forestalled both by the countermeasures and bad weather. In the attack on Heilbronn (a No.5 Group operation) where the bombing was well concentrated heavier losses were experienced, 11 aircraft (3.7 per cent) failed to return.

Bomber Command  
Night Raid  
Rept. No.789

Ibid Rept.  
No.783

Ibid Rept.  
No.794

Bomber Command  
Quarterly Rev.  
No.11, p.8

On the night of 17/18 December, the second night of the Ardennes offensive, Bomber Command attacked Duisburg, Ulm and Munich. Ulm situated on the upper Danube between Stuttgart and Augsburg was important as an administrative and communications centre for southern Germany and contained a number of war production factories and military installations. A large part of the city was devastated and at least 30 factories were damaged or destroyed, among them the works of Klockner-Humboldt Deutz A.G., producers of armoured fighting vehicles and motor transport. Munich was again attacked by No.5 Group. Severe and widespread damage was inflicted on the old city centre and districts north and south of the main station.

Two towns exclusively associated with industry were bombed in December. They were Oberhausen and Bonn but at the latter place no additional damage was done.

There was one important attack on a single industry in this period. The works of I.G. Farbenindustrie at Ludwigshaven were bombed on 15/16 December. Damage was concentrated in the area of the nitric acid plant, the experimental synthetic oil plant and the heavy chemicals plant. As a result of the raid and previous Bomber Command and U.S.ST.A.F. attacks, about 350 buildings out of an approximate total of 700 were damaged or destroyed.

Ibid

Transportation Targets: Attacks on the Dortmund - Ems and Mittelland Canals.

It will be recalled that the first raid in 1944 by Bomber Command on the Dortmund-Ems canal took place on 23/24 September. The enemy resumed navigation nearly a month later on 21 October. In the meantime further plans had been made to put the canal out of action again. No.5 Group made its second attack on Ladbergen on the night of 4/5 November and breached the canal at the same place, but this time the breach on the western by-pass was much wider. The eastern

See Chap. 6  
p.141

Bomber Command  
Night Raid  
Rept. No. 760

U.S.S.B.S.  
Rept. No.200  
Chap. 5  
Bomber Cmd.  
Quarterly Rev.  
No.11 p.13

by-pass was also hit and two lengths of the embankment, totalling about 1,500 feet were destroyed. Two bombs pierced the viaduct over the River Glane. The result was that both arms of the canal became impassable and the water carrying barges with it, flowed into the surrounding countryside, emptying the canal both from the north and from the south. The Mittelland canal was also drained for the first 18 miles because a safety gate had accidentally been left open. Three aircraft were lost during the operation, of which two were shot down by enemy fighters close to the target area on the return route. The eastern arm was sealed off and repair work began on the western arm. These repairs were completed by 21 November and on that date the canal was being filled with water.

Bomber Command  
Night Raid  
Rept. No.770

The third attack was made on 21/22 November, Loran being used for the operation. The attack was timed to take place just before the canal was filled with water and it prevented navigation along the canal being resumed. Each of the 128 aircraft despatched bombed the target. Cloud was down to 4,000 feet and the bombers flew beneath it in order to deliver their bombload accurately. The embankments of the western arm were breached on both sides of the safety gate and the canal was again drained from the Ems Underpass to Bevergern. The enemy tenaciously repaired the waterway again. Reconstruction was completed by 24 December and on that date through navigation began once more.

U.S.S.B.S.  
Rept. No.200  
Chap. 5

Just over a week later, on 1 January 1945, a further breach was made, 180 feet in length, and all barge traffic ceased again. Repairs to the canal were completed on 6 February and navigation was resumed to the north and south but not to the east.

Ibid

Bomber Command  
Night Raid  
Rept. No.762

The bombing of the Mittelland canal at Gravenhorst was equally effective. The first attack by Bomber Command against this target was made on 6/7 November by No.5 Group, but because of darkness and haze it was impossible to identify the aiming point and the mission was abandoned. On the night of the 21/22nd, the night on which the third attack on Ladbergen took place, the bombers flew below cloud level and made a breach in the embankment. The eighteen miles of the Mittelland Canal was drained and navigation stopped. Over a distance of a mile photographs showed 59 stranded barges. Nevertheless, on 10 December, navigation beyond Gravenhorst was resumed. The next attack on this target was made on 1/2 January, the night after the daylight bombing of Ladbergen. The aircrews put down a most accurate concentration of bombs and the embankment was holed in many places. Although repairs were made rapidly, navigation beyond Gravenhorst was never resumed again.

Ibid  
Rept. No.770

U.S.S.B.S.  
Rept. No.200  
Chap. 5  
Bomber Command  
Night Raid  
Rept. No.806

The operations against these two canal systems were, apart from the damage inflicted on rail facilities in area attacks on towns, the most profitable contribution which Bomber Command made towards the transportation campaign that autumn and it seriously affected the movement of raw materials and goods away from and into the Ruhr.<sup>(1)</sup>

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(1) The carriage of pre-fabricated U-boat sections was also affected (See Chap. 10, p.240) see also Speer's views on the bombing of the canals Chap. 11, p.258.

A.H.B./  
II/79/3  
p. 262

This is illustrated by a table of traffic reproduced in a report of the British Bombing Survey Unit which shows the flow of traffic through the Munster Locks on the Dortmund-Ems Canal from October 1944 to January 1945. The following figures have been adapted from this report.

Month	Traffic to North and East 1,000 tons per month		Traffic from North and East 1,000 tons per month	
		Percentage		Percentage
Monthly average for year ending 23 September, 1944.	844	100	585	1,000
October, 1944	180	21.4	174	29.7
November, 1944	42	5.0	75	12.8
December, 1944	241	28.6	25	4.3
January, 1945	14	1.6	11	1.8

The attacks by Bomber Command against the two canal systems during the period November 1944 to January 1945 have been summarised as follows.

A.M.W.R. Sum  
of Bomber  
Command Ops.  
Nov. 1944 -  
Jan. 1945.

Date	Target	Aircraft			Tonnage
		Despatched	Attacked	Missing	
4/5 Nov. 1944	Ladbergen (Dortmund-Ems)	176	170	3	930.4
21/22 " "	"	128	128	-	629.2
1 Jan. 1945	"	104	94	1	558.6
		408	392	4	2,118.2
6/7 Nov. 1944	Gravenhorst (Mittelland)	235	30	10	66.7
21/22 " "	"	143	129	2	613.3
1/2 Jan. 1945	"	157	152	2	715.7
		535	311	14	1,395.7

Attacks on Communications Centres 1 November - 16 December 1944

Bomber Command made only three attacks against communication centres in November. Aschaffenburg (near Frankfurt), the Kalk Nord station at Cologne and Fulda east of Frankfurt, the last two targets being bombed in daylight. All the targets were in the belt between 10° East and the Rhine. The bombing of Aschaffenburg resulted in damage to the station and to residential property, but the daylight operations undertaken by No. 3 Group were scattered. The breakdown of G.H. made the raid on Fulda ineffective. In the first two weeks of December Soest was badly damaged on the 5/6th but the most devastating attack was on Geissen on 6/7 December carried out by No. 5 Group. Craters studded the marshalling yard and damage to railway

A.H.B./  
II/W/241/3/472  
(A)  
Encl. 38A

Bomber Command  
Night Raid  
Rept. No. 770

Ibid  
Rept. No. 784

Ibid  
Rept. No.785

tracks and rail facilities was very great. On 24 December the marshalling yard was still completely unserviceable.

Results of Attacks on Communications

A.H.B./  
II/79/3  
pp.182 -185

See Chap. 10

The principal obstacle to the attack of communications in the autumn of 1944 was the exceptionally bad weather over the continent. This factor not only limited the number of sorties flown but also prevented visual aiming for the vast majority of attacks. Of the 18,000 tons of bombs dropped by the two Strategic Air Forces in November against transportation targets of which nearly 5,000 tons were dropped by Bomber Command only 1,200 tons were dropped under visual conditions. Targets that had been attacked had to wait ten days or more for photographic cover. Mainly because of the weather, only one quarter of the bomb tonnage was aimed at scheduled rail and waterway targets.<sup>(1)</sup>

See Chap.7  
p.165

Thus, there was no great decrease in rail traffic in western Germany under the heavy and systematic air attacks which began in November. As the members of the C.S.T.C. pointed out, quite rightly, the enemy's programme of troop movements could take place with little interruption. Apart from the weather the targets selected for bombing were too dispersed to have any great effect on the railway system. Nevertheless by December 1944 waggon supply for all users in western Germany fell by 28 per cent compared with the November level representing a reduction of 67 per cent compared with December 1943. The waggon allocation to the Ruhr coal trade in December showed a slight increase of six per cent over the previous month but this December total of 8,200 units was down by 53 per cent compared with December 1943. This fall took place in spite of the priority given by Speer in November 1944 to coal movements and despite the fact that, within the Ruhr itself, as the result of the transport unification plan and some reduction in air attack, waggon supply to the pits in December was slightly higher than in the two preceding months. The attack on the Dortmund-Ems and Mittelland canal system prevented coal from the Ruhr reaching the rest of Germany. Movements of coal, for example, had dropped from 29.9 per cent in September to 19.2 per cent in October, but had risen to 28.2 per cent in December, compared with a daily average of 36.0 per cent in January to December 1943. The canals could not relieve the strain on the railways, caused by the bombing, by providing an alternative means of transport.<sup>(2)</sup>

Close Support to the Land Battle - Operation Queen

Bomber Command continued to give support to the Allied Expeditionary Force during November, December and January.

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- (1) From 26 October to 16 December out of some 120 attacks on railway targets only about 15 were delivered under visual conditions. (B.B.S.U. Rept. Strategic Air War against Germany 1944-1945 p. 26). The effect of weather on transportation attacks has been analysed in the table at App.20.
  - (2) See also Chap.11, p.258 et seq for the results of attacks on communications. See Chap.10 p.228 for summary of bombing operations against transportation targets.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
November 1944

During November 5,689 tons, 10.7 per cent of the total tonnage was dropped on Army support targets. From the middle of December until 18 January a heavy tonnage was discharged on targets related to the German offensive in the Ardennes and Bomber Command, like the Eighth Air Forces and the Tactical Air Forces participated wholeheartedly in the air effort which so played havoc with enemy communications that the enemy was unable to penetrate beyond the Meuse.

The other operations with which Bomber Command was concerned were Operation Queen, an offensive on the central sector in which the First and Ninth United States Armies were to attempt to break through the German defences east of Aachen on 16 November and the attacks on the Ruhr dams early in December, the object of which was to stop the enemy flooding the Roer and thus cut off the communications of General Bradley's Army Group. All these operations have been described in detail in R.A.F. Narrative The Liberation of North West Europe, Volume V and the following section will therefore give no more than a summary of the part played by Bomber Command in its interventions in the land campaign.

BC./T.S.32192  
and B.C./S.H./  
T.S.43

The main features of the air plan for Operation Queen was a powerful daylight attack by British and United States heavy bombers, after which the ground forces were to exploit the confusion caused by the bombing. The Eighth Air Force using fragmentation bombs was to bomb a number of defended localities close to the United States troops and Bomber Command was to destroy the towns of Duren, Julich and Heinsberg which lay just behind the front. They had been converted into fortified areas containing troops and equipment and were also focal points for communications. Aircraft of Bomber Command drawn from all Groups began to attack at 1445 hours on 16 November. This was the first occasion on which Bomber Command had supported a United States Army operation. The haze which had handicapped the Eighth Air Force in the morning had cleared and both Duren and Julich were bombed with great accuracy and much devastation was caused. A total of 1,188 aircraft of Bomber Command was despatched, of which 1130 attacked the target and dropped 5,689 tons of bombs.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
November 1944

The ground forces were unable to exploit the temporary confusion which ensued after the air attack as their start line had been placed too far away from the target area. The anticipated break through did not come about and United States troops had to fight their way forward slowly, subduing each defended locality as they went. By the end of November the line of the Roer had not yet been reached in strength.

#### Bombing the Roer Dams

By 3 December the Ninth United States Army on the left had reached the line of the Roer east of Geilenkirchen, but the First United States Army, on the right flank, was making slow progress in the Hurtgen Forest near the source of the Roer. The enemy was able to control the waters of the Roer and Urft (a tributary of the Roer) as he occupied the dams situated south of Duren. The most important were the Urft and Schwammenauel dams. General Bradley anticipated that, following upon his advance across the Roer, the enemy would open the sluices and flood the Roer valley. With their communications cut behind them, the Americans would be brought face to face with the powerful armoured reserves which had been concentrated before Cologne. The dams were strongly constructed and it was considered doubtful whether even the heaviest bombs would have any effect upon them.

A.H.B./  
IIH/241/3/  
472(A)  
Encl. 42A  
et seq  
B.C./SH/T.S.42

D.S.C./T.S.100/  
9 Pt. 3  
Encl. 68A  
para. 4

Bomber Command  
O.R.B.  
Overlord Apps.  
Supp. 2  
Encl. OL2/16  
June 1944

On 29 December SHAEF (Air) decided that Bomber Command should attempt to break the dams. By that date the First United States Army had reached a point little more than five miles away. The two important dams were attacked on five occasions between 3 and 11 December and a number of direct hits were scored. The top of the Urft dam was deeply chipped at three points. In one case the chip extended almost down to water level which, at the time of reconnaissance, was 13 feet from the top. But the enemy was able to manipulate the water level so as to avoid erosion of the dam and spillway. On 12 December the Deputy Supreme Commander decided to abandon the attempt as it was diverting too much of the daily air effort. Plans were then set in motion to capture the dams with ground forces.

Three successful attacks on the Urft Dam were made by Nos. 5 and 8 Groups; 910 aircraft were despatched of which 341 attacked and dropped 1,997 tons of bombs including 35 Tallboys. No. 3 Group attacked the Schwammenauel Dam once; 56 aircraft were despatched and two G.H. aircraft attacked dropping 12 tons. In fact, a far greater number of aircraft were involved because of the poor state of the weather. Altogether 2,776 aircraft were laid on to attack the two dams involving 16 operations; 1,794 were cancelled before take off and 642 aircraft brought back their bombs because of adverse weather.

The Battle of the Ardennes

Field Marshal Von Rundstedt launched his counter-offensive at 0530 hours on 16 December on a forty mile front extending from Monschau south of Aachen to Echternach north-east of Luxembourg. The intention of the Fuehrer was to seize the great supply bases of the Allies, such as Antwerp, Brussels and Liege, split the British and United States Armies and so gain a respite in which he could develop his secret weapons. The attack was planned to begin under cover of fog and low cloud which would prevent the Allies from being able to exercise their great air superiority. SHAEF was taken by surprise although it knew well enough that units of Sixth S.S. Panzer Army had recently assembled west of the Rhine in the central sector of the front. But once the attack had begun the Supreme Commander reacted swiftly and American reserves were despatched to seize key communication centres in the battle area. By 18 December the seriousness of the German offensive had been fully recognised and two days later General Eisenhower instructed Field Marshal Montgomery to take over command of the United States troops to the north, and General Bradley those formations to the south, of the wedge driven by the Germans into the Allied front. Air Marshal Coningham took over command of the American tactical aircraft north of the bulge in addition to his own force.(1)

Meanwhile SHAEF had not hesitated to call upon the Strategic Air Forces in the emergency. On 18 December the Eighth Air Force began to bomb railway centres behind the

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(1) Air ground operations in the Battle of the Ardennes are described in detail in R.A.F. Narrative, The Liberation of North West Europe, Volume V, Chapter 3.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
December 1944  
Bomber Cmd.  
Int/Tacs.  
No. 315/44

Eifel front<sup>(1)</sup> and on the 19th 150 Lancasters of No.3 Group were detailed to attack Trier, an important railway junction on the River Mosel north-east of Luxembourg, but in the gathering fog only 32 aircraft were able to take off. They bombed the target from above 8 to 10/10ths layered cloud. All aircraft returned safely to base although most of them were directed to other airfields in the United Kingdom. The raid, small though it was in size, was believed to have been most effective and a signal of appreciation was sent to the Commander-in-Chief Bomber Command by the Supreme Commander and his Deputy. Henceforward the heavy bombers were to be largely instrumental in halting the impetus of the German advance. Target information was passed from the advanced headquarters of Bomber Command at SHAEF (Versailles) under Air Vice-Marshal Oxland to Headquarters Bomber Command at High Wycombe.

D.S.C./T.S.100  
Pt. 9 Encl. 29A  
and D.S.C./H42

The railway system which served the enemy troops in the Ardennes sprang from the great marshalling yards at Cologne and Troisdorf east and, Neuss and Rheydt west of the River Rhine. The railways usually followed the line of the river valleys through this hilly district. Reinforcements of troops from north-western and central Germany passed through towns on the Rhine such as Frankfurt, Bingen, Mainz and Koblenz. The whole area in which troop and supply movements took place formed a parallelogram with St. Vith and Trier, Cologne and Koblenz at the four corners.<sup>(2)</sup> It was ideal country for a restricted offensive against lines of communication. A number of railway lines crossed the tributaries of the Rhine and Mosel and the bridges which carried them were therefore most vulnerable to air attack. Moreover, good first class roads were scarce and, because the secondary roads were unsuitable for heavy transport, the enemy was compelled to use the main roads. Several of these could be blocked at points where detours were virtually impossible.

Bomber Cmd.  
Int/Tacs.  
No. 316/44

From 20 to 22 December flying over the battle area practically ceased. The Tactical Air Forces were grounded and the Eighth Air Force was unable to operate at all. Aircraft of Bomber Command making use of their navigational aids and blind bombing techniques were able to take off once by day and twice by night. On 21 December a second attack was made on Trier, this time by 113 aircraft of No. 3 Group but, as before, fog prevented a number of aircraft from taking off. Flak opposition was almost negligible and no enemy aircraft attempted to intercept the force. It was difficult to ascertain the results of the raid apart from a large cloud of smoke seen by air crews. That night Nos. 4 and 6 Groups and attendant pathfinders bombed the important Nippes marshalling yards at Cologne and No.1 Group made for the city of Bonn. Other formations, as already related, visited Politz. Bad weather conditions were encountered both at bases and over the target area. Crews bombed on the glow of the ground markers but only light damage was done. No aircraft was lost from these operations despite the fact No.100 Group was unable to lay on any countermeasures because of the weather.

Bomber Cmd.  
Night Raid  
Rept. No.797

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- (1) One bombardment division of the Eighth Air Force was placed under command of General Vandenberg (Ninth United States Air Force) and was responsible for the attack of tactical targets.
  - (2) See Map No. 12 in R.A.F. Narrative, Liberation of N.W. Europe, Vol. V. See also Eighth Air Force Diary of Operations (Appendix 11) for effort made.

Ibid  
Rept. No. 798

Bad weather was again experienced on the following night and only 318 aircraft could take off. Nos. 1 and 4 Groups provided the bulk of the force. The targets were marshalling yards at Bingen and Koblenz. Weather conditions were better than had been anticipated and much damage was caused especially to the former target. Only three aircraft (from the Bingen force) were lost but five more were wrecked in landing crashes. Intruders destroyed five enemy night fighters.

Bomber Cmd.  
Int/Tacs.  
No. 318/44

By 23 December the fog had dispersed over the battle area and the Tactical Air Forces were able to operate in strength. The improved weather also enabled the G.A.F. to exert some influence on the battle and a number of air actions were fought over the salient. The object of the enemy that day was to divert the Tactical Air Forces from the battle area. The daylight effort of Bomber Command was not very great, small forces raiding Trier and the Gremburg marshalling yard at Cologne. The force of 30 Pathfinder aircraft sent to Cologne became engaged with enemy fighters which had been originally ordered to intercept a large force of United States heavy bombers raiding marshalling yards behind the Ardennes front. At least two out of the six Lancasters which failed to return fell to enemy fighters. Both raids appeared to be accurate.

Ibid  
No. 319/44

Bomber Cmd.  
Night Raid  
Rept. No. 800

The vigorous reaction of the G.A.F. led the Allied Air Commanders to order an attack on enemy airfields in the vicinity of the battle area on the following day. (1) Both British and American Strategic bombers took part. Bomber Command flew 338 sorties against airfields at Essen and Dusseldorf for the loss of six aircraft. Apart from their large scale raid on New Year's Day the G.A.F. was never able again to launch so many aircraft against the Allies. During the night of 24/25 December Bomber Command, braving bad weather at bases again, continued to operate against the G.A.F.; one force bombed Hangelar airfield at Bonn while another put the finishing touches of destruction to the Nippes marshalling yard at Cologne. This final attack made the railway facilities 100 per cent unserviceable.

Bomber Cmd.  
Int/Tacs.  
No. 320/44

By Christmas Day, although the enemy thrust had lost its initial impetus because of the stubborn defence made by American troops and because of the decisive action of the Air Forces against rail centres behind the front, the situation was still critical particularly in the northern part of the bridge where Sixth S.S. Panzer Army appeared to be forcing its way towards Namur. The town of St. Vith was an important road centre for the enemy in these operations as main roads passed through it to all the important sectors of the front such as Vielsalm, Laroche and Houffalize. On Christmas Day Marauders of the Ninth United States Air Force bombed St. Vith with the result that the streets were blocked with debris. But its importance demanded an attack by Bomber Command. The operation took place on the afternoon of 26 December in the face of extensive fog over England. Aircraft from all Groups took part but care was taken to select only experienced crews. On the return journey 134 aircraft of Nos. 4, 5 and 6 Groups were diverted either to Scotland or to western England. Two aircraft were lost to flak.

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(1) The Air Ministry would have preferred attacks on aviation fuel (A.H.B./II/70/218).

2nd T.A.F.  
O.R.S. Rept.  
No. 19 App. D  
and SHAEF  
Enemy Comms.  
Sum No. 23  
Annexe p. 3

The bombers dropped 1,138 tons of high explosive which made all routes through the town completely impassable. Clearance work did not begin until three days later and after 16 days only a small amount of debris had been removed. The main roads were not in fact cleared until 3 February, more than a week after the Allied occupation. Of all the attacks against road centres or choke points in the Ardennes this was the most effective.

Bomber Cmd.  
Int/Tacs.  
Rept. No. 321/44

Bomber Command returned to the attack of railway targets on 27 December when aircraft from Nos. 1, 3 and 5 Groups and pathfinders made a concentrated raid on Rheydt, a communication centre west of the Rhine. Bad weather over airfields prevented the Command from operating until early in the following morning (28 December). The target was the railway workshops at Opladen north of Cologne and Nos. 4, 6 and 8 Groups took part in the raid. They encountered thick fog over the target but many hits were scored on the tracks and buildings.

Bomber Cmd.  
Night Raid  
Rept. No. 801

By 27 December no further advance towards the River Meuse was made by Von Rundstedt's forces and the critical phase of the battle was over. The great air effort between 23 and 27 December had succeeded in paralyzing communications in the parallelogram in which lay all the essential routes to the front. From 19 to 27 December, Bomber Command had flown 1664 sorties and dropped 5,950.4 tons of bombs against tactical targets. The bombing affected enemy transportation in three ways. First, the enemy was forced to detrain at railway centres on the Rhine and in some cases was compelled to rely on railway facilities east of the river. The, by then, familiar sequence was observed; first, there was an increase in road transport to bring up supplies to the front which meant that the scanty stocks of fuel were quickly consumed. Second, the bombing of rail centres along the Rhine (mainly the work of Bomber Command) forced back rail traffic in the river valley as far east as Kassel and Wurzburg which increased delays and re-routeing. Thirdly, the general effect of these air attacks was for the enemy to impose a ban on all daylight rail traffic west of Giessen except when bad weather curtailed flying. Apart from the delay of supplies the flow of reserves to the front was also seriously interrupted and troops were often forced to detrain as much as 100 miles from their destination. After the war Speer said that, without any doubt, the lack of supplies experienced at the front was due to transport difficulties caused by air attack. Even before the offensive began the railway system on the right bank was badly blocked. The German Army relied on the railways because motor transport was limited and consisted of worn out vehicles. Allied air superiority also barred road travel in daylight.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
December 1944

Speer  
Interrogations  
Report No. 26

Less obvious, but just as damaging to the enemy effort, were the indirect effects of strategic bombing on the battle. In the first place, the enemy had begun the offensive with extremely limited stocks of fuel for his tanks and mechanized transport. This was made evident by prisoners of war captured during the battle and borne out by statements made by senior German officers at the end of the War. Before the offensive began Von Rundstedt warned the Fuehrer that petrol stocks were inadequate and field commanders such as General Bayerlein (Panzer Lehr Division) recorded that he foresaw that the meagre fuel ration allocated for his tanks would soon be exhausted in the hilly country over which his division would have to operate. The enemy high command had intended to rely on seizing Allied fuel dumps rapidly and

R.A.F.  
Narr., Lib.  
of N.W. Europe  
Vol. V.  
pp. 66 - 67

when the obstinate Allied defence forestalled this plan, tanks and vehicles often had to be abandoned by the roadside.

See Chap. 2,  
p.36

Bomber Cmd.  
Quarterly  
Rev. No.11,  
p. 19.

Secondly, there were several inadequacies in German tank production. This was revealed after the Bomber Command raid on Friedrichshafen in April 1944, when the main tank transmission producer (Zahnradfabrik) and one of the two main tank engine producers (Meybach) were heavily damaged. Shortly afterwards Speer assigned equal priority to the manufacture of tank engines, tank transmissions and assault guns as existed for fighter aircraft production. About a month later the Haupaussehuss Panzerwagen were informed that higher priority for production of Panther and Tiger tanks could not be applied for and that a definite attempt must be made to continue without it.

Prisoners of war revealed that tank crews often received their tanks only a few days before they were due to take part in the battle. Many tanks also failed to reach the front because they lacked fuel; for the same reason sustained operation was impossible for those that reached their destination. Innumerable cases of engine trouble were experienced during the action owing to inadequate running in; and the enemy clearly had difficulty in fitting out and maintaining panzer divisions at a strength which was sometimes below 60 and never much higher than 80 tanks. This was the highest average that the enemy could maintain.

#### The Second Phase of the Battle of the Ardennes

In the meantime plans were being made by Field Marshal Montgomery for a counter offensive by United States troops supported by certain British formations from Twenty-First Army Group, to drive the enemy out of the salient. On 3 January the First United States Army began an attack in the direction of Houffalize while the Third United States Army, which had relieved the garrison holding the key road centre at Bastogne, advanced northwards to meet it. Contact was made on 16 January, thus eliminating the enemy from the greater part of the salient.

R.A.F.  
Narr. Lib.  
of N.W. Europe  
Vol. V  
p.92

The British and United States Air Staffs were naturally anxious to return to the attack of oil as soon as possible, once the enemy's railway system west of the Rhine had been dislocated and his airfields rendered inoperable. The Supreme Commander, on the other hand, insisted that targets in the battle area should have first priority for visual bombing and the Army Staff of SHAEF, taking advantage of the heavy bombers placed at their disposal, were exercising their propensity for demanding the attack of targets which were not strictly within the tactical zone.

A.M.W.R.  
Sum of  
Bomber Cmd.  
Ops. December  
1944

Bomber Cmd.  
Night Raid  
Rept. No.804

The Eighth Air Force continued to attack the network of rail centres between the Rivers Ahr and Moselle. From 28 December to the beginning of January Bomber Command attacked Bonn, Munchen Gladbach, the Kalk marshalling yards at Cologne and Houffalize by night and the Lutzel and Mosel marshalling yards at Koblenz and Vohwinkel by day. No.3 Group was responsible for daylight operations as usual. Houffalize, a road junction in the salient much used by the enemy, was the nearest to the front but the raid, which was made by No.5 Group towards dawn on 31 December, was ineffective. Altogether in December Bomber Command discharged 18,454 tons on transportation targets, the highest total against this type of target since April 1944.

R.A.F. Narr.  
Lib. of N.W.  
Europe, Vol.V  
pp.98-99.

By the beginning of January 1945 the Allied Air Forces had largely stopped rail traffic in the Cologne-Coblenz-Trier area. On 6 January the Supreme Commander, under pressure from General Spaatz who had become alarmed over the growth of the German jet aircraft industry, consented that the heavy bomber forces should return to the attack of industrial targets. But bad weather in early January and a diversionary attack in Alsace by the Germans to distract attention from their forces withdrawing from the bulge prevented full scale strategic bombing.

Bomber Cmd.  
Night Raid  
Rept. No.815

The Strategic Air Forces did not resume the unrestricted bombing of industrial targets until 14 January. But from the beginning of that month, Bomber Command was already selecting targets well away from the salient. From 1 to 14 January four daylight and five night raids were made on tactical targets. The most powerful of these attacks was directed against the railway centre of Saarbrücken which the enemy was using for his secondary offensive in the southern sector launched on 1 January. Bomber Command visited the town in force on 13/14 January and also in daylight on the following afternoon. The marshalling yards were completely put out of action. The last attack on a target actually within the salient was made on the night of 5/6 January when Houffalize was attacked by No.5 Group for the second time. The town was covered with craters afterwards, but no roads were hit, and single track railway lines leading from the town were cut in many places.

Ibid  
Rept, No.810

The Bombing of Royan

Another operation relating to the support of the ground forces, though unconnected with the Ardennes offensive, must be discussed in some detail at this point, since it concerned an attack by R.A.F. heavy bombers involving a serious loss of life to the citizens of Royan at the mouth of the River Gironde near Bordeaux. On the evacuation of France in the summer of 1944 the Germans had left behind a garrison to prevent the Allies from using the port. Similar garrisons were detached at St. Nazaire and Lorient on the western French seaboard. Plans to eliminate the Germans known by the Code-name Independence (later Venerable) had been under discussion since the autumn and operations were due to begin on or about 25 December 1944.

SHAFF (Air)  
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Diary Vol.I.  
A.H.B./IIS/112/  
2/5  
Jan/8A-8R

A conference had taken place between General de Larminat, commanding the French Army in the West, General Royce, commanding the First T.A.F. and the Commander of the French Western Air Force on 10 December and four gun positions, which were likely to give trouble to the attackers, were chosen for bombing, together with the town of Royan which was believed to be strongly held by the enemy. General Royce suggested that training units of the Strategic Air Forces should be employed so that there should be no undue diversion from German targets and proposed that the night bombing training squadrons of the Eighth Air Force should do the job. The French had affirmed that Royan would be evacuated of civilians by 15 December and that the town would be then clear for attack. The operation by the Eighth Air Force did not take place. Bomber Command, however, held that the task was unsuitable for training units, even if they had the necessary bombs and handling gear and informed SHAFF that it would bomb the target when weather prohibited the attack of targets on Germany.

A.H.B./  
IIS/241/3/546

A.H.B./  
IIG/241/18/1

Meantime, Operation Independence had been postponed indefinitely, but Bomber Command was notified on 3 January that the batteries and the Royan defended area were still open to attack. The weather forecast for western Germany was unfavourable for the night of 4 January and the Deputy Commander-in-Chief Bomber Command telephoned Air Vice-Marshal Oxland at SHAEF that the west coast of France was the only possible area for a main attack that night and that he proposed sending some 300 aircraft to Royan provided the target was still clear. Air Vice-Marshal Oxland questioned the advisability of despatching such a large force but was told that it was in order.<sup>(1)</sup> SHAEF (Air) was then informed and signals were sent to First T.A.F. asking it to verify whether Royan had been evacuated. Attempts to contact the French Western Air Force Commander were made without success and as a signal received by the French headquarters at 2000 hours that evening was unanswered, it was presumed that the target was clear. No. 5 Group and Pathfinders bombed Royan in two waves at 0400 hours and 0530 hours on the following morning. The French afterwards reported that about 800 civilians were killed and 200 injured in the raid. German propaganda at once exploited the incident and General Juin, Chief of Staff French Army complained vigorously to SHAEF about the bombing.

Sir Charles Portal insisted that SHAEF should investigate the incident thoroughly. It transpired that there was a serious misunderstanding between General Royce and General de Larminat; the former being convinced that the French had marked Royan as a target area on the map, while the latter was equally certain that he had only requested the bombing of certain batteries. General Bedell Smith apologized formally to the French Government and further air attacks on French towns were prohibited by SHAEF unless they had the approval of General Juin. Sir Arthur Harris pointed out that such heavy casualties could have been avoided if incendiary and blast had been used in preference to H.E. and penetration fusing, but that he had been told that the town was only occupied by Germans. It was later learned that the French casualties were much less than originally reported and that 500 Germans were killed or injured in the town.

No further raids were made on Royan by Bomber Command but the Gironde area capitulated after heavy attacks by the Eighth Air Force on 1 May.<sup>(1)</sup>

Naval Targets: the sinking of the Tirpitz

See Chap. 4  
p.103

A.H.B./  
IIG/129

The reader will recall that the Tirpitz was severely damaged on 15 September by the specialist squadrons of Bomber Command operating from a Russian base. On the night of 16/17 October the repaired battleship left Alten Fjord and steamed slowly southwards at a speed of not more than eight to nine knots. Heavy damage had been caused to the vessel's bows by a 12,000 pound bomb and the starboard propeller shaft had been injured by midget submarine attacks. The Germans intended to sail her to Tromso Fjord where she was to be used as a floating fortress anchored near the island

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(1) For further details see R.A.F. Narrative Liberation of Northwest Europe Vol.V. Chap. 8 pp.258-260.

A.H.B./  
ID/12/83

A.H.B./  
IIF/241/3/491

of Haakoy. Allied Intelligence soon became aware of the Tirpitz' move and on 18 October a reconnaissance aircraft returned with excellent photographs of the battleship. The position of the Tirpitz was now 200 miles closer to Bomber Command bases and it was believed that, by operating from forward airfields in northern Scotland and by introducing further modifications to the aircraft, enabling them to carry enough fuel for the return journey, there would be no need to make use of Russian bases for another operation. Even so, the round trip to attack the battleship and return amounted to 2,252 miles and, as all the aircraft were to carry 12,000 pound bombs, the Lancasters were fitted with Merlin Mark XXIV (18 pounds boost) engines and paddle-bladed propellers to facilitate take-off. Extra fuel tanks were also fitted to each aircraft which involved the removal and replacement of the tail turrets. The mid upper turrets were taken off to reduce weight. The new equipment was fitted and final flight tests were carried out within a period of five days.<sup>(1)</sup> Other preparations included the despatch of two Mosquitos to Sumburgh in the Shetlands to fly meteorological reconnaissances over the Norwegian coast and the Admiralty made two destroyers available for Air Sea Rescue purposes.

A.H.B./  
IIF53/2

The operation against the Tirpitz had now been renamed Obviate and, on 28 October, Nos. 9 and 617 Squadrons moved to their forward airfields at Lossiemouth, Milltown and Kinloss for refuelling and final briefing before their second attack. The distribution of the aircraft over these airfields lessened the risk of a timing upset or a complete failure in the event of one faulty take off which was quite possible in view of the extra loading of the aircraft. All 39 bombers took off without mishap starting at 0230 hours on 29 October and flew at low level towards the Norwegian coast, afterwards heading apparently for Russia. They then made for the rendezvous, a small lake at Latitude 68.20 North, Longitude 1900 East whence they flew towards Tromso. Unfortunately the Tirpitz was covered by low cloud and, although one 12,000 pound bomb fell near the portside aft of the battleship, no damage was caused by the 33 aircraft which attacked. One aircraft was forced to land in Sweden after being hit by flak. The remainder of the force returned to their bases in north Scotland by 1500 hours.

A.H.B./  
IIF/241/3/490

The Air Officer Commanding No. 5 Group, Air Vice-Marshal Cochrane, believed that a repeat attack using the same plan stood the best chance of success. Furthermore, he considered that visual conditions would be better during the early part of November than in October. He therefore proposed to leave the two squadrons in their modified state. But time was running short for after November, in that part of Norway, the sun would not rise above the horizon again until the spring and, owing to the prevailing westerly wind, poor weather was likely on five days out of six. An east wind was needed to clear the sky.

On 2 November the operation was renamed Catechism and two days later both squadrons were ready to make another attempt, but bad weather forced them to return south to their home base.

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(1) Nos. 9 and 617 Squadrons had not been idle since their first attack on the Tirpitz. On 23/24 September they had taken part in the attack on the Dortmund-Ems Canal and on 7 October No. 617 Squadron had breached the Kembs Dam.

Bomber Cmd.  
Int/Tacs  
No. 283/44

A.H.B./  
IIS.3/3 and  
IIG/129 and  
Bomber Cmd.  
Quarterly Rev.  
No. 11, p. 14

At the end of the following week they had returned to Scotland. Although, on 11 November, the weather reports from reconnaissance aircraft were not particularly favourable the Commander of No. 5 Group decided to take a chance and the Lancasters left Scotland in the early hours of 12 November following the same route as before. Low lying cloud was encountered on the way out but while approaching Tromsø, the fjord was observed to be clear of both cloud and smoke and the battleship was easily spotted. Although the Tirpitz had been warned of the approach of hostile aircraft at about 0815 hours, little could be done except clear the ship for action for there was no smoke screen apparatus at her new anchorage. The construction of shore anti-aircraft batteries had, however, been completed. The force of 31 aircraft began to attack the battleship at 0941 hours and completed their task eight minutes later. The Tirpitz opened up with her main armament and light flak but these defences were comparatively ineffective, and, although it had been requested, there was no fighter opposition. The Lancasters pressed home their attack with determination at a height of 12,000 to 16,000 feet and dropped twenty-nine 12,000 pound bombs.<sup>(1)</sup> The first bomb to hit the ship struck her almost amidships and this was followed by a second hit aft and to port of 'C' Turret. The second bomb started a fire. The aircrews could not observe what damage they had caused because of the smoke, but they saw a jet of white steam shoot up from the battleship to a height of two or three hundred feet. A third Tallboy also hit the ship. The last aircraft to leave the target area saw the ship heel over and the film taken by the Film Unit aircraft, which operated throughout the action, showed that the Tirpitz had capsized.<sup>(2)</sup> This was confirmed by reconnaissance aircraft which flew over the hulk later that day. Casualties to the bomber force amounted to one aircraft, hit by flak, which made a successful forced landing in Sweden.

A.H.B./IIG/129

According to survivors of the Tirpitz' crew, twenty minutes after the first hit there was an explosion and a hole 120 feet long appeared on the port side of the ship from deck to keel. Shortly afterwards the Tirpitz turned turtle to port, rolling through approximately 140° and her superstructure became embedded in the sea bottom. Approximately 1,000 of her crew were lost. Rescue work began immediately and 85 men were saved through holes cut in the bottom of the hull.

Bomber Cmd.  
O.R.B.  
Overlord  
Supp., p. 76  
and A.H.B./II/  
70/474

Many congratulatory messages on the achievement of Bomber Command were received by the Commander-in-Chief, in particular, from His Majesty the King, the Prime Minister, the Chief of Air Staff, the Secretary of State for Air and Mr. B. N. Wallis, inventor of the 12,000 bomb.

#### Attacks on Port Areas and Shipping

Bomber Command also made several attacks on port areas and shipping, of which several were harbouring

- (1) It is interesting to note that Director (Air Tactics) did not think that the Tallboy would penetrate the main armour in a fit state to detonate completely and recommended the 2,000 pound A.P. bomb (A.H.B./II/70/474).
- (2) According to the account of the senior survivor on the Tirpitz this occurred at about 0952 hours. (A.H.B./IIG/129).

German naval units. On 18/19 December No. 5 Group made an attack on the Polish port of Gdynia which had only been raided once before on a small scale in 1942. Visibility was poor over the target area largely because of a smoke screen. The battleship Lutzow was identified by some crews but most aircraft attacked the position of the ship in relation to the jetty. Severe damage was caused in the new shipyard and bombs fell amongst railway tracks and rolling stock. A floating dock with a vessel in it was sunk while an old Schliessen type battleship appeared to be down at the stern. The total tonnage of shipping sunk amounted to 17,763 tons.

The Chief of Air Staff criticized this operation because he held that it made it more difficult to resist demands by the Admiralty for attacks on U-Boat assembly yards and naval units.<sup>(1)</sup> Inquiries were then made by Air Marshal Bottomley. The Deputy Commander-in-Chief Bomber Command replied that, in the prevailing weather, only Breslau and Gdynia were suitable for attack. The bombing of Politz was out of the question. He maintained that No.5 Group had received permission from the Commander-in-Chief to attack important naval units by way of a change. This form of attack was alleged to be within the terms of the directive as being directed against a fleeting target of great importance.

Three attacks were made on shipping in the port of Horten in Oslo Fjord during December which involved 155 aircraft and in which 500 tons of bombs were dropped. The main targets were the cruisers Koln and Emden but these naval units were elusive and the British aircraft were not aided by weather conditions. In the raid on 28/29 December 4,902 tons of shipping and one U-Boat were sunk. In the final attack on 31 December/1 January the Koln was attacked in moonlight. When the bombing began, the cruiser began to move northwards at high speed. Bombs fell close to the Emden and one near miss was claimed on the port side. One vessel of 7,000 tons was damaged.

Raids were also made on U-Boat and E- and R-Boat pens in accordance with Admiralty requests. On 15 December Lancasters of No.5 Group carrying 14 Tallboys attacked the pens at Ijmuiden, Holland. Part of the roof over four of the pen entrances collapsed and another hit made a hole in the roof about 15 feet across. One E-Boat was sunk. At Rotterdam, also attacked by No.5 Group, three direct hits were scored on the southern part of the shelters by 12,000 pound bombs. A large crater was made in the roof of the southern shelter. A great length of roof over the entrance, measuring 158 feet by 20 feet in length and width was smashed. Two out of the three sections of the shelters were damaged, the centre one receiving a direct hit on the roof which destroyed two buildings. Heavy damage over this shelter entrance caused the collapse of the roof, 118 feet in length and 38 feet in width. Severe damage was caused elsewhere in the port but no shipping was hit.

On 12 January a small force from No.5 Group made another attack on Bergen, the submarine base on the Norwegian coast;

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(1) See Chap.7. The Air Staff were resisting pressure from the Admiralty to bomb submarine yards which they held would divert the bomber offensive from oil and communications. The Battle of the Ardennes had also begun.

Bomber Cmd.  
Night Raid  
Rept. No.795

Adm./T.S.D./  
F.D.S.

A.H.B./ID/4/83

Adm./T.S.D./F.D.S.

Bomber Cmd.  
Night Raid Rept.  
No. 805

Adm./T.S.D./F.D.S.

Bomber Cmd.  
Quarterly Rev.  
No.11 p.16 and  
Adm./T.S.D./  
F.D.S.

Ibid

Bomber Cmd.  
Int/Tacs No.  
10/45

they used Tallboy bombs. A smoke screen in the vicinity of the U-boat pens and a ground haze made target identification difficult and was the reason for the bombers spending nearly three quarters of an hour in the target area. The G.A.F. reacted with unusual vigour and about 20 F.W.190's and Me 109's took off from Herdla airfield and pursued the bombers for about 50 miles on the homeward route, shooting down three Lancasters. The bombers claimed to have damaged five aircraft and a Mosquito claimed one F.W.190 damaged. The fighter escort did not see the enemy aircraft, probably owing to the dispersal of the bombers in the vicinity of the target area.

A.H.B./  
ID/12/83

The submarine pens at Bergen were still under construction at the time of attack. Two hits were scored with 12,000 pound bombs, one in the roof of a pen which was then only two and a half metres thick and the second bomb hit the rear part of the structure where the roof was about three and a half metres thick. Both bombs completely perforated the roof, but there were no U-boats in the pen at the time of the attack, so the fall of concrete caused no damage. Nevertheless the building programme was set back by three months. The 12,000 pound bombs did more damage than all the smaller calibre bombs used in previous raids, and paid a good dividend in terms of sorties required to achieve damage, e.g. two hits out of 32 sorties.

#### Minelaying Operations

Bomber Cmd.  
O.R.E.  
Apps. Vol. 3  
N.S.O./26,  
Nov. 1944  
N.S.O./23,  
Dec. 1944  
N.S.O./28,  
Jan. 1945

Weather conditions in the month of November and the first fortnight of December did not favour minelaying operations by Bomber Command. The object of the operations was to interfere with shipping in the Kattegat and Baltic and to strike confusion among shipping passing to and from the Norwegian ports. This was done with a view to disorganizing troop movements from Norway to Germany.

In the first fortnight of November only two minelaying missions were carried out; one was aimed at sea lanes in the Heligoland Bight and the other was designed to delay troop movements into Germany from Scandinavia. This latter operation continued through November into December, Oslo, Moss and Horten Fjords being the most important areas. It was known that extensive delays were caused which the enemy's fleet of overworked minesweepers were quite unable to prevent. Minelaying in the Gulf of Danzig also embarrassed the enemy for he was anxious to maintain free passage for the movement of his warships between their bases and the Russian front in Latvia. In the second half of December, the weather improved and a greater air effort was possible. Nearly all the routes in the eastern Baltic were closed directly after mining had taken place and no less than 26 ships were laid up outside Swinemunde. Transports and freighters were diverted from Oslo, Moss and Horten after their approaches had been mined.

Another feature of the offensive was the interference caused to U-Boat training and acceptance trials in the eastern Baltic. In January many mines were laid in areas extending from Swinemunde to Pillau with the object of prolonging this embarrassment. Mosquitos of No.5 Group also laid a small number of mines in the River Elbe between Brunsbuttel and Hamburg.

SECRET

194

The following statistics for minelaying operations from November 1944 to January 1945 are shown below.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
Nov. 1944 -  
Jan. 1945

<u>Month</u>	<u>A/C Despatched</u>	<u>A/C Effective</u>	<u>No. of Mines Laid</u>	<u>Losses</u>
Nov.	170	151	750	2
Dec.	260	240	1,160	3
Jan.	159	144	668	6

CHAPTER 9

SECOND REVISION OF THE DIRECTIVE TO THE  
STRATEGIC AIR FORCES: THE EFFECT OF THE  
RUSSIAN OFFENSIVE

Situation on the Western Front, January 1945

By the middle of January the crisis in the Ardennes was over, although hard fighting was to continue in that sector until the end of the month. By that time the 'bulge' had been eliminated and the enemy was withdrawing to the Rhine. Although Hitler did not gain any of his planned objectives, the counter-offensive had delayed General Eisenhower's advance into Germany by at least a month. Moreover, the optimistic feeling in the Allied high command which had existed during the autumn and early winter of 1944 that the war would soon be brought to a swift conclusion was dampened by the strength and surprise of the German thrust. The strategic bombing offensive against Germany which had been growing in strength during November and early December had slackened in impetus because of the necessity for the heavy bombers to attack tactical targets. It was not surprising, therefore, that in the last week of 1944 both Air Chief Marshal Harris and General Spaatz, or their representatives, were demanding that the heavy bombers should return to industrial targets in Germany. The American air commanders were particularly anxious over this situation. Most of all, they were worried by the growth of the German jet aircraft industry which would naturally affect daylight air operations over the Reich. At the Air Commanders conference on 11 January General F. L. Anderson, deputy to General Spaatz, concluded that, 'from the strategic point of view the picture is very sad'. He thought that the strategic bombing offensive should be replanned on the assumption that the war against Germany would last well into 1945. He quoted a number of target systems such as oil and U-boat production which had been sacrificed for the purpose of supporting the ground forces. He believed that, if jet aircraft production was not attacked soon, the Germans would have between 500 and 700 serviceable jets by June 1945; he named eight jet aircraft factories which were particularly vulnerable to attack. He also demanded the bombing of U-boat production and the ball bearing industry. Both Generals Spaatz and Doolittle, the latter Commanding General the Eighth Air Force, shared the same views.

A.H.B./  
IIS/112/100/9  
(D) Encl. 17A

There was a strong belief in certain quarters that strategic bombing during the winter months had been somewhat ineffective. German industry, especially those branches of it which had been dispersed, was still productive in spite of the area bombing by Bomber Command, and the oil industry had recuperated while the Strategic Air Forces had devoted their attention to the land battle. Even the attacks on communications which had proved so successful in the Battle of France only had a limited effect on the complex railway system in western Germany and the repair organization of the Reichsbahn had shown itself adequate to meet the demands made upon it. While the British Air Staff continued to pin their faith upon increasingly powerful attacks on the oil industry, the Americans speculated on plans for wide spread air action over Germany, including large scale attacks by fighter bombers against

the most vulnerable targets in place of the more exposed and less accurate heavy bombers.

At the beginning of 1945 the British Air Staff believed implicitly in the oil plan as a means of bringing the war to a rapid conclusion. As they saw it, existing oil supplies for the Wehrmacht depended on the eight remaining large synthetic oil plants which were still capable of production. If these could be neutralised in the ensuing weeks, 'the enemy will be confronted with the most acute oil situation he has yet had to face'. On the other hand the Deputy Chief of Air Staff, for one, did not contemplate with satisfaction the large effort which had been devoted to attacks on transportation as compared with attacks on the oil industry. He suspected that there had been a tendency to confuse tactical and strategic requirements under the pretext of affording close support to the Armies, and he was concerned lest the oil campaign should suffer. Writing to General Spaatz on 29 December, he said that he hoped that the critical needs of the battle 'will not be misinterpreted in any way so as to allow transportation to displace oil in the priority of strategic targets'.<sup>(1)</sup> He asked General Spaatz who, being close to SHAEF had the ear of the Supreme Commander, to represent these views to him as strongly as possible.<sup>(2)</sup>

Apart from the doubtful effects of the strategic bombing offensive there was also less confidence about the future in Allied naval and military circles. The Navy was concerned over the increased production of the prefabricated U-boat fitted with the Schnorkel breathing device. These U-boats had been causing a good deal of damage to Allied shipping in the Channel and the Admiralty, as already related, were insisting that the heavy bombers should devote a proportion of their effort to the destruction of U-boat building yards. Even on land the Army commanders had been shaken by the power of the German armour in the Ardennes offensive while the Wehrmacht had been strengthened by the addition of Volks Grenadier divisions which were being trained to defend the Fatherland. By skilful defensive operations on the Western Front the enemy, they thought, might hope to delay the Allied advance and so gain time for the development of Hitler's secret weapons.

In fact these gloomy assumptions were some way from the truth. Economically Germany was on the point of collapse; the oil industry was declining and attacks on rail communications, although they had been unable to prevent the Eifel offensive, were causing serious delays and re-routing of freight and other traffic. By the end of January the outlook from the Allied point of view was more optimistic. The enemy had suffered severe losses in the Ardennes battle in men, arms and equipment and the diversion from oil had been offset by the brilliant attacks against oil plants in Silesia and eastern Germany by the Fifteenth U.S. Air Force in the latter part of December. Still more significant a big Russian offensive had been launched on the eastern front in the middle of January.

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- (1) In December the Eighth Air Force had dropped 23,698 (short) tons on communications and only 2,937 tons on oil. Bomber Command had discharged 20,167 (short) tons on communications and 5,722 (short) tons on oil.
- (2) D.B. Ops. believed that A-C-M-Tedder's insistence on transportation targets was due to General Spaatz.

R.A.F.  
Narrative  
Lib. of N.W.  
Europe, Vol. V  
Chap. 4.

The Supreme Commander had decided to strike into Germany in three phases. In the first phase, due to begin early in February the Allied Armies were to advance and destroy the enemy west of the Rhine, they would then secure bridgeheads across the river which would be developed into a jumping off point for the final phase, the advance into the heart of Germany. The major crossing of the Rhine was to take place at Wesel north of the Ruhr at the end of March. These plans for the conclusion of the German war, and global strategy in general, were to be discussed at a conference of the Heads of Allied Governments and Combined Chiefs of Staff which was to be held at Yalta in the Crimea in the first week of February (Argonaut). Mr. Churchill, President Roosevelt and Marshal Stalin were to be present. The conference with the Russians was to be preceded by a preliminary meeting of the Combined Chiefs of Staff at Malta (Cricket).

Second Revision of the Directive to the Strategic Air Forces

A.M. File  
C.39441/49  
Pt. I  
Encls. 48A -  
56A and A.H.B./  
ID4/23B

The general dissatisfaction with the progress of strategic air operations led Air Marshal Bottomley and General Spaatz to revise the directive in the light of the situation early in 1945. On 12 January they drew up a modified directive. The oil industry and communications were still the primary objectives for attack, oil having first priority. They suspected that the enemy's jet aircraft, which he was using to an increasing extent, might interfere with the operations of the strategic bomber force, if the source of production was allowed to develop. Offensive measures should be taken against jet engine production centres, training establishments and appropriate storage units. They maintained that the additional targets would be valuable from the tactical point of view in that they would distract attention from the heavily defended oil targets. They also laid stress on the attack of targets in the enemy's U-boat organization, particularly as both the First Sea Lord and Admiral King, the American Chief of Naval Staff, had recently been pressing for some mention of this subject in the current directive.

The Chief of Air Staff approved the new directive in principle, but he did not believe that the jet aircraft industry should be given priority above oil and communications. In his opinion the war might well be finished by May 1945. This would depend on the progress of the Russian offensive which had just begun and he feared lest this diversion from the two main target systems might lose them a chance of a quick decision. He thought it unnecessary to inform the Combined Chiefs of Staff of the revision of the directive but he proposed to raise the subject with General Arnold at the Yalta conference.

A.H.B./  
IIH/241/3/599  
(G)  
Encl. 30A.

The revised directive (the third since September 1944) with a covering letter to the Commander-in-Chief was sent to Bomber Command on 19 January. First priority was the petroleum industry, second, the German lines of communication. When weather or tactical conditions were unsuitable for operations against the two major priorities, attacks were to be delivered against area targets using blind bombing technique when necessary. Next, in priority, was the G.A.F. with emphasis on its jet aircraft production, training and operational establishments. The remainder of the directive did not differ in principle from the preceding

one with the exception that stress was laid on the attack of the enemy's U-boat organization by the marginal effort of the bomber forces.

Effect of the Russian Offensive on Bombing Policy: decision to bomb cities in Eastern Germany

The Russian winter offensive began between 12 and 15 January on the Vistula extending to the Carpathians. The main thrust was between Ostrolenka (north of Warsaw) and Cracow. By 1 February Soviet troops had reached the Oder in the Kustrin area (north of Frankfurt on Oder) which was only 50 miles from Berlin; they had captured the Silesian industrial zone and cut East Prussia from central Germany. It soon became evident that this was an operation of great importance and that it would have a decisive effect on the length of the war in Europe. It also presented an opportunity for the strategic bomber force to influence the course of the war. On 25 January the Joint Intelligence Committee produced paper in which they examined the possibilities of assisting the Russian offensive by modifying the directive to the Strategic Air Forces. There were five measures which they believed would influence the battle. They agreed that the bombing offensive against oil targets should remain on the highest priority. Second, they held that the bombing of tank factories, of which there were nine major targets would have a great influence on the Russian offensive.<sup>(1)</sup> Thirdly, they considered that heavy air attacks on Berlin would interfere with troop movements to the eastern front and would disorganise the German military and administrative machine. Fourthly, they proposed that sea mining operations in the Skagerrack and Baltic should be intensified so as to interfere with the passage of reinforcements to the eastern front from Norway and Latvia. Attacks by the Air Forces based in the Mediterranean area were to be directed against reinforcements moving to the Russian front from Italy or Hungary. Finally they suggested that air attacks should be made on rail communications along which reinforcements might travel from the western to the eastern fronts.

ID3/601(C) and  
J.I.C. (45) 34  
(0) Final  
25 Jan. 1945

Ibid

On the same date the Committee issued a special paper which dealt exclusively with the bombing of Berlin. It was of the opinion that heavy area attacks on the capital of the Reich should not detract in any way from the bombing of oil plants and tank factories. On the other hand heavy and well timed air raids on this city might have a disruptive effect on the battle raging on the eastern front. The destruction of Berlin would not by itself break Germany's will to resist or lead to a sudden downfall of the Nazi regime. The attacks might have a political value in proving to the Russians the desire of the Western Allies to help their offensive.

C.39441/49  
Pt. I  
Encl. 59B

The Air Staff presented their views on the two papers on the following day. They agreed on the need for the absolute supremacy of oil as first priority. With regard to the attack of tank factories they thought that the necessary effort could be devoted to this type of target, only provided that SHAEF could be persuaded to discontinue attacks on

A.H.B./  
IIG/86/6  
Mins. of 15th  
Meeting

(1) Attacks on tank production had been removed from the directive in November. Proposals to reintroduce this priority were first discussed at the C.S.T.C. Meeting on 24 January after strong demands made by War Office and SHAEF. This was due to the unexpected German tank strength revealed in the Ardennes battle.

long term communications targets, and were satisfied with a concentration of attacks more directly concerned with the battle on the western front. They were sceptical about the effects which the proposed massive air raids would have on Berlin and thought that weather conditions would prevent a combined air attack on the lines of Operation Thunderclap.(1) This meant that the combined bomber forces would operate against Berlin over a period of four days and nights dropping an aggregate load of upwards of 25,000 tons. Such attacks, if carried out, would have to be extended over a much longer period for unless heavy casualties were to be accepted Bomber Command could only operate in non-moonlight conditions. They were doubtful about the effects on the battle which might be expected from bombing communications connecting the western and eastern fronts. Minelaying operations in the Baltic and Skagerrack would pay good dividends. They were convinced that, since the Strategic Air Force could be used so effectively in this critical stage, demands made by the Armies for close support should be examined very critically so that there could be no unnecessary diversion from the strategic target programme.

Ibid  
Minute No. 59

The bombing of Berlin was discussed over the telephone on 26 January by the Deputy Chief of Air Staff with the Commander-in-Chief Bomber Command. The view of the latter was that such a raid should be supplemented by similar attacks on Chemnitz, Leipzig and Dresden which would equally share with Berlin the task of housing evacuees from the eastern front, and would also be concerned in the problems of transportation involved by the crisis on that front. He informed Air Marshal Bottomley that he was prepared to bomb Berlin as soon as the moon had waned a little and could also take on any of the three cities named.

Ibid  
Minute No. 60

The opinion of the Chief of Air Staff on these matters was made known in a minute to Air Marshal Bottomley on 27 January. He instructed that neither of the Joint Intelligence Committee papers could be acted upon until they had been approved by the Chiefs or Vice Chiefs of Staff. He agreed in principle with the views expressed by the Air Staff and doubted whether the attack on Berlin would justify the heavy losses which it would be bound to incur. Tank factories could not be included in the directive without permission from the Combined Chiefs of Staff and the Supreme Commander's request for support could not cover an attempt to prevent tanks reaching the eastern front. He concluded: 'Subject to the overriding claims of oil and such other agreed targets as the rocket and jet engine factories, submarine building yards for marginal effort etc., we should use available effort in one big attack on Berlin and attacks on Dresden, Leipzig, Chemnitz, or any other cities where a severe blitz will not only cause confusion in the evacuation from the east but will also hamper the movement of troops from the west'. He requested Air Marshal Bottomley to try to convert the Deputy Supreme Commander and General Spaatz to his views. These two air commanders had expressed their opinion on the bombing of Berlin two days earlier, and agreed that the heavy bombers should prepare for the raid but should not strike until the Russians were across the River Oder in strength.

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(1) Code name for combined Anglo U.S. raids on Berlin to bring about a collapse in morale and last discussed by the Air Staffs in August 1944 (see Chap.3, p.68)

Ibid  
Encl. 61A

On the same day as receiving this minute from Sir Charles Portal, Air Marshal Bottomley wrote to Sir Arthur Harris instructing him that as soon as moon and weather conditions permitted, he was to attack the above mentioned cities in eastern Germany with the object of exploiting the 'confused conditions' existing in front of the Russian advance.

A.H.B./  
ID3/601(C)

P.M/M115/5

The Prime Minister was also taking a close personal interest in these plans to assist the Red Army's offensive and on 26 January he enquired of the Secretary of State for Air whether 'Berlin, and no doubt other large cities in Eastern Germany, should not now be considered especially attractive targets'. Sir Archibald Sinclair informed him that all available effort was to be directed against Berlin, Dresden, Chemnitz and Leipzig with the object of disrupting communications between the eastern and the western fronts, all of which was to be undertaken with the minimum amount of diversion from the attack of oil targets. Bomber Command would be unable to take part before about 4 February when the moon had waned and weather conditions had improved. In another minute written two days later, the Prime Minister commented on the great effort which had been expended on the attack of communications as compared with oil targets and expressed anxiety lest the latter type of target should be neglected. Sir Charles Portal reassured him that oil should remain top priority and that the bombing of communications was only justifiable at that stage to delay divisions moving to the eastern front, in the event of a critical situation in the west or when weather conditions prevented the attack of first priority targets.

A.H.B./  
ID/4/83

A.H.B./  
ID3/23B

The Prime Minister and the Chiefs of Staff left London at this stage for the conference with the Combined Chiefs of Staff at Malta. On 31 January the Vice Chiefs of Staff noted with approval the two papers of the Joint Intelligence Committee. Their decision was endorsed by the Chiefs of Staff at Malta on the same day. Meanwhile, on 28 January, the Deputy Chief of Air Staff had consulted with the Vice Chief of Air Staff, Sir Douglas Evill and General Spaatz on the situation caused by the Russian offensive. Air Marshal Bottomley then flew to SHAEF to discuss the problem with Sir Arthur Tedder. These deliberations were summarised in a memorandum by the Vice Chief of Air Staff, after receiving a signal from Air Marshal Bottomley at SHAEF on 31 January, in which the latter stated that he had chosen a list of priorities to meet the new situation. First priority for all the strategic bombers was the main synthetic oil plants which were to be attacked by day whenever visual conditions were anticipated. Second priority for the Air Forces operating from the U.K. was the attack of Berlin, Leipzig, Dresden and associated cities. As Sir Douglas Evill explained, 'A series of heavy attacks by day and night upon these administrative and control centres is likely to cause considerable delays in the deployment of troops at the front, and may well result in establishing a state of chaos in some or all of these centres..... The justification for the continuance of such attacks would be largely reduced if the enemy succeeded in stabilizing his eastern front. Successful attacks of this nature delivered at once, however, might well prevent him from achieving this aim.' General Spaatz was to make daylight attacks on Berlin while Air Chief Marshal Harris was to bomb by night.

G.3944/49  
Pt. I,  
Encl. 63A  
Ibid  
Encl. 62A

Ibid  
Encl. 63A

Third priority was the attack of communications, especially those which affected the assembly, entrainment and movement of major reinforcements to the front. The Strategic Air Forces in England were to be directed to the Ruhr-Cologne-Kassel area. Fourth priority was the attack of jet aircraft production and

the communications system of southern Germany. Marginal effort was to be directed against tank factories and submarine yards with special stress upon the former. The fighter escorts to the strategic bombers, after completing escort duties, were to attack rail movement on the main routes of reinforcement to the east. Air Marshal Bottomley, in concluding his signal, which was to be repeated to Sir Charles Portal at Malta, stated that the Russians, in view of their striking advance, would be anxious to know Allied intentions and plans for the attack of targets in eastern Germany. He asked that the Combined Chiefs of Staff should consider the problem and inform him of any limitations which ought to be imposed on the operations already ordered for Bomber Command and U.S.ST.A.F. This new list of priorities was despatched to the Chiefs of Staff by the Vice Chiefs of Staff on 2 February.

Mins. of 17th  
Mtg. of C.S.T.C.  
para. 1. A.H.B./  
IIG/86/6

On the 7th seven cities additional to Berlin, Leipzig and Dresden were selected by the C.S.T.C. as being associated with the movement of evacuees and military forces behind the eastern front. They were Chemnitz, Halle, Plauen, Dessau, Potsdam, Erfurt and Magdeburg. A revised list of industrial area targets was also issued; they were selected with regard to their association with the current priority target systems.<sup>(1)</sup> In order of priority they were as follows:-

Kassel	Wurzburg
Nuremburg	Weimar
Hanover	Jena
Zwickau	Hanau
Hildesheim	Bielefeld
Flensburg	Pforzheim
Munich	Worms
Mannheim	Ludwigshaven
Gera	

#### Attacks on Tank Production raised to Second Priority

Pressure had been placed on the C.S.T.C. by the War Office, backed by the Joint Intelligence Committee, both of which wanted the attacks on tank production raised to second priority.<sup>(2)</sup> In his memorandum the Vice Chief of Air Staff stated that of the major tank factories, three were in the area of important oil targets and one in Berlin. The remaining four, including two at Kassel, one at Nuremburg and one at Friedrichshafen, were more isolated. However, a useful proportion of these objectives could be attacked simultaneously with the high priority attacks on oil but it was essential to bomb them in good visual conditions.

The Vice Chiefs of Staff therefore decided to make tank production co-equal with communications and second only to oil. Communications targets were now placed in the following order of priority.

(i) Rail assembly areas and bottlenecks for eastward movements.

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- (1) This list replaced that issued on 22 November 1944 by the C.S.T.C. (See Chap. 7, p. 165).  
(2) This target system had been suspended on 1 November (see Chap. 7, p. 151).

(ii) Targets in relation to impending operations on the western front.

(iii) Communications targets in cities such as Berlin, Dresden etc.

Attacks on tank factories were to have priorities over class III above and they were to be bombed during the critical battle in the eastern front. This list of priorities was approved by the Chiefs of Staff at Yalta on 6 February. The Chief of Air Staff asked Air Marshal Bottomley to discuss the proposals with General Spaatz and if he was in agreement to issue a new directive. It appeared to the Vice Chiefs of Staff on 7 February that only the British Chiefs of Staff, and not the Combined Chiefs of Staff, approved of the new bombing priorities. Air Marshal Bottomley sent the new list to General Spaatz that day. In parenthesis he said that the Combined Chiefs of Staff wanted special measures to be taken against the U-boat menace and that the directive would have to be amended accordingly. Marginal bombing effort was to be increased, especially against Hamburg and Bremen and also U-boat operating bases.(1)

Ibid

The raising of the priority for tank production was discussed at the Air Commanders conference at SHAEF on 8 February. SHAEF (Air) disagreed with the proposed change contending that the communications priority should not be disturbed and that six of the more important tank factories could be used as 'filler targets'. However, on 11 February, the new amendment was sent to Bomber Command. Priority lists of tank factory targets were to be issued periodically by the C.S.T.C.

A.H.B./  
IIS/112/1/100/9  
(D) Encl. 47A

A.H.B./  
IIH/241/3/599  
(G) Encl. 36A

#### The End of Area Bombing

Heavy raids on Dresden and Chemnitz were made by Bomber Command on 13/14 and 14/15 February and powerful daylight attacks on these cities were also made by the Eighth Air Force. A heavy attack on Berlin was made by U.S.ST.A.F. on 3 February.(2) Great devastation was caused at Dresden, as will be described in the following chapter, and this later provoked certain newspapers into making inferences that there had been a change in Allied bombing policy as a result of the recent Yalta conference. While no formal pronouncement concerning heavy bomber attacks on German morale was made, it may be inferred that the attack of cities in eastern Germany was discussed by the Allied Air Staffs. The allegations of 'terror' bombing were partly inspired by some indiscreet remarks by Air Commodore C. M. Grierson (SHAEF Air) at an 'off the record' SHAEF press conference in Paris held on 16 February in which he described how the air forces planned to bomb large population centres and afterwards prevent relief supplies from getting through.

A.H.B./  
IIS/112/2/5  
Mar. 1 and  
App. Mar./3A

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- (1) Similar instructions were sent to Bomber Command on the same day with a proviso to increase minelaying operations against U-boats including U-boat training areas (see p. 219)
  - (2) Plans had been made for a combined attack on the eastern quarter of Berlin by Bomber Command and U.S.ST.A.F. but owing to other commitments it was never executed (see Bomber Cmd. Overlord Apps., Supp. 2, Encl. 20 B, June 1944).

The war correspondent of Associated Press afterwards sent a story from Paris, the gist of which was that Allied Air Chiefs had made the long awaited decision to adopt the terror bombing of German populated centres. Five hours after the original message had been broadcast, Reuter denied that any such decision had been made. But, by that time, American evening newspapers had given full publicity to the story and German propaganda had made capital out of it. Shortly afterwards General Arnold requested that SHAEF should publicly deny that there were any intentions of introducing specific air attacks on German morale(1)

C/39441/49  
Pt. I,  
Encl. 83A

Ibid Encl. 84A

Now that the end of the German war was clearly in sight, the bombing of Dresden led the Prime Minister to consider whether the policy of area bombing had not become indiscriminate and wasteful. He foresaw the problems with which the occupying forces would have to cope when they 'took over control of an utterly ruined land..... I feel the need for precise concentration upon military objectives such as oil and communications behind the immediate battle zone, rather than mere acts of terror and wanton aggression however impressive.' These opinions were conveyed in a minute to the Chief of Air Staff on 28 March, four days after the crossing of the Rhine at Wesel, and at a time when Allied troops were advancing swiftly into Germany. The view of the Deputy Chief of Air Staff was that the attack of German towns should be balanced against the results of strategic bombing thereby crippling Germany's war economy and hastening military defeat.(2) He considered that the Prime Minister was criticizing past bombing policy unjustly and that he had ignored the overall mission of the Strategic Air Forces which was 'the progressive destruction and dislocation of the German military, industrial and economic systems, and the direct support of the land and naval forces'. He denied that there had been any occasion when German cities had been attacked purely for the sake of provoking terror.

A.H.B./  
ID4/23B

The Commander-in-Chief Bomber Command was asked to comment on the Prime Minister's signal since he had been such a fervent protagonist of area bombing and remained convinced that it had been the most effective way of destroying the German economy. Replying on 29 March Sir Arthur Harris, agreeing with the Air Ministry, explained that it was the complete dislocation of transportation rather than the destruction of cities that made recovery initially impossible. As for Dresden, 'the feeling such as there is..... could easily be explained by any psychiatrist. It is connected with German bands and Dresden shepherdesses. Actually Dresden was a mass of

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- (1) The question of the bombing of Dresden was raised in the debates on the Air Estimates in the House of Commons by Mr. Richard Stokes on 6 March 1945 who quoted a report in the Manchester Guardian of 5 March on the Dresden raids and this developed into a brief discussion as to whether strategic bombing could win the war. No statement was made by the Secretary of State for Air. (Hansard March 1945.)
  - (2) Dresden was described by the Air Staff as being a rail and water borne communications centre of particular significance in connection with the Russian campaign. It also contained a large number of light engineering works, factories making electrical motors, precision and optical instruments and chemicals.

munitions works, an intact government centre and a key transportation centre to the East. It is now none of these things'. He argued once more that the destruction of German cities had enabled Allied troops to advance into Germany with the minimum number of casualties. He did not believe that attacks on military objectives such as oil and communications behind the battle zone would have done more to shorten the war. In any case the weather largely governed the choice of targets. Attacks on cities were strategically justified, insofar as they tended to shorten the war and preserved the lives of Allied soldiers. Strategic bombing of German cities must go on until organized resistance had broken down.

The views of the Air Staff on area bombing were based on the objectives of the Combined Bomber Offensive as laid down at the Casablanca Conference. It was only recently, they explained, that bombing aids had been so improved as to make accurate night attacks on industrial plants or other precise objectives at all possible. In daylight, weather conditions over Germany allowed only a limited number of opportunities for accurate bombing. For this reason the object of British bombing policy was to attack important concentrations of German industry by means of area bombing to ensure the maximum continuity and weight of attack. Now that Germany was on the point of collapse further attacks on industry would be unlikely to take effect before the close of hostilities. Thus priority was being given to short term targets.

Meanwhile the Prime Minister, on the advice of Sir Charles Portal, agreed to withdraw his allegation of acts of terror and wanton aggression in the conduct of Allied bombing operations and reworded his minute so as to deal only with the question whether it was in the Allied interest at that stage of the war to continue with area bombing. It was dispatched to the Chief of Staff Committee on 1 April. Their conclusions reached on 6 April were as follows:-

- (i) Area bombing designed solely with the object of destroying or disorganizing industrial areas should be discontinued.
- (ii) There should be no alteration to the current bombing directive such as would exclude area bombing.
- (iii) Area attacks might prove necessary against those targets, the destruction of which was calculated best to assist the advance of the Allied Armies into Germany or to have the most immediate effect upon the enemy's ability to continue armed resistance.
- (iv) Any ultimate political or economic disadvantages of area bombing necessitated by these operations should be accepted.

They requested that these proposals should be accepted by the Combined Chiefs of Staff.

Ibid

The Air Staff also postulated that there were four situations in which area bombing would be valid. First, attacks might be made on built up areas behind the fronts containing reserves and maintenance organization in the event of resistance stiffening on the western or eastern fronts. Secondly, in the attack of communications systems in central and eastern Germany the time factor might make it impossible to wait for visual conditions for precise bombing. Thirdly, area attacks might be made on these towns

used by the Germans to house departments of the German High Command on evacuation from Berlin. Finally, the destruction of important naval targets, such as those at Kiel, might involve the widespread devastation of towns with results equivalent to area attack. On 6 April the Air Ministry informed Bomber Command that they must henceforward conform to these principles.

The Fourth Directive to the Strategic Air Forces

By the end of March the Allies had crossed both the lower and the upper reaches of the Rhine. The German strategy for the defence of the Reich had been based on a stand west of the Rhine and east of that river there was nothing to withstand the swift advance of General Eisenhower's forces. The cream of the German army in the west withdrew into the Ruhr area but they were encircled by British and U.S. forces on 1 April and by the 18th some 325,000 prisoners had surrendered and resistance had crumbled. Thus the Armies completed the task of the heavy bombers which had battered this area so vital to Germany for four years. By the same date British troops were pressing on towards the north German ports. The U.S. and Russian forces were about to join hands on the Elbe. American and French troops heading into southern Germany were destroying the possibility of a National Redoubt. At the Air Commander's conference on 5 April Air Chief Marshal Harris admitted that it was becoming difficult to find targets for his Command. The Strategic Air Forces had completed their task and the success they had achieved could be seen by the red streaks all over the war map marking the advances of the ground forces.

A.H.B./  
IIS/112/100/9  
(E),  
Encl. 26A

C.39441/49  
Pt. II

In the light of these events the original objectives laid down for the Strategic Bomber Force no longer existed. Enormous dislocation of the enemy's economic system had already been achieved and it was now necessary to avoid destruction of facilities which would be needed for the forces of occupation. On 13 April General Spaatz and Air Marshal Bottomley decided upon the fourth and final strategic directive in which they stated that the main task was to give direct support to the land campaign. Priorities were oil supplies, lines of communication. Tank production was omitted at the request of SHAEF. Other objectives were to be attacked only at the request of the Supreme Commander. 'Policing' attacks against the G.A.F. were to be made whenever necessary to prevent interference with Allied ground and air operations. Certain objectives in the enemy's U-boat organization were to be attacked whenever possible by marginal effort.

The directive was submitted to the British Chiefs of Staff on 16 April. The Combined Chiefs of Staff gave it their formal approval on 4 May. In the meantime, pending the approval of the Combined Chiefs of Staff, the Deputy Supreme Commander, General Spaatz and Air Marshal Bottomley had agreed that this directive should govern the operations of the Strategic Air Forces in Europe until further notice. The directive was not, however, issued to Bomber Command or U.S.ST.A.F. until 5 May, by which time hostilities in the northern sector had been concluded.

Attempts to co-ordinate Strategic Air Operations with the Russians

A.H.B.  
ID7/223D  
(Pt. I) and  
C.A.S.  
Folders  
2126 Pts.  
I and II

In the Mediterranean theatre the Russians had already come into contact with the Western Allies during their advance into the Balkans and the question of co-ordination between the Russian forces in southeast Europe and the Allied forces under the Supreme Allied Commander, Mediterranean theatre was under discussion in the autumn of 1944. On 7 November U.S. aircraft accidentally attacked a Soviet mechanized column in Yugoslavia causing serious casualties. This incident led to the institution, through the Allied Military Mission in Moscow, of an arbitrary, temporary bomblines south of Sarajevo to the southern borders of Yugoslavia. The Russians at first used the bomblines as a barrier against interference by the Western Allies with their military or political policies for eastern Europe. Thus, for example, in the northern sector they intended to prevent the Anglo-U.S. Air Forces from dropping supplies to the Polish Partisans, ostensibly on the grounds that the supplies might fall into the hands of the enemy.

The Supreme Commander, Mediterranean theatre protested against the unnecessary restrictions of the bomblines and after ineffectual attempts by the Allied Mission in Moscow to alter it, unilateral action was taken by the Combined Chiefs of Staff to adopt a new bomb line, of which details were notified to the Soviet General Staff. Early in December, the Combined Chiefs of Staff sent a signal both to Moscow and to Allied Force Headquarters which defined how a bomblines should be established<sup>(1)</sup> and how liaison parties should be formed to modify it when the occasion arose. As far as north-west European air operations were concerned, General Spaatz and Air Marshal Bottomley were authorised to establish and make changes in the bomblines north of the latitude of Vienna. The Russian General Staff did not consent to these arrangements and were entirely opposed to the idea of establishing air liaison detachments with the armies in the field. In their opinion liaison could best be established through Moscow.

Until the beginning of the Russian offensive in January 1945, there was little likelihood of any clash between the Soviet forces and the western Allied Air Forces in north-east Europe and there was consequently no need to define a bomblines. The British Air Staff adjusted, when necessary, their strategic target list in accordance with the Russian ground situation, deleting targets which were judged to be too near Russian occupied areas. The position of the Russian front line was given in the daily communiques endorsed or commented on by the Allied Mission in Moscow. Until the Russians suggested a

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(1) 'A bomblines is an imaginary line on the ground established by army field commanders setting forth the forward boundary of an area in front of their ground forces in which the attack of ground targets by friendly aircraft is prohibited. This line should be delineated by terrain features easily recognizable to pilots in the air at all altitudes. It should be close enough to advancing troops to permit the attack of all vital strategic air objectives and tactical targets, air attacks which will materially assist in the advance of ground troops or are necessary to the success of a strategic bomber offensive in carrying the war to the enemy. It should not be construed as a boundary for restricting movements of friendly aircraft.'

speedier method of communicating changes on their land front, the Air Staff were content with the prevalent system.

A.H.B./  
ID7/457B

The question of the co-ordination of strategic bombing between the Western Allies and the Russians was raised at the two military tripartite meetings held at Yalta on 5 and 6 February. General L. S. Kuter, representing General Arnold (unable to attend the conference through illness) expressed the demands of the Western Allies as follows. First, that there should be no rigid division of eastern Germany into spheres of action of the Soviet, British and American strategic bombers respectively. Secondly, that day to day liaison should be established between a responsible officer of the Russian High Command and representatives of the Allied Military Mission in Moscow, in order to exchange information upon which the Western Allied air staffs could regulate the strategic air forces in accordance with the development of Soviet ground operations.

General Antonov, Deputy Chief of Staff Red Army, suggested, as the Russians had done before, that they should define a bomblines running through Stettin-Berlin-Dresden-Zagreb. But such a line, as General Kuter pointed out, made it impossible for the Strategic air forces in the west to bomb highly important oil targets such as Politz, Ruhland, Moosbierbaum and transportation and industrial targets near Berlin and Dresden. A number of tank and jet aircraft factories would also be affected. General Antonov remained adamant in his view that a bomblines should be worked out by the three Air Staffs and maintained that effective liaison could be established between the Soviets and the Allied Military Mission in Moscow. He reported that Marshal Stalin had refused to sanction liaison on any lower level. Sir Charles Portal endeavoured, without success, to convince the Russians that, instead of working out a bomblines they should see how far it was possible to safeguard the interest and security of the Soviet forces while keeping in mind the need to destroy as many German installations as possible.

Sir Charles Portal, General Kuter and Marshal of Aviation Khudyakov then met to draw up a draft agreement which was to be subject to ratification by the high command of each nation. The agreement, as the British and Americans understood it, ran as follows:- the position of the forward Russian troops was to be noted to the Allied Air Staffs daily through the Allied Missions in Moscow. Secondly, Allied Air Forces were not normally to operate in the proximity<sup>(1)</sup> of advanced Russian formations without prior notification to the Russian General Staff. In order to bomb a target within the limited zone they were to give the Soviet General Staff 24 hours notice and, in the absence of any comment from the latter, would be free to carry out the operation proposed.

On 8 February Marshal Khudyakov submitted to Sir Charles Portal and General Kuter a considerably revised draft agreement which was quite unacceptable to the Western Allies. The main differences were that, in the Russian proposal, it was necessary to obtain agreement for any Allied bombing east of the line 24 hours before the attack was to take place. The Russians also insisted on a limited zone between their front line and the places already mentioned

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(1) This is to say within a distance of 50 miles.

between Stettin and Zagreb which would be moved forward automatically at a given distance from the Russian front as their offensive proceeded.

The Chief of the Air Staff wrote to Marshal Khudyakov on 9 February and informed him that his new proposals were impossible from the British point of view. Unless the Russians accepted the original agreement, the R.A.F. would continue to act upon the arrangements in force before the Yalta conference. A similar letter in respect of the U.S.A.A.F. was sent to the Marshal of Aviation by General Kuter.

C.A.S. Folder  
2126 Pt. II

However, by 7 March, a month later, a reasonable agreement was reached with the Russians by the Allied Military Mission in Moscow which closely resembled the original proposals made at Yalta. The limited zone was defined for the time being between the Soviet front line and the line Pasewalk - Prenzlau - Angermunde - Berlin - Ruhland - Dresden - line of River Elbe - Pardubice - Brno - Vienna - Maribor - Zagreb. South of the latter the line was to remain as previously agreed. Notice of an attack on a target in the limited area was to be given at least 24 hours in advance. Information of Russian advances was to be handed to the Allied Mission in Moscow 48 hours in advance. These arrangements were to come into effect on 10 March and were to continue until cancelled by one or more of the parties concerned. Further adjustments were made as the Red Army advanced and the Strategic Air Forces were notified accordingly.

As the Allied and Russian forces approached each other, incidents both from air to ground and in the air continued to occur. The Russians obstinately refused to agree to the establishment of liaison parties between the ground forces and insisted on maintaining a rigid bomblines which greatly restricted Allied tactical air operations. (1) SHAEF decided on 11 April that all targets for the Strategic and Tactical Air Forces would have to be cleared with the Soviet High Command 48 hours in advance. This ruling held until the junction of American and Russian forces on the Elbe when air operations in the proximity of the Red Army were no longer necessary.

Policy for the Attack of Oil and Benzol Targets in the Final Phase

A.H.B./  
IIG/86/6  
Mins. of 13th  
Mtg. paras.  
1-17

A lengthy discussion took place on the future of the oil offensive at the thirteen meeting of the C.S.T.C. held on 10 January. The Chairman, Colonel Maxwell, Director of Operations U.S.ST.A.F., repeating General Anderson's plea for a recasting of the strategic bombing offensive, suggested that, in the course of the following weeks, the Strategic Air Forces should concentrate upon the oil industry alone and that they should use blind bombing technique, even for these precision targets. For the next two months there would be a lull on the western front which would give the strategic bomber force its last opportunity to influence the course of the war.

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(1) And oil attacks in March. On 12 March the Russians demanded an attack on the German General Staff H. Q. at Zossen, near Berlin. It was bombed by the VIIIth Air Force on 15 March at the expense of the two remaining active synthetic oil plants supplying the eastern front, Ruhland and Bohlem, the destruction of which would have been of far greater value to the Red Army.  
(A.H.B./II/70/218)

Only in a real emergency were the heavy bombers to be diverted from this important task. Mr. Lawrence, the oil expert from the Ministry of Economic Warfare, believed that, if the remaining ten major synthetic oil plants and refineries were destroyed and kept out of action for the next three months, enemy resistance would collapse. Other members of the Committee stated that attacks on petrol, oil and lubricant depots by the Tactical as well as by the Strategic Air Forces would ensure that the enemy would be unable to accumulate a tactical reserve of oil as he did before the Battle of the Ardennes. The Committee agreed that the Working Committee (Oil) should prepare an estimate of the enemy's output of petrol and oil products in the event of the ten principal targets being put out of action for the next three months and that the Joint Intelligence Committee should then make an appreciation of the consequent effect on the enemy's powers of resistance.

A.H.B./  
ID3/1773 (C)

The Joint Intelligence Committee, reporting on 23 January, believed that there were no bulk reserves of aviation or motor spirit left in Germany and that the output up to 18 January was between 345,000 and 375,000 tons or 26 per cent to 27 per cent of normal. This reduction in petrol supplies would result, within a period of about six weeks, in the almost complete immobilisation of the German Army and Air Force. 'The increase in underground production after mid-March would be too little and too late to do more than slightly alleviate this catastrophic situation'.

Ibid

The Chiefs of Staff considered this report at their meeting on 24 January. They were impressed by the results achieved by only a relatively small percentage of the Allied bombing force(1) and directed that every effort must be made to eliminate the remaining oil plants.

A.H.B./  
IIH/241/3/616  
(B) Enc. 12A

At the end of January the C.S.T.C., whilst agreeing that the attack of the major oil producers had assumed the greatest significance,(2) the attack of petrol, oil and lubricant depots engaged in supplying the enemy on the western front was less urgent than hitherto and decided to suspend them from attack. Depots known to specialize in the supply of G.A.F. fighter formations merited continued attack but on a lower priority than oil production targets. The bulk of the oil storage depots and several minor production plants were therefore omitted from the priority list issued in Commands.

A.H.B./  
IIG/286/6  
14th Mtg.  
Mins.  
para.29

The ruling did not apply to the attack of benzol plants. This branch of the oil industry helped to eke out the inadequate petrol stocks of the Wehrmacht and it was believed that its total output came to 20,000 tons a month. In addition the attack of these plants would affect the enemy's supply of materials for explosive fillings of shells. Most of the plants were adjacent to the important Ruhr steel works and incidental damage to these works had already been caused. Four or five targets were close to rail centres. Weather might prevent the heavy bombers attacking the synthetic oil plants for periods of a

Ibid  
16th Mtg. Mins.  
paras. 12-14

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- (1) 49,122 short tons had been dropped by Bomber Command and Eighth Air Force on oil compared with 103,428 tons on communications from October to December 1944.
  - (2) i.e. the first 21 targets in the priority list of which eleven were for attack by the Fifteenth Air Force only.

fortnight or more, in which case the omission of the benzol plants would seriously prejudice the oil programme. As many of the plants were conveniently situated in the Ruhr, the C.S.T.C. recommended that their attack should continue on first priority. Blind bombing technique was admissible.

The C.S.T.C. believed that the suspension of the priority accorded to the attack of strategic oil storage installations would not harm the over-all effects of the oil offensive. The attack of the distribution system should be timed to coincide with an Allied ground offensive. It would be far more effective when the major producers had been put out of action and when the remaining stocks in the distribution system were the only source of fuel supply for the enemy's immediate military needs. A plan was produced for the bombing of oil storage depots and kept up to date. It was to be put into operation at the appropriate moment.

Ibid  
17th Mtg.  
Mins.  
paras. 14-16

A.H.B./  
IIH/241/3/616  
(B)

During the latter part of January and February improving weather had increased operational possibilities and the Strategic Air Forces were able to intensify raids over Germany. At the beginning of January 1945 there were still 60 major oil producers on the priority list. By the third week in February there were only 40 major targets. Decisive damage had been inflicted on Politz and Lutzkendorf, two of the most important targets. Still outstanding were Bohlen, Ruhland and Magdeburg. In the west the destruction of the synthetic oil plants and the major benzol plants was going according to plan so well, that a further 13 smaller benzol plants were added to the list at the end of February.

A.H.B./  
IIG/486/6  
17th Mtg.  
Mins.  
paras. 8-13  
18th Mtg.  
paras. 4-6  
19th Mtg.  
paras. 4-8  
and  
20th Mtg.  
paras. 3-13

There had been heated discussion at C.S.T.C. meetings as to whether the attack of benzol plants would clash with the bombing of communications in and around the Ruhr. It must be explained that, at this time, plans for the interdiction of the great industrial area were being discussed and certain members of the C.S.T.C., backed by SHAEF, argued that the whole railway system of Germany would be jeopardised if coal was prevented from leaving the Ruhr. Furthermore, the importance of the Ruhr as a coal production area had increased since the Russians had occupied the coalfields of Upper Silesia. Other members of the Committee thought that the small amount of effort allotted to benzol plants ought not to be diverted from the all-important synthetic plants. One member maintained that complete interdiction of the Ruhr would not bring about the collapse of German economy because of the increase of brown coal production. They also considered that the list of oil priorities was too long and complicated.

On the other hand the oil experts believed that, at the risk of being called 'oil fanatics', the sources of benzol should be destroyed as it could be used in motor transport either mixed with alcohol or alone with no or very minor carburetor adjustment giving very nearly optimum performance. So long as the battle continued to rage on the western front there was every reason to raid the benzol plants. Attacks on these plants were usually made in blind bombing conditions and did not interfere with visual attacks on communications. The C.S.T.C. had moreover, set out to limit German oil production to 50,000 tons a month. This target had not yet been reached and until that time benzol plants should continue to be attacked. In addition, when weather conditions were unfavourable for the bombing of the important oil targets in central Germany, the heavy bombers could attack communications targets

and benzol plants in the Ruhr at the same time. Finally on 2 March, after General Spaatz and Air Marshal Bottomley had ruled that the Committee reach a firm decision, the latter agreed that benzol plants should remain on the priority list until the major oil producers had decisively been put out of action. They did not consider that this policy conflicted with the Ruhr interdiction programme.

Ibid  
23rd Mtg. Mins.  
paras.5-6 and  
24th Mtg.  
paras.2-4

By the end of the third week in March there were only 22 targets left on the oil priority list. At this stage with the rapid progress made in the immobilization of oil production and the crossing of the Rhine by the Allied Armies, the plan for the attack of the oil storage installations was put into operation. During the next four weeks the majority of the principal depots in the distribution system which had not already been overrun by the Allied Armies were bombed by the Tactical as well as by the Strategic Air Forces.

All the synthetic oil plants except Ruhland were put out of action during March or reduced to an insignificant output. Ruhland, which was out of range of the heavy bombers based in the United Kingdom, was eliminated by a long range attack of the Fifteenth Air Force on the 23rd. By the end of March the whole of the German oil refining industry apart from a few small Geilenberg units was out of action and the remaining targets were destroyed by the Fifteenth U.S. Air Force. Early in April the oil industry came to a complete standstill and in the course of the month plants were rapidly overrun by the ground forces. The whole war production machine was on the point of collapse so that repair and dispersal schemes could no longer be implemented. The task of dislocating the enemy's oil resources had been completed.

Flensburg  
Docs. Vol.XVII

Some idea of the decline of the oil industry can be gained from the scanty figures of oil production available for this period in the Speer papers. The plant at Bohlen in January 1945 produced 12,140 tons; in February this total had risen to 13,010 tons; it had fallen in March to 660 tons. That at Magdeburg dropped from 7,320 tons in January to 400 tons in February and nothing in March. Politz dropped from 5,470 tons to 2,010 tons in the same period. Total production for five major producers: Leuna, Bohlen, Magdeburg, Zeitz, Politz had decreased from 46,750 tons in January to 11,260 tons in March and 730 tons in April.

The Final Transportation Plan - The Isolation of the Ruhr

A.H.B./  
IIG/86/6  
Mins. of  
C.S.T.C.  
Mtg.  
12 Jan. 1945

The Working Committee (Communications) under Mr. D. Wood, which had been instructed at the end of December to investigate the results of the transportation plan up to that date, made it quite clear that the large tonnage which had been dropped on this target system(1) had not affected the German economy as a whole but had had considerable local repercussions just behind the front. In the area Cologne - Coblenz - Trier rail traffic had been brought to a standstill by a large scale and continuous series of attacks made during the Ardennes battle on all types of rail targets. Less dislocation was caused in other areas west of the Rhine on

(1) A total of 103,428 (short) tons had been dropped by Bomber Command and U.S.ST.A.F. from October to December 1944 of which 50,000 tons were dropped in December alone. (B.B.S.U. Strategic Air War against January 1939-45)

the central and southern sectors of the front. In the remainder of the area beyond the Rhine eastwards to 10° East a large number of attacks on rail centres had been wasted. There was no substantial interference with economic traffic such as was immediately noticeable after the cutting of the Dortmund-Ems and Mittelland Canals. Delays to troop movements were relatively light because of the slow rate of despatch deliberately adopted by the Germans to meet this very difficulty.

A.H.B./  
IIH/241/3/615  
Encl.2A

The Committee reached three conclusions. First, that there was no shortage of locomotives in Germany and that a very great effort would be required to cause a shortage. Attacks on motive power should therefore be made in a more limited area. Attacks on large centres dispersed over a wide area such as that west of 10° East could only be expected to have long term results as the bulk of the economic traffic haul consisted of raw materials which required long processing periods. From a military point of view, attacks on railway centres as such would only be of value when they were being heavily used for troop movements. The Committee recommended concentrated attacks on all types of railway targets in five areas which they listed in order of priority.

- (i) Cologne - Coblenz - Trier
- (ii) The area west of Cologne - Wesel - Emmerich
- (iii) Coblenz - Frankfurt - Saarbrucken
- (iv) The northern and eastern approaches to the Ruhr - Wesel - Coesfeld - Munster - Hamm - Soest.
- (v) Railways west of the line Frankfurt - Stuttgart - French frontier.

They were to be attacked in a co-ordinated effort by both Tactical and Strategic Air Forces.

The programme was expected to achieve four results. First, the pushing back of enemy rail heads from the area west of the Rhine. Second, the interference with the areas immediately east of the Rhine which the enemy would be forced to use increasingly. Three, interference with military movements outside these areas when intelligence permitted. Fourthly, the cessation of all economic traffic in the affected areas, in particular, the serious dislocation of traffic from the Ruhr and the halting of traffic from the Saar.(1)

A.H.B./  
IIG/86/6  
Mins. of  
15th Mtg.  
of C.S.T.C.  
paras.25-35

The C.S.T.C., as usual, did not hesitate to reaffirm their belief in the oil plan which had affected all the battle fronts and not merely one section of the western front. However, preparations were going forward for the next phase in the ground battle. The main military objective was the Ruhr and the Supreme Commander wanted the Air Forces to assist the Armies by paralysing its economic activities. There was

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- (1) The C.-in-C. Bomber Command failed to find any 'scheme' in the Committee's findings and maintained that the latter should discover exactly what SHAEF wanted in the nature of attacks upon transportation upon which Bomber Command O.R.S. would investigate and state whether the plan was practicable. (A.H.B./IIH/241/3/615 Min. 6).

# PLAN FOR INTERDICTION OF RUHR COMMUNICATIONS 28 FEBRUARY 1945

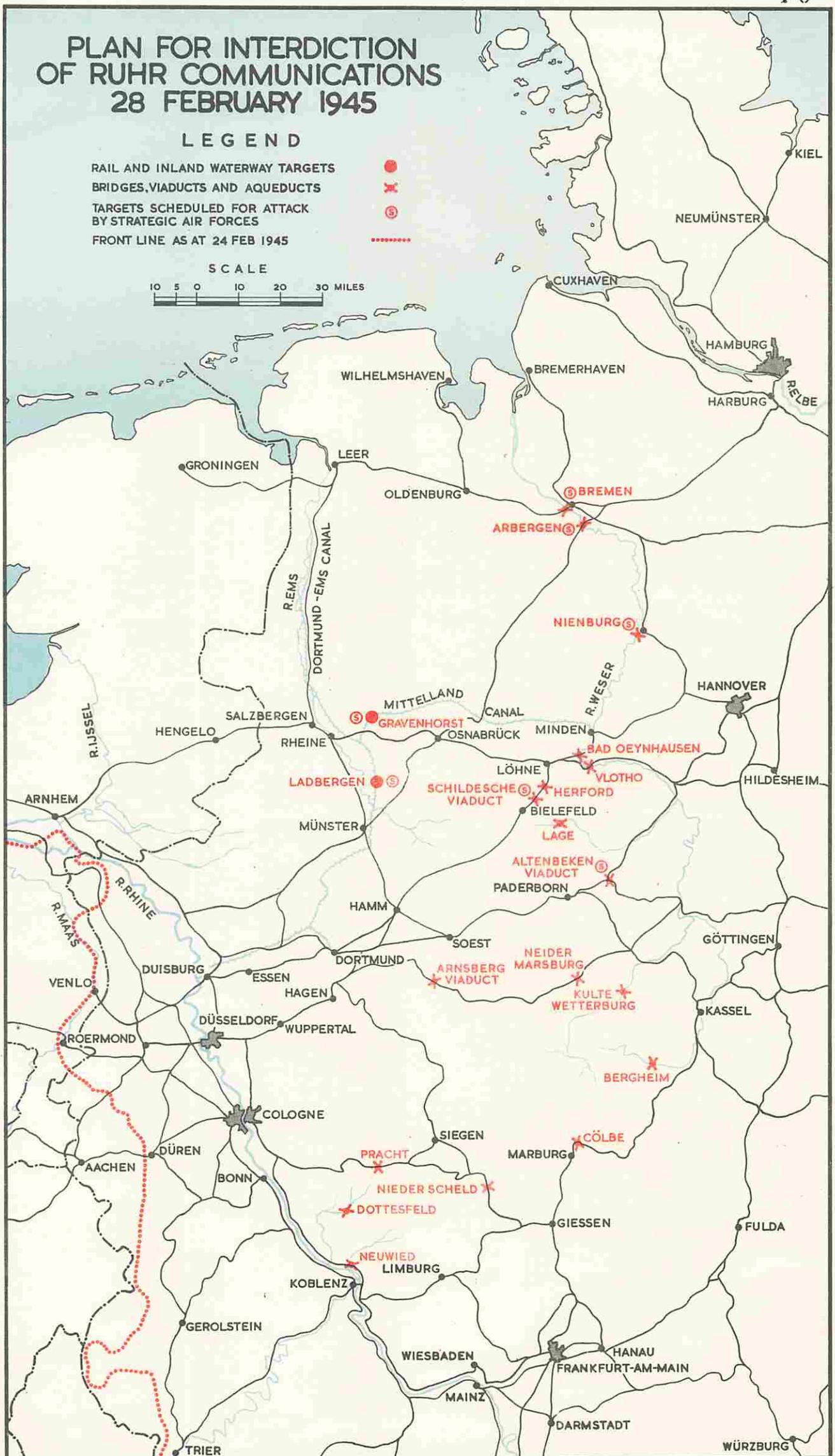
## LEGEND

RAIL AND INLAND WATERWAY TARGETS  
BRIDGES, VIADUCTS AND AQUEDUCTS  
TARGETS SCHEDULED FOR ATTACK  
BY STRATEGIC AIR FORCES  
FRONT LINE AS AT 24 FEB 1945



## SCALE

10 5 0 10 20 30 MILES



also an immediate requirement to delay the panzer divisions of Sixth S.S. Panzer Army which were being withdrawn from the western front for action in the east.

A.H.B./  
IIS/112/1/100/  
9(D)  
Encl. 47A  
para. 13

The problem was discussed at the Air Commander's Conference on 8 February where General Vandenberg, Commanding General Ninth Air Force, who had had experience of bridge cutting in the Battle of the Ardennes, suggested drawing a line of interdiction consisting of 16 bridges from Bremen to Coblenz, This line would sever the Rhineland, Westphalia and the Ruhr from the rest of Germany. The Deputy Supreme Commander suggested that the isolation of the Ruhr from the east would assist the battle in the west. SHAEF believed that the plan would also have a strategic value in that the enemy would be unable to draw coal and steel from the Ruhr which was his major source since the loss of Upper Silesia.

Ibid  
Encl. 52A and  
A.H.B./  
IIG/286/6  
Mins. of 20th  
Mtg. of C.S.T.C.  
2 Mar. 1945  
paras. 21-31

The Working Committee (Communications) of the C.S.T.C. met at SHAEF on 10 February to discover how far attacks on transportation targets by the Tactical Air Forces could be co-ordinated with the existing plan of attack on communications by the Strategic Air Forces. The Committee agreed that all the Air Forces should aim at the complete isolation of the Ruhr. Sir Arthur Tedder said that the interdiction plan should be co-ordinated in the heavy bomber attacks on railway centres in the Ruhr itself. The C.S.T.C. approved General Vandenberg's plan and it was presented to the Air Commanders at their conference on 15 February; the latter agreed that it should be put into operation at once. Thirteen bridges were to be attacked by medium bombers of the Tactical Air Force and fighter bombers were to attack movement on the outskirts of the Ruhr. Five bridges or viaducts which were out of range of the medium bombers were allocated to the Strategic Air Forces. There were situated at Bielefeld, Altenbeken, Arbergen, Bremen and Nienburg, the latter three bridges over the Weser. The Bielefeld, Arnsberg and Altenbeken viaducts, although west of the interdiction line, were placed high in the priority list because their destruction would at once reduce by half the enemy's traffic on the three main trunk lines leading into the Ruhr from northern and central Germany.

A.H.B./  
IIS/112/1/100/  
9(D)  
Encl. 55A  
para. 14.  
See Map No. 10

The Ruhr interdiction plan was approved both by the Joint Intelligence Committee and the Directorate of Bomber Operations in London because it was going to stop the export of hard coal and steel components from the Ruhr and prevent the import of raw materials and military supplies into the Ruhr. On 1 March the Joint Intelligence Committee issued a paper under the title 'Effects of interrupting the export of hard coal from the Ruhr to the rest of Germany'. It pointed out that the monthly supplies of hard coal available to Germany had fallen as a result of the loss of Upper Silesia to the Russians and because of the reduction in the output from the Ruhr and the Saar from 18 million tons in the middle of 1944 to nine million tons. It was believed that the German railway system was operating on only three weeks supply of coal and coal stocks in Italy, Norway and Holland were also extremely low. Shortages of coal were occurring over a wide area and some of the most important war factories were affected. The J.I.C. concluded that further interdiction of coal supplies from the Ruhr together with the loss of the remaining Silesian coal fields would disorganize the German war effort within a few weeks.

J.I.C. (45)  
60(0) Final  
1 Mar. 1945  
and A.H.B./  
ID/4/36

For once, as the Director of Bomber Operations noted, there was 'no clash between our strategic requirements and those for the support of our armies in the west'.

The Air Staff further believed that, as the interdiction plan was meeting with considerable success, no change of priority between oil and communications was required. The accuracy of these appreciations has since been confirmed by the reports of Speer and his colleagues.

Ibid  
Encl. 21A  
et seq.

The communications targets list was called from the beginning of March the Isolation of the Ruhr. Targets were classified into three groups. Those targets formerly listed as 'Communication targets of special importance' were henceforth called 'major interdiction targets'. There were six of these in order of priority, the Bielefeld Viaduct, the Dortmund Ems Canal, the Arnsberg Viaduct, and the Bremen Arbergen and Nienburg bridges. The second group now termed main centres were composed of marshalling yards on the fringes of the Ruhr, the destruction or damage of which would make a direct contribution towards the isolation of the Ruhr. These 'main centres' were largely those targets which had formerly constituted the first priority area and were listed in order of importance. (1) Targets which were some distance away from the Ruhr were grouped together under the title of 'alternative weather and filler targets' and were attacked when weather conditions over the Ruhr were unfavourable. (2) As preparations for the crossing of the Rhine north of the Ruhr reached their climax the Strategic Air Forces played an increasingly important part in bombing Ruhr communications, including the dropping of a ten ton bomb on the Bielefeld viaduct by Bomber Command.

On 24 March, the day that the Allied Armies crossed the Rhine at Wesel, the isolation of the Ruhr became an accomplished fact. One or more spans had been brought down on 14 of the 16 bridges between Bremen and Coblenz while the remaining two had been neutralised by First U.S. Army's advance from the Remagen bridgehead. The Bielefeld and Arnsberg viaducts had been destroyed whilst 20 out of the 25 railway centres on the periphery of the Ruhr had been so heavily damaged as to prevent either through running or marshalling. The important part played by Bomber Command in these operations will be described in the next chapter.

#### Operations Clarion and Bugle

See Chap. 7  
p. 162  
B.C./S.32305

The original plan for Operation Clarion as devised by U.S.ST.A.F. in December 1944 was described in an earlier chapter. Suffice it to say that there was to be a widespread attack over Germany by small formations of heavy bombers against targets which had hitherto escaped attack and were only lightly protected by flak. It was hoped that the operation would overwhelm the already strained railway system, result in a redeployment of flak and a consequent softening of the enemy's defences around priority targets; finally, it would demonstrate the Allies' great air superiority.

The plan had originally been rejected by the British Air Staff on the grounds that it would divert effort from oil, but fine weather had been forecast for four days after 20 February and, in view of the increasing Allied pressure,

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- (1) They were: Lohne, Soest, Osterfeld, Oberhausen, Sterkrade, Schwerte, Rheine, Osnabruck, Seigen, Troisdorf, Betzdorf, Dillenberg, Arnsberg.
  - (2) The most important were Kassel, Bebra, Bonn, Marborg, Frankfurt-am-Main, Mainz and Bischofsheim.

A.H.B./  
ID/4/36

Ibid

both on the western as well as on the eastern fronts, SHAEF was intent on trying out Clarion on 22 February. General Anderson assured Air Marshal Bottomley that the operation would have no repercussions on the oil offensive. The operation involving all the Air Forces took place over a wide area bounded by Hamburg, Brandenburg, Halle, Nuremburg and Kassel; 7,200 tons of bombs were dropped. Weather restricted the operations of the Eighth Air Force and it was decided to continue the operations on the next day. The Chief of Air Staff's suspicions were at once aroused as he believed that the oil plan was suffering, but he was assured by Air Marshal Bottomley that the weather on that day prohibited visual attacks on the four remaining important synthetic oil plants.

Ibid

Bomber Command played a small part as Clarion was essentially a daylight operation and a small force bombed oil and interdiction targets in the Ruhr area. It is doubtful whether any tangible results were achieved by Clarion as the operation was unrelated in space and time to operations on the Western Front.<sup>(1)</sup> The British Air Staff and the C.S.T.C. disapproved of it because it went against all the experience gained during the winter that transportation attacks should be concentrated against specific areas. Saturation could not be achieved because attacks on the most important railway centres outside the Ruhr such as Halle, Leipzig and Erfurt were precluded because of their strong defences. Moreover pressure had been released in an area which had suffered dislocation and had been transferred to an area comparatively unaffected by air attack and therefore more resilient.

A.H.B./  
IIS/112/1/100/  
9(D)  
Encl. 73A  
para. 13  
B.C./S.32501

The Deputy Supreme Commander was satisfied with the interim results of Clarion and wanted to follow it up with another all-out attack, this time against communications in the Ruhr area. This plan was called Bugle and was supported by the Ground Staff at SHAEF as it related to military operations north of the Ruhr.<sup>(2)</sup> But U.S.ST.A.F. vehemently opposed the plan as they wanted to continue widespread attacks over Germany on the model of Clarion combined with a big raid on Berlin. They also were afraid lest the Eighth Air Force should suffer severe casualties over the Ruhr. Sir Arthur Tedder wanted to alternate Bugle with Clarion but with emphasis on Bugle for the time being. The British Air Staff, as already seen, strongly approved the interdiction plan for the Ruhr and their view on Operation Bugle was that marshalling yards in the Ruhr were suitable targets provided that the oil offensive was not neglected.

A.H.B./  
ID/4/23B

Unfortunately the operation order devised for Bugle by SHAEF was not sent to the Air Ministry for approval and this led to a contretemps between Air Marshal Bottomley and Sir Arthur Tedder. The latter in an outspoken signal to Air Ministry on 8 March criticized the system of selecting strategic bombing targets thus: 'the fact that the operations of the immense Strategic Air Forces are supposed to be directed by a committee and advised by a series of committees and sub-committees is so remarkable and

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- (1) See R.A.F. Narrative, Liberation of N.W. Europe, Vol. V. Chapter 5 page 165.
  - (2) The area south of the line Essen-Vohwinkel was allotted to Bomber Command.

constitutes such a unique method of conducting military operations that there is no risk of its being forgotten'. Sir Arthur Tedder was convinced that at that stage of the war there was hardly any margin between strategic and tactical operations.

Air Marshal Bottomley thought this criticism was directed against the C.S.T.C. which was merely an advisory body, but he was assured by Sir Arthur Tedder that the object of his criticism was the Combined Chiefs of Staff Committee and that the subordinate committees were the Chief of Air Staff and Commanding General U.S.A.A.F., followed by General Spaatz and Air Marshal Bottomley, after whom came the C.S.T.C. and its Working Committees. The signal was subsequently withdrawn and more tactfully worded. Sir Charles Portal, having written personally to Sir Arthur Tedder, instructed that no reply was to be made to the implied criticism of the control of the Strategic Air Force.

Poor weather prevented the execution of Bugle as it had done with Operation Hurricane, (1) but from 10 to 12 March very heavy attacks against the Ruhr transportation system were made by Bomber Command and the Eighth Air Force.

After the Crossing of the Rhine: Transportation Attacks in Central Germany and the Isolation of the National Redoubt

Henceforward the bombing of communications became exclusively a tactical operation. The advance of the Allied Armies from the last week of March onwards was so rapid that target systems were overrun before the much deliberated plans for attack had been executed. The belief that the enemy would make a last ditch stand in the National Redoubt in the Tyrol was strongly held at SHAEF and after the crossing of the Rhine the Deputy Supreme Commander instructed that the heavy bombers should concentrate on the Leipzig - Halle - Chemnitz area in central Germany to forestall enemy formations moving southwards into the National Redoubt. Additional reasons for the choice of this area were, firstly, that it was the last industrial area remaining to Germany and, secondly, that it contained most of the Nazi and Wehrmacht Staff organisations evacuated from Berlin or concentrated there prior to moving into the National Redoubt. (2)

A.H.B./  
IIS/112/1/100/  
9(E)  
Encl. 19A para. 12  
Encl. 25A para. 13  
and Mins. of 24th  
Mtg. of C.S.T.C.  
29 Mar. 45.  
paras. 28-36  
See Map  
No. 11

Mins, 25th  
Mtg. of  
C.S.T.C.  
4 Apr.  
paras. 1-26

The C.S.T.C. was divided in its opinion of the new plan. The technical members disapproved of it for the following reasons: the area was undamaged and would be resilient to air attack and re-routing of trains would not present, as in the Ruhr, any difficulties. The distance at which the targets lay from Allied air bases would restrict the navigational aids of the Strategic Air Forces and limit fighter escorts, and they would not have the co-operation of the Tactical Air Forces. Better results would be achieved by the attack of

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- (1) As C.in-C. Bomber Command had foreseen the C.S.T.C. also opposed plans of this nature and preferred the continuation of attacks on a given target system (20th Mtg. C.S.T.C. 2 March 45).
  - (2) Two alternative schemes considered and subsequently rejected were the interdiction of the National Redoubt from Italy and southern Austria and an interdiction plan based on the Elbe bridges to prevent movement between the eastern and western fronts.

the remaining oil plants and secondly ordnance depots.<sup>(1)</sup> The representatives of SHAEF, on the other hand, while agreeing that oil should stay at first priority, thought that it would be a mistake to change over to another target system after the marked success achieved in the interdiction of the Ruhr.

SHAEF becomes responsible for Transportation Targets

The latter were strongly supported by Air Chief Marshal Tedder who, on 10 April, tartly reminded Air Marshal Bottomley that the function of the C.S.T.C. was to choose targets and not to settle policy. He was also seriously concerned lest the Air Forces should attack unprofitable targets. At this late stage in the war the laborious system of control of the heavy bombers was simplified. Sir Arthur Tedder, General Spaatz and Air Marshal Bottomley, conferring together, on 11 April, agreed that, while oil was still to remain first priority, the strategic bombers should now directly assist the land battle. At the Air Commanders meeting on the 12th, it was decided that, in future, SHAEF should promulgate, in a daily signal, communications targets for attack by the strategic bombers. The first signal was issued on 14 April. By that date the Americans had penetrated deeply into central Germany. The priority area was henceforward to be south and east of a line Dresden - Hof - Waldsassen - Arnsberg - Ulm.

C.39442/49  
Pt.I Encl.99A

Ibid  
Encl.100A

A.H.B./  
IIS/112/1/100/  
9(E)  
Encl.33A para.12

C.S.T.C.(Comms.)  
Weekly Bulletin  
No.21, 2 May 1945

By the end of April there were few railway targets at all relevant to the war. By the 24th all available lines to Munich from Czecho Slovakia and Austria had been cut by the Strategic Air Forces and the Rosenheim - Innsbruck - Brenner route was damaged at a number of points. Military rail traffic was confined to movements from Bohemia towards the eastern confines of the Redoubt through Linz, the only route left to the enemy which was at all serviceable.

Problems of Close Support

The problem of discovering how urgent were the requests made by SHAEF for heavy bomber support was never satisfactorily solved. According to the directive to the Strategic Air Forces, requests made by the Supreme Commander in the event of an emergency on the western front were to be given overriding priority, but this privilege was subject to abuse. After the battle of the Ardennes, when the land battle was in a less critical state, requests for heavy bomber support continued to be received from SHAEF. They were treated by the two heavy bomber forces in a dissimilar fashion. On the one hand, Bomber Command would attack these targets at the expense of oil, on the other hand, the Eighth Air Force attacked them at the highest priority which did not conflict with the visual attack of oil targets. In the case of the latter U.S.ST.A.F., being closer in touch with SHAEF than Bomber Command, was able to classify each demand.

Mins. of 15th  
Mtg. C.S.T.C.  
and A.H.B./  
IIG/86/6

The C.S.T.C. decided on 24 January that when there were urgent requests by SHAEF which were intended to take

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(1) On 18 April members of the C.S.T.C. touring the forward area confirmed the success of attacks on oil and transportation and advised against the attack of ordnance depots.

priority over all targets including oil, they should be graded as 'Emergency - Army Support'. They recommended that SHAEF should always inform Bomber Command whether its request justified the cancelling of a raid on an oil target. Furthermore, the emergency priority should only be used when issues of 'overall strategic importance were at stake, and that requests on lower priority should be made as seldom as possible in order that the communications programme could be implemented expeditiously and effectively'. The matter was settled at the Air Commanders' Conference on 1 February when the Deputy Supreme Commander made it clear that the Supreme Commander could only request heavy bomber support if it was certain to influence the battle on the western front. He instructed that this principle must be observed in future.

A.H.B./  
IIS/112/1/100/  
9(D)  
Encl. 39A

G.A.F. Targets

In view of the importance ascribed to bombing G.A.F. targets, particularly those connected with jet aircraft production, the Commander-in-Chief Bomber Command instructed that attacks would be carried out by his Command on neighbouring towns where appropriate. G.A.F. target signals continued to be received from the C.S.T.C. They were concerned in the first place with Jumo jet engine factories and, secondly, with jet airframe and other types of jet engine production. At the same time the C.S.T.C. realised that if all the available effort was divided between the four target systems (oil, armoured fighting vehicles, jet aircraft and U boats), it might not be possible to exert pressure on any one of them to bring its production down to a critical level at which a decisive result could be expected. At the C.S.T.C. meeting on 17 January it was suggested that, instead of attacking distant marshalling yards, the visual effort left over from the bombing of oil targets might more profitably be employed against the other three target systems.

A.H.B./  
IIH/241/3/608

Mins. of 14th  
Mtg. of C.S.T.C.  
and A.H.B./IIG/  
#86/6

Mins. of 17th  
Mtg.  
C.S.T.C.  
paras.25-30

Ibid  
Mins. of 22nd  
Mtg. para.26

Three weeks later the Director of Bomber Operations indicated at the C.S.T.C. meeting on 7 February that there was a danger of exaggerating the threat of the German jet fighter force. Recent intelligence had indicated that fuel shortages were affecting, not only the training of pilots, but also the operation of jet aircraft. It would be wrong to absorb offensive air power into defensive operations of this nature. The Committee agreed to review this target system weekly, in the same way as they did with other systems against the background of the changing war situation. By 14 March the activities of the G.A.F., and jet aircraft in particular, were declining, and it was felt that, if the war was to end shortly, there need be no undue concern regarding the menace of jet aircraft.

Ibid  
Mins. of 23rd  
Mtg. para.23

One G.A.F. target with which Bomber Command became associated was the underground factory of Nieder Sachswerfen in central Germany. This target was believed to be the largest single producer of Jumo .004 jet engines, of rockets and, by March, it was assumed to be producing synthetic oil. The British Chiefs of Staff enquired whether it would be possible to destroy it using the heavy bombs at the disposal of Bomber Command. The project was discussed with the Eighth Air Force and both commands arrived at the conclusion that it would be impossible to destroy the target with existing

IIH/241/3/573

weapons. (1) The only feasible method of reducing the output of the factory would be to attack communications in the vicinity or to destroy the industrial cities from which came the partly fabricated or raw materials needed by such plants.

In April, during the rapid advance of the Allied Armies east of the Rhine, a large number of transport aircraft flew on to advanced landing grounds laden with supplies to maintain the spearheads of the attack. Their safety was to be assured by the bombing of G.A.F. Airfields on which were based not only jet but orthodox fighter aircraft. A series of attacks on airfields by the Eighth Air Force prior to the crossing of the Rhine had proved to be highly successful whereas the aircraft industry by that time was well dispersed and much of it was underground thus making it invulnerable to air attack. On 29 March the attack of jet aircraft production was suspended in favour of airfields. Air Chief Marshal Harris ordered that those airfields within Oboe coverage should be extracted from the priority list of airfields in the specific areas issued periodically by SHAEF (Air) and entered in the targets list and on the targets map of the Operations Room Bomber Command. During the latter part of April nine airfields were attacked by Bomber Command in Schleswig-Holstein and east of the Elbe.

A.H.B./  
IIH/241/3/608  
Encl. 36A

See Bomber  
Command  
Diary of operations  
App. 10

#### Naval Targets

The third directive to the Strategic Air Forces stated that, with regard to the support of naval operations, the responsibility for air attack on enemy shipping within range of shore based aircraft in the United Kingdom rested primarily with the Air Officer Commanding Coastal Command. Because of the growing menace of the U-boats, already discussed, certain objectives in the enemy's U-boat organization were to be attacked whenever possible by a marginal effort or incidental to operations covered by the other target systems of the directive.

A.H.B./  
IIH/241/3/  
599(G)  
Encl. 34A

The U-boat threat was discussed at Yalta by the Combined Chiefs of Staff who agreed that appropriate countermeasures should be taken. They were drawn up in a directive to Bomber Command on 7 February and ran as follows:

- (1) To maintain and, if possible, increase 'marginal' bomber effort on assembly yards, concentrating as far as possible against Hamburg and Bremen.
- (ii) To maintain 'marginal effort' against operating bases, being ready to increase this when bases became crowded beyond the capacity of concrete pens.
- (iii) To increase by 100 per cent if possible the air mining effort against U-boats including their training areas.

A.H.B./  
IIH/241/3/  
607

Subsequent target lists issued by the C.S.T.C. in February 1945 contained U-boat construction yards and submarine pens. Hamburg was given first priority, main targets being the launching slips at Blohm and Voss and Finkenwarder, all connected with the assembly of pre-fabricated U-boats. The slips at Kiel were placed on second priority.

- 
- (1) Mr. B. N. Wallis, inventor of the five and ten ton bombs, examined their possible effect against this target but considered that they were impracticable for the task.

The ports of Kiel, Wilhelmshaven and Bremerhaven assumed increasing importance from March 1945 onwards, because they became a concentration point of both U-boats and naval surface craft escaping from the eastern Baltic which was then rapidly becoming dominated by the Russians. The cruisers Hipper and Emden were reported at Kiel in the first week of March. These ports were also of importance as industrial and communications targets. By the end of March information had been received that there were 78 U-boats, two heavy cruisers (Hipper and Scheer) one light cruiser (Emden) and other naval units lying in Kiel Harbour. The port had by that time become the principal German naval port in the Baltic and was highly important as an administrative base. Orders were issued to the two Strategic Air Forces to make a heavy attack which was to be concentrated as far as possible in time so as to give the enemy no opportunity of dispersing the shipping. There could, however, be no bombing until the Swedish relief ship Hallaren had passed through the Kiel Canal on its way to western Holland. This vessel was taking food supplies to the starving Dutch. (1)

Ibid

A.H.B./  
 ITH/241/1  
 3/599(G)  
 Encls. 39A-43A

See Chap. 10  
 p. 242

Considerable discussion on the Kiel operation took place between Bomber Command, the Admiralty and the Air Staff. At one time the Commander-in-Chief Bomber Command was of the opinion that a day attack co-ordinated with the Eighth Air Force and taking advantage of American fighter cover would be more successful than a night raid by Bomber Command alone. This plan was unacceptable. Kiel was eventually cleared for attack by 8 April and the targets recommended for attack were as follows: the area covering Germania Werke and Deutsche Werke, the Howalds Werke, the naval dock and the oil storage depot in Kiel harbour. Heavy raids by Bomber Command took place on 9/10 and 13/14 April.

(1) See R.A.F. Narrative Liberation of N.W. Europe, Vol.V. Chapter 8.

## CHAPTER 10

THE CLIMAX OF THE BOMBING OF OIL AND  
COMMUNICATIONS, 19 JANUARY TO 8 MAY 1945

Influence of the Ground Battle on Bombing Operations

The battle on the Western Front now influenced the bombing offensive as it had done during the previous summer. When the Allied Armies advanced into Germany after the middle of February, they not only overran night fighter bases, radar stations and flak belts but reduced the hostile territory over which the bombers flew to reach their objectives.

On 8 February, the first phase of General Eisenhower's offensive into Germany, known as Operation Veritable, began in the Rhineland south of Nijmegen, with the object of closing to the Rhine. Two American offensives towards the Rhine began in March in the central and southern sectors. Here progress was more rapid because the enemy had concentrated his strength in defence of the Ruhr. By 9 March the Allies were already drawn up on the west bank of the Rhine from Koblenz to the sea, apart from a small pocket opposite Wesel, and U.S. troops had made a bridgehead across that river at Remagen. Between approximately the 9th and the 23rd the Saar basin and the Rhine Palatinate were overrun by U.S. troops and a further bridgehead established near Darmstadt. The pocket opposite Wesel was also eliminated. The crossing of the Rhine at Wesel, for which elaborate preparations had been necessary, including the participation of the strategic bombers, took place on the night of 23/24 March and by the end of the month all the Allied Armies were across the Rhine and spreading rapidly eastwards in many parts. The Ruhr was encircled at Paderborn on 1 April and spearheads soon reached Munster and Kassel. Little progress, however, had been made into Holland north of the Ruhr or into Baden south of Karlsruhe.

The Strategic Air Forces, from the middle of February onwards, became increasingly concerned with operations designed to cut off the Ruhr from the rest of Germany, together with the elimination of the remaining oil targets. As the Ruhr was the principal objective of General Eisenhower's forces, tactical and strategical operations became almost indistinguishable.

Bomber Command Losses

There were no startling developments in the last three months of strategic bombing operations. Bomber Command continued to maintain tactical superiority both by day and by night. Losses in night operations remained at a low level. Lack of an early warning system still hampered the enemy fighter controllers, while until the end of hostilities there were many occasions when they were unable to distinguish between a genuine bomber force and a 'spoof' raid.<sup>(1)</sup> There was, on the other hand, a slight increase in bomber losses during March when 141 aircraft failed to return from the 6.553 heavy bomber night sorties. This was

Bomber Cmd.  
O.R.S. Rept.  
Nos. 123, 125,  
130.

(1) See R.A.F. Signals History, Vol VII, pp 201-204 where an account of the development of Window and Mandrel tactics in this period will be found.

attributed to four possible reasons: the controllers were receiving warning earlier than was indicated by the first plots broadcast; they were guessing the most likely position of initial penetration by the bombers, either from the Mandrel Screen or from weather conditions; they had possibly developed better co-ordination and may have exercised more restraint by holding back reserves until they had appreciated the situation more clearly. (1)

Considerable use of the Window and Mandrel forces, particularly in March, continued to be made, for as the enemy became more competent in seeing through Window, it became necessary to increase its density. Towards the end of March Mandrel aircraft began to operate in the dual role of Mandrel and Window. With the cooperation of No. 492 Group (U.S.A.A.F.) it was possible to make several feint attacks simultaneously in different directions.. The only serious attempts to intercept the night bombers in April were made over the Hamburg - Kiel area. Daylight operations by Bomber Command increased with the arrival of better weather in March when the greatest number of sorties (9,617) were flown since August 1944. Here, too, the only interceptions were made in the Hamburg area, including two minor clashes with Me. 262's. In general, complete air supremacy was enjoyed and for the whole of April there was only one daylight interception.

Overall figures for sorties and losses of Bomber Command from February to April 1945 were as follows:

Daylight Operations

<u>Month</u>	<u>Sorties</u>	<u>Losses</u>	<u>Percentage</u>
February	3,730	10	0.3
March	9,517	52	0.5
April	5,232	22	0.4

Night Operations

February	13,879	168	1.2
March	11,678	171	1.5
April	8,871	50	0.6

Enemy Intruder Activity

The increasing weight and accuracy of Bomber Command's attacks and the declining effectiveness of the German fighter defences called for special measures on the part of the enemy. No hostile intruders had flown over Great Britain since June, 1944. But the enemy had planned for some time to inflict casualties on Bomber Command aircraft as they returned to base and attempted to do this on 3/4 March. As the British bombers withdrew across the North Sea after attacking Kamen and the Dortmund-Ems Canal details of their homeward tracks were broadcast by the controllers by special beacons and about 70 fighters took off from airfields in northwest and west Germany. The force consisting of Ju 88's and He 219's, with a few Ju 188's equipped as pathfinders, crossed the English Coast in two waves and dispersed to pre-determined airfields

Ibid  
Rept. No. 125  
para. 50  
et seq  
and  
A.W.A. Rept.  
No. BC/G/13 and  
A.H.B./IIB/47/4

(1) The enemy was also making use of a new A.I. (Neptune V.R.) which might have become a serious threat if there had been a larger, more efficient German night fighter force, (R.A.F. Signals History, pp 159-160)

ranging from Northumberland to Oxfordshire, at which the bombers were expected to land.

A total of 786 aircraft of Bomber Command were operating that night. Of these, 45 were attacked in the air at, or near, their bases, 27 being damaged and 19 totally destroyed. Three aircraft of the Command on training flights were shot down. Thus of a total of 48 attacks, 30 caused damage, which in 22 cases resulted in complete destruction. It should be remembered that the bombers were taken by surprise; some were burning navigation lights; all were flying low when attacked and a number were just about to land.

A further attempt was made on 17/18 March when some 18 Ju 88's flew from Holland in two waves and intruded over English airfields at a time when heavy bombers usually took off for operations against Germany. It so happened that no heavy bombers operated that night and only two aircraft were attacked, of which one was shot down. On the 20/21st intruders again took off but they were too early for the main operations of Bomber Command, although a Halifax of No. 7 Group was shot down. Hitler then ordered that intruder operations were unprofitable from the point of view of propaganda and decreed that Allied bombers must be destroyed over Germany where they could be seen by the people falling in flames.

Objections to Tactical Bombing Operations by No.38 Group

A.H.B./  
ID/4/83

R.A.F. Narr.  
Lib. of N.W.  
Europe Vol. V

During the early part of February, No.38 Group, whose function was airborne and S.O.E. operations, was employed in tactical bombing raids at night on the western front under the control of 2nd T.A.F. There were no airborne operations planned for the winter months and the Air Officer Commanding No.38 Group wanted to give his aircrews operational experience in the area of future airborne operations and in general to keep up their morale.

The Commander-in-Chief Bomber Command objected to No.38 Group being given this independent role. He felt that it would jeopardise the planning of his Command's highly complicated penetrations into Germany by night and warned that it would strain the already serious aircraft and crew position and increase the shortage of H.E. bombs without causing any noticeable effect to the progress of the war. The wastage of crews in these operations would go far to supply the extra marginal effort required by the Admiralty. He also demanded that No.138 Squadron should be released from S.O.E. duties and be reconverted to a heavy bomber squadron.

A.H.B./  
ID/4/83

The Air Ministry explained that the scale of bombing operations by No.38 Group could not amount to more than an average of two sorties per month, per crew. Bombing was restricted to medium altitudes and penetration did not normally exceed 25 miles. They were using the 500 pound Mark XIII bomb which had been rejected by Bomber Command, and SHAEF had been satisfied with the results achieved. Meanwhile No.38 Group was operating under No.2 Group for these operations and targets were sent to SHAEF by Headquarters 2nd T.A.F. in the normal way. There ought to be no difficulty in co-ordinating bombing operations over Germany through the advanced headquarters of Bomber Command. Apart from this, No.38 Group gave details of routes, times and target areas to No.100 Group over the telephone which were afterwards confirmed by signal.

Raids on Area Targets

Bomber Cmd.  
Night Raid  
Rept. No.837  
and A.H.B.6  
Trans.

Without question the raid on Dresden on 13/14 February, hitherto untouched by the R.A.F., was one of the most devastating single attacks made by Bomber Command during the war. Two forces of Lancasters totalling 805 aircraft bombed the city in two separate waves with a three hour interval between each attack. They devastated 85 per cent of the fully built up area. A third force of 360 aircraft, mainly Halifaxes, bombed the big synthetic oil plant at Bohlen near Leipzig, but their bombing was scattered.

The first attack on Dresden was made by No.5 Group at 2215 hours and was highly concentrated; the second force consisting of aircraft from Nos. 1, 3, 6 and 8 Groups also bombed accurately and by the time they had finished fires were visible for 150 to 200 miles. It was the second attack which caused the majority of casualties as it caught large numbers of people fleeing from the city. There was very little fighter opposition considering the depth of the penetration while the flak over Dresden was negligible. Five aircraft were lost from the Dresden raid and one aircraft was missing from the Bohlen force.

8th A.F.  
Mthly. Su..  
of Ops.  
Feb 1945.

Two further attacks on Dresden were made in daylight by the Eighth Air Force on 13 and 15 February in which 526 aircraft took part. A further raid by U.S.ST.A.F. took place on 21 March and a final attack was made on 17 April in connection with attacks on railway centres on the fringe of the National Redoubt. Full photographic cover was not available until 22 March when immense damage was revealed, the bulk of which was undoubtedly caused by Bomber Command. The homes of about 500,000 people were ruined. The old town was wiped out together with most of the inner suburbs. Industries, bridges over the Elbe and some 20 public buildings including hospitals, art galleries, ministries, law courts, were destroyed. The main railway station was completely gutted.

Information  
A.H.B.6

Several accounts have been written of the holocaust caused by the bombing on 13/14 February.<sup>(1)</sup> Great fires raged through the city and most of the casualties were due to asphyxiation in the intense heat. The asphalt on roads and pavements blazed and brought rescue vehicles and fire appliances to a halt and people caught fire as they fled into the country. The fire brigade headquarters was hit and firemen dropped dead from their vehicles as they drove through the streets. Wild animals which had escaped from the zoo sought shelter together with human beings. The number of dead will never be known exactly. One estimate stated that 30,000 people were killed or missing. The German Ministry of Propaganda announced that 350,000 to 400,000 lives had been lost. A Swiss agency stated that after the third attack 100,000 citizens had been killed, without counting the thousands of refugees who had sought safety in Dresden from the Russian Army. After the raids the disposal of the dead was a serious problem. Flame throwers burnt hundreds of bodies huddled in craters and cellars; elsewhere corpses were walled up. A number of funeral pyres, each built with 400 to 500 bodies found in the streets, were set alight.

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(1) The following paragraph has been based on an account of the raid by Axel Rodenberger entitled 'Der Todt von Dresden' published by Franz Muller Rodenberger of Dortmund in 1952.

Since the war the Dresden raids have evoked much controversy and they have provided useful fuel for propaganda hostile to the western powers. On a more serious level it has been asked whether such a heavy attack was justified at that stage of the war. A partial answer to this question may be found in the analysis of events and policy in the previous chapter. The importance of Dresden as a communication centre in relation to Breslau, from which the Germans were then in retreat, may be seen by looking at the map. Moreover, the target was at extreme range from the United Kingdom and the time of the year did not often offer suitable weather for bombing. It was agreed that only a series of heavy attacks would be of any value and therefore when fine weather came, a succession of heavy blows were duly delivered by both British and American heavy bombers. In addition, it was one of the last chances offered to the Commander-in-Chief Bomber Command to vindicate his theory of area bombing.

Bomber Cmd.  
Night Raid  
Rept. No. 838.  
and A.H.B.6  
Trans.

The neighbouring town of Chemnitz (40 miles west of Dresden) was also raided by Bomber Command and the Eighth Air Force. It was bombed by the Americans on the 14th and followed up that night by 717 British heavy bombers. An industrial concern making ammunition boxes was destroyed. An attack on the nearby oil refinery at Rositz provided a diversion. Losses, again very small, amounted to 10 aircraft. The town of Cottbus about 20 miles north-east of Dresden and only 15 miles from the Russian advance was raided by the Eighth Air Force on 15 February. The damage done to Chemnitz was on a much smaller scale than at Dresden and the railway facilities were largely unharmed. At Cottbus the town and marshalling yard were damaged. In the course of two days, Bomber Command had flown 1522 sorties and discharged 5,256 (short) tons of bombs and the Eighth Air Force had flown 1,266 effective sorties and dropped 3,050 (short) tons of bombs on these three cities near the Russian front.

Ibid.  
Rept. No. 846

A.H.B./  
IIS/112/1/100/  
9(D)  
Encl. 73  
para. 9 and  
A.H.B.6  
Trans.

The other outstanding area attack by Bomber Command in February was against Pforzheim south of Karlsruhe (375 aircraft) carried out on 23/24 February by Nos. 1 and 6 Groups and Pathfinders. Sir Arthur Harris reporting on the attack at the next Air Commanders conference at SHAEF said that 'the whole place had been burned out'. In defending himself against the accusation of terror attacks, he said that the town contained a large number of small workshops for the manufacture of precision instruments. German reports stated that the railway station was put out of action indefinitely, three industrial installations were gutted and one badly damaged. The bombers were attacked by enemy fighters and ten aircraft (2.7 per cent) were lost both to fighters and flak.

Bomber Cmd.  
Night Raid  
Rept. No. 828  
and A.H.B.6  
Trans.

The other large scale attack on an area target was against Wiesbaden on 2/3 February. The main damage appeared to be in the large residential houses and blocks of flats on the outskirts of the town. According to German reports 30,000 people were bombed out, 12 military and six industrial installations were completely destroyed.

Bomber Cmd. Day  
Raid Rept. No. 1  
Bomber Command  
O.R.B. Apps.  
D.F.G.I. and Raid  
Repts., March 1945.

The Pforzheim raid was the last deliberate area attack by night. In March the heaviest raids - which were all directed against the Ruhr - took place by day. The inhabitants of this industrial area had a sharp foretaste when 478 bombers completed the destruction of Mannheim on 1 March. Two large scale daylight attacks were made in the second week of March with the double intention of destroying rail facilities and built-up areas. On the 11th, 1079 aircraft of Bomber Command

Ibid  
Report No.8

escorted by 18 Mustang squadrons attacked Essen. This was the heaviest daylight raid, up to that date, of Bomber Command since the war began. Although the target was attacked through 10/10ths cloud heavy damage was inflicted on the central station marshalling yard making it 90 per cent unserviceable. The Krupps works sustained further damage and widespread destruction was caused in central Essen. The defences were swamped under the great weight of the attack and only three aircraft failed to return. Seven Spitfire squadrons from continental bases covered the withdrawal of the bombers.

A.H.B.6 Trans.

Bomber Cmd.  
Day Raid  
Rept. No.9

An even greater number (1,107 aircraft) was despatched on the following afternoon against Dortmund. There was again 10/10ths cloud but skymarkers were well placed. No.3 Group bombed on G.H. Very heavy damage was caused and railway tracks and roads were blocked throughout the area. The Dortmund East station was badly damaged. Provisional reports put the number of casualties at only 23 killed and 180 injured. Two aircraft were lost.

Bomber Cmd.  
Night Raid  
Rept. No.856

Other large scale raids during the month of March were made against Chemnitz and Dessau. On 5/6 March 683 aircraft dropped 1,971 tons on Chemnitz which had also been attacked by the Eighth Air Force on 2, 3 and 5 March, the old town and area surrounding it stretching to the north as far as the main railway centre were completely devastated. German reports stated that there were area fires throughout the central district of the city and fire storms developed. On the return route the main force was subjected to a number of fighter attacks but this merely distracted attention away from another force raiding the oil plant at Bohlen. Twenty aircraft (2.8 per cent) were lost, nearly all through fighters. Dessau, on the road and rail route between Leipzig and Berlin, which was connected with troop movements to the eastern front and noted in the priority list of 7 February, was attacked on 7/8 March. Sky markers were used because of low cloud but by the end of the raid the target area was covered with fires visible for 100 miles on the return journey.

Ibid  
Rept. No.858

There was only one other bombing operation which, although not designed to be an area attack, but rather directed against rail facilities and barracks housing military and Nazi personnel, was of the same magnitude. This was the bombing of Potsdam on 14/15 April and the first time, since March 1944, that British heavy bombers had penetrated the Berlin defence zone by night.<sup>(1)</sup> The Commander-in-Chief Bomber Command proposed the operation on 12 April at the SHAEF conference but Sir Arthur Tedder doubted whether the target was so important and thought that there might be repercussions with the Soviet High Command. He directed that the target would first have to be cleared with the Chief of Air Staff.

Ibid  
Rept. No.892

A.H.B./  
IIS/112/1/100/9  
(E) Encl. 33A  
para. 12

The central area of the town suffered severely and rail facilities and barracks were heavily damaged. The plant and offices of Arado Flugzeug Werke aircraft components factory was also put out of action. The raid took place shortly after the Chief of Staff had decided to suspend area attacks except in special circumstances and, on hearing about the raid, the Prime Minister asked the Chief of Air Staff 'What was the point of going and blowing down Potsdam?' The explanation given was that both the O.K.L.<sup>(2)</sup> and the control centre of the G.A.F.

A.H.B./  
ID/4/83

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- (1) Lack of longrange fighter cover prevented a daylight attack.
  - (2) Oberkommando Luftwaffe.

operational headquarters had been evacuated to the Potsdam area while the town was an important centre for communications leading west from Berlin.

#### Mosquito attacks against Berlin

A.M.W.R.  
Sum of  
Bomber Cmd.  
Ops. Feb. -  
Apr. 1945.

Meanwhile Mosquito attacks on Berlin had been increasing in number since the beginning of February. In that month the capital of the Reich had been visited 14 times by forces ranging from six to 12 aircraft and 955 tons were discharged. In March 1,617 Mosquitos of No. 8 Group made 29 attacks on Berlin and dropped 1,855 tons of bombs. The heaviest raid took place on 21/22 March when 142 sorties were flown.

A.H.B./  
IIG/29  
Report No.  
349/45

Mosquitos equipped with Oboe also visited other large German towns including Magdeburg, Erfurt, Stuttgart and Hannover and on several occasions forces of 50 aircraft were employed. Thus the total number of Mosquito sorties for this sort of operation in February was 2,248 for the loss of only seven aircraft (0.3 per cent). From 20/21 February to 27/28 March inclusive Mosquitos operated on 36 consecutive nights against Berlin and for this received a special message of congratulation from the Chief of Air Staff. A factor which assisted continuous attacks was the ability of the comparatively small force to operate in weather that prohibited major operations; landing in fog was possible at airfields equipped with Fido. In March 2,694 sorties were flown. The enemy made some attempt to intercept the Berlin raiders, on certain occasions using Me. 262's, but destroyed only seven out of the total nine Mosquito casualties for the month. In April 15 attacks were made involving 1,047 aircraft and 1,273 tons of bombs. By 20 April the Red Army was on the outskirts of the city and further air operations were unnecessary. The raids had a certain nuisance value but their most disturbing aspect was the loss of sleep which they caused. Speer, when interrogated, stated that with the exception of the Oboe attacks Mosquito attacks had not much effect. He considered that irregular attacks, spread as widely as possible would have been more effective.

8th Air Force  
Mthly. Sum of  
Ops. Feb.-  
March 1945.

Three heavy daylight raids were made on Berlin by the Eighth Air Force. The first, involving nearly 1,000 aircraft, took place on 3 February on the eve of the Yalta conference. It was believed that the Sixth S.S. Panzer Army was passing through the city en route to the eastern front and there was a feeling that the raid might convince the Russians of American willingness to help their offensive. The bombing was in the vicinity of the Templehof Station but damage to rail facilities was only moderate and an area about one and a half miles square in the heart of the city was devastated. Damage was caused to the Chancellory and Foreign Office. Further attacks of over 1,000 U.S. aircraft were made on 23 February and 18 March. Damage to property and buildings was greater than that to railway installations.

#### Summary of Area Bombing October 1944 - April 1945

See Chap. 7  
p. 164

The following tables give some indication of the effort made by light and heavy bombers of Bomber Command against area targets over the period October 1944, when the attack of industrial targets was recommenced, until April 1945. The first table shows the attack made against 29 industrial cities recommended by the C.S.T.C. in November 1944: firstly, those in western Germany which were closely connected with oil and transportation and whose destruction, it was believed would affect the ground battle: secondly, important

A.M.W.R. Sum of Bomber Cmd. Ops. industrial cities in eastern Germany the attack of which could have no influence on land operations.

Month	Selected Targets in Area west of 10° East		Selected Targets in Area East of 10° East		Total	
	A/C Att.	Tonnage	A/C Att.	Tonnage	A/C Att.	Tonnage
1944						
October	392	1392	258	875	650	2267
November	1428	4730	417	986	1845	5716
December	2929	10702	332	1026	2261	11728
1945						
January	1062	3770	1538	5434	2600	9264
February	671	2079	1824	5220	2495	7299
March	1324	5204	1685	5113	8009	7018
April	-	-	241	450	241	450
	7806	27,877	6295	19104	18101	43742

See Chap. 9  
p.201

on 7 February a revised list was issued and ten new targets were introduced in western Germany which were attacked by 1006 aircraft dropping 3807 tons of bombs.

A number of industrial towns not included in the list issued by the C.S.T.C. were bombed, especially if weather conditions prevented operations against those specifically mentioned. The monthly tonnages dropped by Bomber Command against all industrial towns from October 1944 to April 1945 were as follows.

Ibid

Month	Tonnage
1944	
October	42,246
November	27,696
December	16,727
1945	
January	11,931
February	21,888
March	30,278
April	2,322
Total	153,088

#### The End of the Oil Offensive

Bomber Command's effort against oil mounted in intensity from January until the end of the offensive in March. In January its total tonnage for oil targets exceeded that of the Eighth Air Force by 6,477 (short) tons, in February by 9,588 (short) tons and in March by 1,661 (short) tons. In February the capture of Upper Silesia by the Red Army had made the Germans much more dependent on oil plants in western and central Germany. The targets which received the heaviest tonnage from Bomber Command were Politz (1659 tons), Bohlen (two attacks 1757 tons), Kamen (two attacks 1686 tons), Bottrop Welheim (1007 tons), Rositz (831 tons). The principal targets of the Eighth Air Force were Lutzkendorf, Magdeburg, Dulmen. The Fifteenth Air Force bombed crude oil refineries in the Vienna district, Moosbierbaum in Austria and storage depots at Regensburg in southern Germany.

A.M.W.R.  
Sum of Bomber  
Cmd. Ops.  
Feb. 1945

A.H.B./  
IA/21  
Table 21

Bomber Cmd. Night  
Raid Rept. No.833 and  
Bomber Cmd. Quarterly  
Rev. 1945.

In Bomber Command's final raid on Politz on 8/9 February 475 aircraft were dispatched to the target area in two waves. A smoke screen was operating when the first aircraft (No.5 Group) arrived but it proved to be quite ineffective. The

second force coming below cloud visually identified the aiming point and made an equally concentrated attack. Smoke rose to a height of 10,000 feet. All the essential buildings and most of the storage tanks were hit and the plant was put out of action for the rest of the war. Only four aircraft were lost.

Ibid  
Rept. No.837

The first attack on Bohlen, made on the night of the great Dresden raid, was scattered. The second attack was made by No.5 Group on 19/20 February followed by three raids by the Eighth Air Force on 2, 3 and 5 March. The plant was still in action after the American raids and another visit by No.5 Group was made in conditions of 10/10ths cloud. Photographic cover was obtained on 7 March and revealed that the only sign of activity was coming from one chimney of the boiler house and it was estimated that production would be suspended for about a fortnight.

Ibid  
Rept. No.829  
A.H.B./  
ID3/1773(C)

Rositz, a brown coal distillation plant south of Chemnitz was attacked simultaneously with that city on 14/15 February. It had already been bombed by U.S.ST.A.F. and repair work was seen in progress after the raid. Kamen was subjected to two attacks on 24 and 25 February by No.3 Group using G.H. technique. Concentrated bombing was reported on the second occasion. The coking plant of Prosper, Bottrop Welheim was attacked on 3/4 February and severe damage inflicted. Benzol plants were attacked in the course of the month at Gelsenkirchen, Osterfeld, Scholven. At the close of February it was reckoned that the plants at Bohlen, Ruhland, Magdeburg and Lutzkendorf produced 40 to 50 per cent of German motor and aviation fuel. When these plants were at a standstill Germany would have to depend for the next four to six weeks on production in transit through the redistribution system.

A.H.B./  
ID/4/83

On 22 February the Chief of Air Staff congratulated Bomber Command on its achievements in the oil offensive, particularly against the synthetic plants in the German interior at Brux Politz and Leuna, each of which had a potential output of 50,000 tons a month.

In March the main attacks by Bomber Command were against Harburg (1039 tons), Misburg (1034 tons), Lutzkendorf (936 tons), Bohlen (two attacks (1985 tons). A total of 18,938 tons were dropped on oil, benzol and storage plants. By 8 March the current rate of oil production was reckoned to be 310,000 tons at the most.

Bomber Cmd.  
Night Raid  
Rept. No.871

It was thought that the immobilization of Ruhland and Harburg alone would reduce output to 35,000 tons per month. At Harburg fresh damage was done to the Rhenania and Ebano refineries; on 19 March they were temporarily out of action. The attack on the Misburg refinery near Brunswick was only partially successful. No.5 Group caused only moderate damage on Lutzkendorf and repairs were begun. By 15 March the temporary elimination of Ruhland had cut fuel stocks by 20 to 25 per cent but Bohlen and Lutzkendorf required further attacks. The final attack on Bohlen on 20/21 March by No.5 Group put the plant out of action once and for all and it was still inactive when captured by Allied ground forces. Benzol plants at Gelsenkirchen, Datteln, Langendreer, Bottrop and Hattingen were also attacked in March.

A.H.B./  
IA/21  
Table 21

The Eighth Air Force's principal targets were oil storage depots at Magdeburg and Emsche-Lippe and synthetic oil plants

at Hamburg and Ruhland while the Fifteenth Air Force continued to concentrate on refineries in the Vienna area.

By the beginning of April oil production had diminished to a mere trickle and little more than policing attacks were required. The Rhenania plant at Harburg was the most heavily attacked target and was still inactive on 19 April. Final attacks took place on Merseburg/Luena and Lutzkendorf and Molbis/Espenhain near Leipzig. Seventeen Tallboys finally destroyed Lutzkendorf.

Meanwhile the Eighth Air Force delivered a final attack on the oil storage depot at Regensburg and the Fifteenth Air Force put out Ruhland. The latter involved a seven hundred mile journey to the target area, some 50 miles from Berlin, and was one of the record flights of the Fifteenth Air Force made from bases in Italy.

Below is a summary of the oil offensive in its final stage from February to April 1945.

	<u>Number of</u> <u>Attacks made</u>	<u>Short tons of</u> <u>bombs dropped</u>
<u>FEBRUARY</u>		
Bomber Command .....	24	15,749
Eighth Air Force .....	10	6,161
Fifteenth Air Force .....	20	4,362
<u>MARCH</u>		
Bomber Command .....	33	21,211
Eighth Air Force .....	36	9,550
Fifteenth Air Force .....	24	6,628
<u>APRIL</u>		
Bomber Command .....	9	5,993
Eighth Air Force .....	7	1,949
Fifteenth Air Force .....	1	124
<u>TOTAL</u>		
Bomber Command .....	66	42,953
Eighth Air Force .....	53	17,660
Fifteenth Air Force .....	45	11,114
	164	71,727

The Interdiction of the Ruhr. Cutting the Dortmund-Ems and Mittelland Canal Systems

The raids on the Dortmund-Ems and Mittelland Canals in the first week of January 1945 have already been described. Two more attacks were made on the Dortmund-Ems Canal at Ladbergen on 7/8 February and 3/4 March<sup>(1)</sup> and one on the Mittelland Canal at Gravenhorst on 21/22 February.<sup>(2)</sup> All operations were the responsibility of No.5 Group. The Dortmund-Ems Canal was drained after the January attack but repairs were completed and navigation resumed on 16 February, for one day only. The canal was then again drained for the

(1) A raid on 24 February was abortive.  
(2) A raid on 20/21 February was abortive.

A.H.B./  
ID3/1773(C)

Bomber Cmd.  
Night Raid  
Rept. No.884

Ibid  
Rept. No. 855

A.H.B./  
IA/21  
Table 21

See Chap 8  
p.178

Bomber Cmd.  
Night Rept.  
No.832, 854, 844  
U.S.S.B.S.  
Effects of Strategic  
Bombing on  
German Tptn.,  
Bomber Cmd.  
Quarterly Review  
1945 pp 21-25.

purpose of deceiving Allied air reconnaissance. It was refilled for one day on 25 February and barges were hurried through north and south. After the second attack the canal was made completely unnavigable.

Repair work to the Mittelland Canal was completely destroyed and navigation continued to be impossible. Repairs were scheduled for completion by 15 April but they were abandoned on 30 March.

The Rothensee Shiplift near Magdeburg had been off the target list as a result of the breaching of the Dortmund-Ems and Mittelland canals. On 15 March it was considered that it might be useful as a target of opportunity but as it was of no great importance to the current plan for the isolation of the Ruhr it was placed at the head of the 'alternative weather and filler targets' list. It was, in fact, never bombed throughout the war despite much discussion and planning.

Attacks on Bridges east of the Ruhr

A.MoW.R.  
Sum of Bomber Cnds.  
Ops. Feb. - Mar.  
1945

BC/S.32131/3  
Encl. 23A

From 19 February to 24 March No.5 Group, Bomber Command made 14 and the Eighth Air Force nine attacks on bridges east of the Ruhr but the bulk of attacks on the line of interdiction were made by medium bombers of the Ninth Air Force. On 9 March the priority list for bridges was as follows: the Bielefeld viaduct, the Arnsberg viaduct, the Bremen, Arbergen, and Nienburg bridges.

Bomber Cmd.  
Quarterly Review  
1945 pp 23 - 24.

The Bielefeld viaduct carrying the main Hamm to Hannover lines had already been damaged early in 1945 by the Eighth Air Force but by placing girders across the damaged spans the enemy was able to relay the track. On 22 February damage to the track at the southwest end of the viaduct was caused by 12,000 pound bombs but it was soon repaired and a further raid was made on 14 March. This time 13 aircraft of No.617 Squadron (No.5 Group) each dropped one 12,000 pound bomb and one aircraft dropped the first of the 22,000 pounders (Grand Slam). This big bomb, which was well aimed, brought down seven spans and left only the extreme bases of the piers standing. (1) Other piers were damaged by near misses from 12,000 pound bombs and the viaduct was henceforward completely impassable.

B.C./S.32131/3  
Encl. 24A

Bomber Cmd.  
Quarterly Review  
1945 pp 23 - 24.

On 16 March the top three priorities were the Arnsberg viaduct and the bridges at Bremen and Arbergen over the River Weser. Next came the bridges at Bad Oeynhausen and Vlotho. The Arnsberg viaduct was situated a few miles north of the Mohne dam. It was a masonry viaduct and carried the main line over the River Ruhr; it was attacked four times by Bomber Command with 12,000 pound bombs and, on the last two occasions on 15 and 19 March, 22,000 pound bombs were dropped. A near miss in the final attack reduced the central spans of the viaduct to a pile of rubble in the river bed. Furthermore the 20 foot thick limestone roof of the tunnel through which the railway approached the bridge was pierced by a 12,000 pound bomb.

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(1) There are a series of interesting photographs of attacks on bridges during this period in the final issue of the Bomber Command Quarterly Review for 1945. See also for details of Grand Slam Annex B.

Ibid

The Bad Oeynhauszen and Vlotho bridges crossed the River Weser 20 miles north-east of Bielefeld. The Eighth Air Force made the bridges temporarily unserviceable. They were bombed by Bomber Command on 23 and 19 March respectively with 12,000 pounders. One of these bombs wrecked a train and the whole of the track on the western approach to the Oeynhauszen bridge; another bomb undermined a pier on the downstream side of the bridge causing the immediate collapse of one span; consequent erosion caused the parallel span to collapse. Although the Vlotho bridge was not hit, it was so distorted by near misses that it became unserviceable,

The Nienburg Bridge north of Bad Oeynhauszen was attacked on 20 and 22 March, on the latter occasion with five 22,000 pounders and twelve 12,000 pound bombs. It was completely destroyed together with the greater part of the approach viaduct.

Ibid

The Arbergen bridge south of Bremen was bombed on 21 March with heavy bombs and two sections of the overland approach were destroyed. At Bremen, the temporary span at the south end of the rail bridge was wrecked and north of the target, where the railway crosses the Nord Strasse, the eastern track received a direct hit on the north abutment which left the bridge girder lying on the road beneath. The tracks leading away from the target were cut both north and south of the river bridge in at least 20 places.

Ibid

By 24 March ten bridges had been destroyed by British and American Air Forces, two very seriously damaged, two others damaged but passable. The latter bridges at Vlotho and Colbe were bombed by the Ninth U.S. Air Force on 24 March. However, on 29 March the Vlotho rail bridge, the Bremen road bridge and the Mittelland Canal were named top three priorities. The last named target was to replace the Rothensee Shiplift as there was evidence of a little barge traffic on the canal. This target was soon to be reached by the ground forces. The Bremen road bridge was bombed by the Eighth Air Force on 30 March and completely collapsed.

The following is a summary of attacks on bridges from 19 February to 24 March 1945.

	<u>Number of Attacks</u>	<u>Effective sorties</u>	<u>Short tons of bombs dropped</u>	<u>A/C Lost</u>
Bomber Command	14	384	2,624	6
Eighth Air Force	9	741	2,399	-
Ninth Air Force	23	958	1,924	31
<b>Total</b>	<b>46</b>	<b>2,083</b>	<b>6,947</b>	<b>37</b>

Attacks on Transportation Centres west of the Line of  
Interdiction

The bombing of rail centres on the fringes of the Ruhr but west of the line of interdiction increased in tempo early in March. This was due both to the increased strategic importance of the Ruhr to the rest of Germany and to the fact that the main assault across the Rhine due to take place late in March was to be at Wesel just north of the Ruhr. Targets attacked by Bomber Command were Hannover, Witten (one of the largest railway repair depots in Germany), Munster, Osnabruck, Rheine, Paderborn. Other towns attacked beyond the line of interdiction yet associated with transportation were

A.M.W.R.  
Sum. of Bomber  
Cmd. Ops.  
March 1945

Hanau, Hagen, Nuremberg and Wurzburg. The great raids on Dortmund and Essen, discussed earlier, also seriously dislocated rail transport.

8th A.F. Mthly.  
Sum of Ops.  
March 1945.

B.C./S.32131/3  
Encl. 30A

The Eighth Air Force bombed the main centres of Betzdorf, Dillenberg. Small attacks were made on Dortmund, Essen, Schwerte, Seigen and Soest. Among the 'filler' targets were Frankfurt-am-Main and Kassel. On 29 March all rail centres and other transportation targets in the battle area were suspended and were only to be attacked on direct request from S.H.A.E.F. as Army support targets. The effort made by Bomber Command and the Eighth Air Force against communications from 10 to 20 March was as follows.

	<u>Effective Sorties</u>	<u>Short Tons</u>	<u>Aircraft Lost</u>
Bomber Command	3,266	14,571	7
Eighth Air Force	1,908	4,369	-

#### Effects of the Interdiction of the Ruhr

Bomber Cmd.  
Quarterly Review  
1945 p. 24

Bomber Command and the Eighth Air Force worked in close co-operation during this phase. The assault against the Ruhr area was pressed home by day and by night when visibility was good or with the aid of the radar devices for target location even in conditions of 10/10ths cloud. Not only were military communications disrupted but the transportation of coal and other essential supplies were severely curtailed. Kehl, head of Speer's Planungsamt, in a written statement appraised the effect of transport difficulties in declining war production as follows: 'about 23 per cent from June to October 1944, at least 60 per cent from November 1944 to January 1945 and 90 per cent from February to April'.

A.H.B./  
IIS/108/1  
pp 14 - 15

The western Allies hoped that, after the loss of Silesia, the interdiction plan by stopping coal passing out of the Ruhr would affect the production of steel and electricity and thus help to paralyse German economy. More important, it would cut off locomotive fuel and cripple both military and civilian traffic. Nevertheless it is now known that the railways in the rest of Germany continued to operate using hard brown coal in place of anthracite.<sup>(1)</sup> The interdiction of the Ruhr, while technically a great success, was too late to influence German economy, and its importance was overshadowed by the military isolation of the Ruhr on 1 April. Had it been achieved earlier, it might have affected Germany's ability to resist through loss of coal in the armament industry.<sup>(2)</sup>

#### The bombing of Transportation Targets after the crossing of the Rhine

Once the Allied armies were across the Rhine S.H.A.E.F. suggested three areas suitable for transportation attacks; first, around Leipzig which was likely to become the main base for the German forces; second, a line of interdiction in Northern Bavaria against communications with the National Redoubt; thirdly, interdiction of the railways

- (1) As foreseen by one section of the C.S.T.C. (See Chap. 9 p. 210).  
(2) This was General Omar Bradley's view. The reader should contrast his opinion with Speer's contemporary reports. See Chap. 11

from Hungary and Austria to Bavaria to interrupt movement of divisions back from the eastern front. Intelligence also believed that government departments and Nazi organizations were moving into the Redoubt and were at that moment situated in the Halle-Gera-Nordhausen area. The first two areas assumed the shape of a dumb bell and were known collectively as 'the dumb bell area'. In fact, all these plans overlapped and the Air Commanders agreed that, provided there was careful planning and co-ordination of each part, they should be considered as one plan.

See Map No.11

B.C./S.32131/3  
Encl. 31A

Ibid  
Encl. 34A

Bomber Cmd. Day Raid  
Rept. No.31 and  
Night Raid Rept.  
No.888

Bomber Cmd.  
Day Raid  
Rept. No.32

On 3 April rail junctions in central Germany at Dessau and Falkenberg were put at first priority. Rail centres on routes from central to southern Germany ranked as second priority. By the 9th great rail activity had been seen on the line Dresden-Leipzig-Halle and the Halle-Nuremberg line. A final series of heavy bomber attacks then took place. On the following day Bomber Command struck at the Englesdorf and Mockau marshalling yards at Leipzig and that night it visited Plauen and the Wahren marshalling yard at Leipzig. On the 11th railway facilities at Nuremberg and Bayreuth were attacked. All through lines were blocked in the Englesdorf yard; at Plauen the northern end of the town was gutted and severe damage was done at Nuremberg and Bayreuth. Enemy opposition was negligible. Meanwhile the armies followed hard upon the strategic bombers' targets. By 16 April the Seventh U.S. Army had captured Nuremberg and Leipzig fell on the 19th to the Americans.

A.H.B./  
IIS/112/1/100/  
9(E) Encl. 39A  
para. 6  
B.C./S.32131/3  
Encl. 38A - 64A

Bomber Cmd. Night  
Raid Repts. Nos.  
894, 895, 896, 902

Ibid Day Raid Rept.  
No.38

At SHAERF the Air Staff was still inclined to be cautious and did not anticipate a rapid collapse of German resistance. Sir Arthur Tedder declared as late as 19 April that he thought heavy bomber operations might continue for another two months. He was determined that the Germans should be prevented from making a last ditch stand in the mountains and highlands of Bavaria and Austria. From 14 April onwards SHAERF issued the list of communications targets and attention was focused on railway lines leading into the Redoubt from southeast Germany and western Czecho Slovakia. Both Bomber Command and U.S.ST.A.F. continued to batter targets in the third week in April, war-weary though air crews were becoming. British bombers raided Komothau and Pilsen(1) in Czecho Slovakia and Cham and Schwandorf in Bavaria; Mosquitos struck at the transformer station of Pasing near Munich to put the Bavarian electric railway system out of operation. The attack had been preceded by a daylight attack by a small force from No.3 Group.

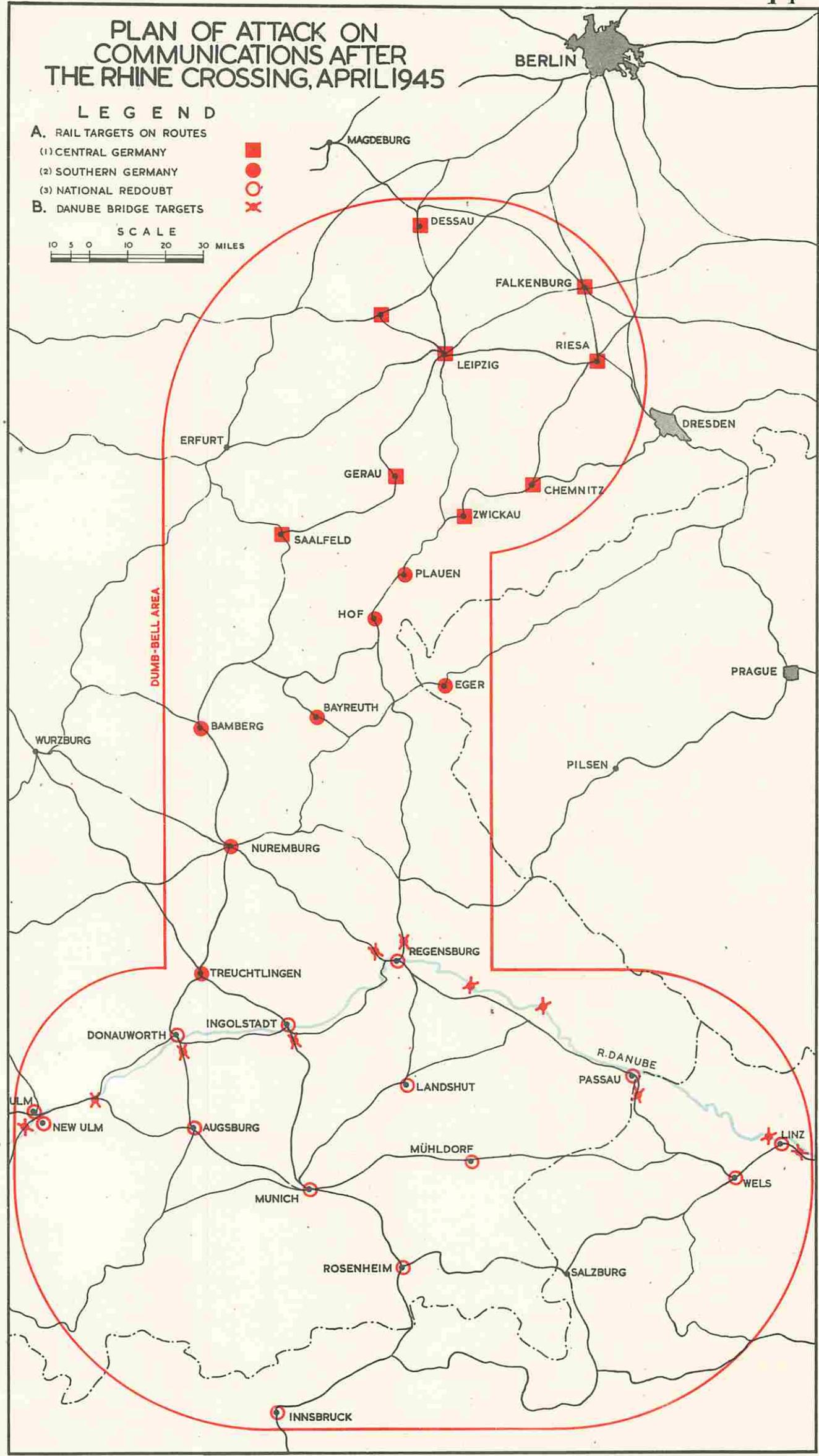
The majority of these targets had to be cleared with the Soviet High Command because of the proximity of the Red Army. Agreement was reached on all of them but attacks on Prague were forbidden. Meanwhile events on land were eclipsing the tedious, repetitive bombing operations in southeast Germany. The Reich was divided, its economy had collapsed and the armed forces were no longer operating. By 4 May the Germans had accepted defeat in the north and total surrender was to follow in four days.(2)

- (1) The Skoda works were severely damaged in a raid on 16/17 April after seven indifferent R.A.F. attacks in 1944 and six attacks by XVth U.S.A.A.F. The armament works were almost the last remaining in enemy hands and so assumed great importance in attacks against the Redoubt. Crews were instructed to bomb only if they identified the target visually in order to avoid causing Czech casualties. (A.H.B./II/70/169.)
- (2) See App.20 for analysis of effort against transportation targets.

# PLAN OF ATTACK ON COMMUNICATIONS AFTER THE RHINE CROSSING, APRIL 1945

## LEGEND

- A. RAIL TARGETS ON ROUTES
  - (1) CENTRAL GERMANY
  - (2) SOUTHERN GERMANY
  - (3) NATIONAL REDOUBT
- B. DANUBE BRIDGE TARGETS



In support of the Armies

When the Allied Armies began to move eastwards again after their rebuff in the Ardennes the strategic bombers once more paved the way clearing obstacles with their weighty fire power. Their technique had by this time been developed to a high pitch of efficiency so that there were no unhappy incidents such as marred the earlier experiments in the bocage of Normandy.

B. C./S. 31618

See Chap. 6  
p. 140

Bomber Cmd.  
Night Raid  
Rept. No. 832

A. H. B./IIS/  
112/1/100/9  
(D) Encl. 47A  
para. 11

On 8 February the First Canadian Army began the first of a series of operations (Veritable) which were designed to drive the enemy back across the Rhine in the north. (1) Field Marshal Montgomery's first attempt in October 1944 had been thwarted because of more pressing operations in the Scheldt estuary but several initial objectives including Cleve, had been bombed by Bomber Command on 7 October. Cleve, a strong point and important concentration area together with Goch, another communications centre, about ten miles to the south-west were attacked on 7/8 February by 769 heavy bombers of Bomber Command. The south and centre areas of Cleve, already partially devastated, were seriously damaged. The bombing of Goch was compact and concentrated but the full weight of bombs could not be dropped because of the heavy cloud of smoke that obscured the target early in the attack. A total of 1,870 tons were dropped on both targets. A repeat attack on Goch proposed by Sir Arthur Harris was declared by the Deputy Supreme Commander to be unnecessary. Ground operations were hampered by floods but Allied troops were on the outskirts of Cleve after two days.

Progress in the Rhineland battle was slow and because of floods the Ninth U.S. Army, under command of Twenty-First Army Group which was to advance northwards on the Rhine from the Roer valley (Operation Grenade), did not get under way until 23 February. Meanwhile Wesel, where road and rail bridges spanned the Rhine, had become a key point for German supplies and reinforcements for the area west of the river. The road bridge had been put out of operation by the Eighth Air Force but Twenty-First Army Group requested the destruction of Wesel which was approved by the Deputy Supreme Commander as it was believed that there were 3,000 vehicles parked in the town. Between 16 and 19 February four day-light attacks were made by Bomber Command and great damage caused.

B. C./SH/T. S. 48

See R. A. F.  
Narrative  
Lib. of N. W.  
Europe, Chap. 5  
p. 187 et seq.

By 10 March the enemy had withdrawn across the Wesel railway bridge which the Eighth Air Force had not been able to knock down. Preparations went ahead for the crossing of the Rhine (Operation Plunder) including the cutting of bridges and the bombing of Ruhr transportation centres. From 21 to 23 March the effort of both British and U.S. heavy bombers was concentrated in the vicinity of the proposed bridge-head. There were three categories of operations; first, attacks on communications leading into the battle area; second, attacks on barracks, camps and defended towns; third, the neutralisation of G. A. F. bases likely to be used for operations against the Allied assault. In the first category Bomber Command bombed Rheine and Munster, both within a 70 mile radius of the bridge-head. In the second,

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(2) For an account of these operations see R. A. F. Narrative Liberation of N. W. Europe, Vol. V. Chap. 5.

they raided Bocholt, Dulmen, Hildesheim and Dorsten. There was dense cratering and disruption of communications.

The climax of all the preparatory operations was the bombing of Wesel before the assault began on 23/24 March. Great importance was attached to its destruction by the Army. There were two attacks, the first in the afternoon of the 23rd when a small force from No.3 Group bombed the town on G.H. from 18 to 21,000 feet. The second came at 2235 hours just after commandos had crossed the Rhine and were waiting 1500 yards away to enter the town. No.5 Group, operating in the light of the moon, made a visual attack dropping 1100 tons on the northwest part of the town. It was supported by twelve pathfinders which dropped ground markers on Oboe. Field Marshal Montgomery regarded the bombing as a masterpiece and informed Sir Arthur Harris that it was 'a decisive factor in making possible our entry into that town before midnight'. The Commandos recorded that only one stick of bombs fell away from the aiming point but that no injury was caused. Wesel was taken on the next day (24 March) with only 36 casualties.

Ibid  
Rept. No.19

Bomber Cmd.  
Night Raid  
Rept. No.874

Bomber Cmd.  
O.R.B.  
Overlord App.  
Supp. 2,  
OL2/20C

On 24 March the amount of air support afforded to the armies was second only to that afforded over the Normandy beachhead on 6 June 1944. All the Allied Air Forces in the west took part while diversions were made by the Fifteenth U.S. Air Force as far away as Berlin. Four hours after the landing of airborne troops just north-east of Wesel, Bomber Command attacked a suspected concentration point at Gladbeck, 25 miles away on the fringe of the Ruhr. Other bombers attacked the rail centre of Sterkrade, southwest of Gladbeck. An oil target was also bombed at Dortmund. The intricate ground and airborne assault across the Rhine was completed without a hitch and by 29 March 14 divisions had broken out of the bridgehead and were operating north of the Ruhr.

Bomber Cmd.  
Day Raid  
Rept. No.20

In the week ending 25 March out of 32 bombing attacks made by Bomber Command 17 were designed to support the Wesel crossings; of these, five were attacks on marshalling yards, five attacks on bridges and seven on troop concentrations and strongholds. Further attacks on communications in the van of the advance were made in the last days of March.

Operations on the American front

While the British were preparing to cross the Rhine at Wesel the American Armies in the central and southern sectors were making good progress. The First U.S. Army headed for Cologne and on 2 March Bomber Command made a supporting attack directed principally against the Hohenzollern and Deutz bridges on the Rhine and 2,898 tons were dropped. The main railway station and the Hohenzollern bridge were badly damaged but the latter could be used by pedestrians and a contemporary German report stated that it would be open on the following day. But by 7 March Cologne had been occupied and on that day American troops, seizing the bridge intact at Remagen, were the first to gain a foothold on the east bank of the Rhine.

R.A.F. Narr.  
Lib. of N.W.  
Europe, Vol. V  
Chap. 5 p.171

Bomber Cmd.  
Day Raid Rept.  
No.2 and  
A.H.B.6 Trans.

R.A.F. Narr.  
Lib. of N.W.  
Europe, Vol.V  
Chap. 5, p.173

Bomber Cmd.  
Night Raid  
Rept. No.865

In the southern sector the Sixth U.S. Army Group advanced through the Saar Palatinate and Bomber Command answered a request for the attack of the communication centres of Homburg and Zweibrucken on 14/15 March. Railway lines were blocked and roads made impassable by rubble and craters. Further crossings over the Rhine were made on the night of 22 March near Mainz.

Bomber Cmd.  
Day Raid Rept.  
Nos. 26, 27 and  
A.H.B. 6. Trans.

A.H.B./IIS/  
112/1/100/9  
(E) Encl. 26A  
para. 8

In the first week of April the First and Third U.S. Armies were fanning out into central Germany. Once again Bomber Command gave support, making two attacks on the town of Nordhausen on 3 and 4 April. It was in this area that Allied Intelligence believed command organizations from Berlin together with the G.A.F. Signals School had been evacuated. The whole town was devastated, including the barracks holding the signal school, but Sir Arthur Harris was sceptical about the latter place being occupied and stated that he did not in any case consider barracks suitable targets for heavy bombers. They would also shortly be required for the occupying forces.

The Bombing of Heligoland and Wangerooge and the Fall of Bremen

A.M. File  
C. 39432/49

The island of Heligoland dominated the approaches to the Elbe and Weser estuaries. About one fifth of a mile square in area, Heligoland had been extensively fortified with batteries of six inch and twelve inch guns. A mile to the east lay the small island of Dune on which an airfield had been built. At SHAEF it was concluded that if the batteries were not silenced the Germans would be able to interfere with minesweeping and sea traffic into Bremen and Hamburg. The heavy guns were able to outrange the armament of naval forces and strong flak defences prohibited the employment of the Tactical Air Force. A heavy bomber attack seemed to offer the only solution. The British Air Staff was requested by SHAEF to examine the problem in conjunction with Bomber Command and the Admiralty. It was then foreseen that the powerful flak defences of Heligoland would have to be subdued before precision attacks on the long range batteries with Grand Slam and Tallboy bombs could begin. The operation, divided into two phases, was planned to take place in the week before the assault on Bremen.

Bomber Cmd.  
Day Raid Dept.  
No. 37 and  
A.H.B. 6 Trans.

Ibid  
Rept. No. 38

A force consisting of 978 aircraft escorted by ten Spitfire squadrons was despatched against the flak defences of the island, the naval base and also against the airfield of Dune on 18 April. The attack on Heligoland by 823 aircraft was very effective, the enemy reporting that every building on the island had been destroyed, radar equipment put out of action, together with 60 per cent of the flak defences. All vessels and small craft in the harbour were sunk. A total of 4,404 tons was dropped. The airfield at Dune was heavily cratered by 125 aircraft dropping 566 tons. There was no opposition from the air but three aircraft out of the force were lost to flak. On the following day 36 Lancasters of Nos. 9 and 617 squadrons completed the task by dropping six 22,000 pounders and twenty-eight 12,000 pounders against the long range guns, of which several were damaged or destroyed.

Ibid  
Rept. No. 43

On 25 April Bomber Command (480 aircraft) bombed the coastal batteries (11 inch and 9.4 inch guns) of Wangerooge island, the most easterly island of the Frisian Group which covered the approaches to the Weser estuary and the port of Wilhelmshaven. Approximately 17 gun emplacements were damaged.

A.H.B./IIS/  
112/1/100/  
9(E) Encl. 39A  
R.A.F. Narr.  
Lib. of N.W.  
Europe, Vol. V  
Chap. 7, p. 235

Twenty-First Army Group insisted on heavy bomber support for its assault on Bremen although Sir Arthur Tedder drew attention to the fact that the port was required for the unloading of shipping as soon as it fell into Allied hands. A daylight attack was made on 22 April against factory strong points, barracks and camps but because of 10/10ths cloud

Bomber Cmd.  
Day Raid Rept.  
No. 40 and  
A.H.B. 6 Trans.  
  
Bomber Cmd.  
Night Raid Rept.  
No. 900

only 206 aircraft out of a force of 757 dropped their bombs. Nevertheless three factories were destroyed including the Borgward motor transport works, the Lloyd dynamo works and 6,000 people were bombed out. That night 40 Oboe Mosquitos continued the offensive against camps and barracks. Bremen capitulated on 26 April.

The Bombing of Berchtesgaden

A.H.B./IIS/  
112/100/  
9(E), Encl. 33A  
para. 12

At the Air Commanders meeting at SHAEF on 12 April Sir Arthur Harris proposed that Berchtesgaden, Hitler's retreat in the Bavarian Alps, should be obliterated. General Spaatz had already prepared a plan for the isolation of the Salzburg-Berchtesgaden area but Air Chief Marshal Tedder did not think that Salzburg itself was a military objective though the area might be a centre of military and political organization. Berchtesgaden was cleared for attack and on the early morning of 25 April 375 British bombers were despatched to bomb the Eagles Nest, Hitler's chalet and the adjoining barracks. They were escorted by 98 Mustangs of the Eighth Air Force and 13 Mustang squadrons of Fighter Command; they flew unmolested for the last 250 miles to the target area over enemy-occupied territory. Ground haze made visual identification of the target difficult but Oboe ground marking was used. Three out of six Lancasters of No. 617 Squadron attacked the Eagle's Nest perched on a mountain top but they did not succeed in damaging it. Fifty aircraft including Nos. 9 and 617 Squadrons scored direct hits on the Chalet while 265 Lancasters and Mosquitos from Nos. 1, 5 and 8 Groups destroyed two barrack blocks and the S.S. Chief Spahn's residence. Seventeen 'Tallboys' were dropped on the area. Heavy flak met the bombers from hillside positions overlooking the barracks but only two Lancasters were shot down. Hitler, having decided to remain in Berlin to the end, did not witness this fine example of complete Allied air supremacy. General Spaatz sent 109 aircraft that day to bomb the nearby marshalling yards at Salzburg.

Bomber Cmd.  
Day Raid Rept.  
No. 43

Naval Targets

8th A.F. Mthly.  
Summ. of Ops.  
April 1945

The final stages of the war were remarkable for the heavy bomber attacks on shipyards, port installations, shipping and U-boats in the north German ports which had been ordered on 7 February. Four battleships were sunk or scuttled as a direct result of attacks by Bomber Command. A special attack was made on the Lutzow (15,206 gross tons) by 16 Lancasters of No. 617 Squadron on 16 April at Swinemunde, after two earlier missions to the target had been abandoned owing to weather conditions, in which the pocket battleship was sunk. In a raid on the German naval dockyards, Deutsche Werke and Howalds Werke at Kiel on 9/10 April by Nos. 1 and 3 Groups, three warships were put out of action. Five near misses on the starboard quarter of the pocket battleship Admiral Scheer (15,650 gross tons) caused her to fill with water and capsize. Three near misses on the light cruiser Emden (6,931 gross tons) damaged her plates below the water level and she was shortly afterwards moved from Deutsche Werke and sunk. Four direct hits were scored on the heavy cruiser Admiral Hipper (18,500 gross tons) while she was in the graving dock undergoing repairs. She was scuttled by the Germans on 3 May.

Bomber Cmd.  
Day Raid Rept.  
No. 35

Bomber Cmd.  
Night Raid Rept.  
No. 887,  
U.S.S.B.S. Rept.  
Deutsche Werke  
A.G. No. 95,  
Bomber Cmd.  
Quarterly Rev.  
1945 and  
Adm/TSD/F.D.S.

Bomber Cmd.  
Night Raid Rept.  
No. 846

Six important attacks on ports or shipbuilding yards were made by Bomber Command between February and April 1945. On 23/24 February in the course of a raid on Horten in Oslo Fiord by No. 5 Group the Karljohans Vorn shipyard was

Adm./TSD/F.D.S.  
Bomber Cmd.  
Night Raid  
Rept. No. 857  
and  
Adm/TSD/F.D.S.

destroyed and the whole dock yard area devastated and 3,201 gross tons of shipping were sunk. Sassnitz, on the island of Rugen in the Baltic, was bombed on 6/7 March by No.5 Group and 4,308 gross tons of shipping were destroyed, including a destroyer of the Narvik class (Z.28) and 4,344 gross tons were damaged. Much injury was done to workshops and buildings.

Ibid  
Rept. No. 886  
and  
Adm/T.S.D./F.D.S.  
U.S.S.B.S. Rept.  
Blohm and Voss  
Shipyard  
Nos. 94 and 183

Early in April shipyards at Hamburg and Kiel were subjected to heavy attacks both by Bomber Command and U.S.ST.A.F. In an attack by 304 aircraft on the Blohm and Voss yards by Bomber Command on 8/9 April very great physical damage was sustained. It was the largest submarine building yard in Germany and all the eight floating docks were severely damaged, thus requiring the outfitting of submarines elsewhere. The administrative buildings were destroyed and most of the records lost. A total of 5086 gross tons of shipping was destroyed and 1078 gross tons damaged. Three U-boats were also sunk. On the following day the Finkenwarder pens and the Deutsche American oil refinery and Storage in Hamburg were bombed by No.5 Group. Twenty-three oil storage tanks were hit in this daylight attack, the distillation unit and boiler house were destroyed together with many dockyard installations and jetties. The ship yards had become a target since the end of December 1944 when U-boat production once more ranked in the strategic bomber priority list and the construction of U-boats from then onwards declined considerably. It is interesting to note that early in 1945 the Germans had already planned to abandon the excellent shipbuilding facilities at Hamburg and Bremen in favour of assembling submarines in what they believed to be an impregnable bomb proof shelter known by the code name Valentin at Farge near Bremen. This shelter, in which 14 submarines were to be assembled per month, never reached full completion.

Bomber Cmd.  
Day Raid Rept.  
No. 30

Bomber Cmd.  
Night Raid Rept.  
No. 886 and  
Adm/T.S.D./  
F.D.S.

Travemunde on the shores of the Baltic was also attacked on 8/9 April by 22 Lancasters of No.4 Group and 5,500 tons destroyed including a U-boat depotship. The Deutsche Werke, Kiel already mentioned for the attack of 9/10 April had hitherto received little damage and production loss had been negligible. It was noted for its excellent dry docking facilities and was of 'inestimable value to the enemy's war effort, particularly with regard to the submarine campaign. In this raid the destruction of the power plant stopped all production. In addition to the three warships put out of action, 5,667 tons of shipping were sunk and 17,590 tons were damaged. A further raid took place on 13/14 April but only increased the damage to the almost devastated shipyard. After these two raids the Deutsche Werke shipbuilding yards closed down completely. It would have taken a year to rebuild the power plant and several weeks to resume even limited construction work.

U.S.S.B.S.  
Rept. Deutsche  
Werke Kiel  
No. 95

Adm/T.S.D./  
F.D.S. and

Bomber Cmd.  
Night Raid  
Rept. No. 891

U.S.S.B.S.  
German Sub-  
marine Industry  
Rept. p.35

U.S.S.B.S. Rept.  
Deschimag  
Bremen No.96

Apart from this thorough destruction investigations after the war revealed that small scale harassing attacks by Mosquitos of Bomber Command against shipbuilding yards were very accurate and caused extensive damage and delays to the U-boat programme. The Deschimag Weser submarine building yards at Bremen were raided by forces of not more than eight Mosquitos on the nights of 18, 19 and 22 February. They were followed by a large scale attack by the Eighth Air Force on 24 February and again by small Mosquito raids on the nights of 25 and 27 February and 5 March. Submarines in course of construction were extremely vulnerable to air attack and shipways were damaged by 4,000 pound bombs.

Attacks on transportation targets also affected the delivery of submarine components which were manufactured in industrial towns over all Germany. The pre-fabricated rough sections of U-boats were carried up the Dortmund-Ems Canal and after the blocking of the waterway in the autumn of 1944, Otto Merker, who had been put in charge of the pre-fabricated submarine building programme by Speer, reported that approximately 80 rough sections were held up. 'These comprise 6,000 tons of materials and one million work hours'. On 10 January 1945 Merker reported that 'Shipbuilding .... has been especially hard hit by the various stoppages of navigation over the canals and must change over to rail transportation'. The bombing of certain industrial towns such as Hagen and Hannover reduced the supply of storage batteries and electric motors manufactured there.

Submarine pens at Bergen, Farge and midget submarine pens at Ijmuiden and Poortershaven were attacked by Bomber Command with Tallboy and Grand slam bombs. A number of direct hits were scored. The Farge shelter was attacked with 13 Grand Slams and 12 Tallboys; two direct hits were scored.

The Eighth Air Force carried out altogether ten major attacks on the shipyards and port facilities at Bremen, Hamburg and Kiel in 1945. In a small attack by 72 aircraft on the Blohm and Voss yards in Hamburg on 17 January 12304 tons of shipping were destroyed and 9,726 tons damaged. On 11 March in an attack on the Krupp Germania Werft at Kiel three minesweepers were sunk apart from damage to installations. On that day 476 Liberators and Fortresses intending to raid the Rhenania oil refinery in Hamburg, caused heavy damage in the Blohm and Voss shipyard in particular, scoring a direct hit on the 250 ton hammerhead crane; 18,285 tons of shipping were destroyed and 8,898 tons were damaged; two U-boats were sunk. Other operations in March were an attack on the port area of Swinemunde, two attacks on Hamburg port, the U-boat yard at Wilhelmshaven and Deschimag Weser at Bremen. The bombing of the latter yard on 11 March resulted in a virtual shut down of the works and only token activity was maintained thereafter. In a second attack on 30 March five U-boats were sunk. In the attack on Wilhelmshaven the light cruiser Köln (8,200 tons) was sunk. Between 11 and 30 March the Eighth Air Force was responsible for sinking 7,855 tons, damaging 33,322 tons of shipping and destroying 15 U-boats.

The Eighth Air Force attacked Kiel on 3 and 4 April making for the Deutsche Werke U-boat construction yards but it did not inflict as much damage as the Bomber Command attacks five days later. Nevertheless on the 4th, 41,538 tons of shipping were sunk and 1,854 tons damaged.

The following table summarises the effort made by the British and American Strategic Air Forces against the main German ports from 24 February to 13/14 April.

U.S.S.B.S.  
German Sub-  
marine Industry  
Rept. p.33 -34

8th A.F. Mthly.  
Sum. of Ops.  
January 1945

Ibid Mar. 1944  
and  
Adm/T.S.D./  
F.D.S.

U.S.S.B.S.  
Rept. 183

8th A.F. Mthly.  
Sum. of Ops.  
Mar.-Apr. 1945

U.S.S.B.S.  
Rept. 96

Adm/T.S.D./  
F.D.S.

8th A.F. Mthly.  
Sum. of Ops.  
Apr. 1944.

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<u>Place</u>	<u>Date</u> <u>1945</u>	<u>Air Force</u>	<u>Effective</u> <u>Sorties</u>	<u>Short</u> <u>Tonnage</u>
Hamburg (Blohm and Voss)	8/9 Mar.	Bomber Command	304	945
Hamburg (Rhenania Oil) ( Refinery )	11 Mar.	Eighth Air Force	476	1090
Hamburg (Port area)	20 Mar.	Eighth Air Force	287	831
Hamburg (Port area)	30 Mar.	Eighth Air Force	427	1195
Hamburg (Blohm and Voss)	31 Mar.	Bomber Command	454	2503
Hamburg (Blohm and Voss)	8/9 Apr.	Bomber Command	427	1683
Finkenwarder	9 Apr.	Bomber Command	17	112
Kiel (Krupp Germania Werke)	11 Mar.	Eighth Air Force	344	793
Kiel (Deutsche Werke)	3 Apr.	Eighth Air Force	693	2006
Kiel (Deutsche Werke)	4 Apr.	Eighth Air Force	505	1498
Kiel (Deutsche Werke)) (Howalds Werke )	9/10 Apr.	Bomber Command	359 217	1739 1215
Kiel (Deutsche Werke)	13/14 Apr.	Bomber Command	467	2134
Bremen (Deschimag)	24 Feb.	Eighth Air Force	198	575
Bremen (Deschimag)	11 Mar.	Eighth Air Force	407	964
Bremen (Deschimag)	30 Mar.	Eighth Air Force	319	929
Wilhelmshaven	30 Mar.	Eighth Air Force	327	937
		<u>TOTAL SORTIES</u> Bomber Command	2245	10331
		<u>AND TONNAGE</u> Eighth Air Force	3983	10818

U. S. S. B. S.  
German Sub-  
marine Industry  
Rept. pp. 34-35

According to the United States Strategic Bombing Survey 'the chaotic conditions which prevailed in Germany late in 1944' together with the disrupted communication system and uncertain steel deliveries 'caused a repeated curtailment in submarine building programmes of approximately 50 per cent'. Only about 20 per cent of the originally planned Types XXI, XXIII and 127 prefabricated submarines were ever completed and an infinitesimal number of them became operational before the end of hostilities'.

The Bombing Survey after surveying the evidence believed that the submarine building yards would probably have resumed production had it not been for the physical occupation of the yards by Allied troops. Out of 14 Type XXI submarines on the slipways at Blohm and Voss in various stages of construction only one was damaged. At Deschimag, Bremen only four out of 16 Type XXI boats on the slipways were damaged. These views were confirmed by Speer who said that attacks on shipyards themselves did nothing to reduce the output of U-Boats. More important was the bombing of plants producing electric motors and batteries. If the

A. H. B. / IIG/29  
Rept. No. 349/45

'Aafa' accumulator factory at Hannover had been destroyed U-boat construction would have stopped after a month.

### Sea Mining

The minelaying effort of Bomber Command continued to be directed against the U-boat training areas and U-boat acceptance trials in the Baltic. Training areas in the north eastern and western Baltic were mined from Danzig, Gdynia and Swinemunde to Kiel Bay and Flensburg Fjord. The Germans would have been unable to conduct their submarine campaign without training in the Baltic and safe escort through coastal waters en route for operations in mid ocean. Nor could they have held Norway without seaborne supplies and this became more and more difficult to achieve in the final stages of the war.

The casualties due to sea mining included all classes of shipping; naval units, U-boats, troopships, depot ships, train ferries, general cargo vessels, tankers etc. Damage was also inflicted on the enemy's minesweeper forces. Apart from actual damage, the mining affected the German shipping programme by imposing delays to an increasing extent in the later stage of the war. The enemy was compelled to deploy a large number of vessels on sweeping and escort duties in order to combat the mining threat. The conversion of merchant vessels to Speerbrechen alone involved the loss of some 200,000 tons of shipping space.

In one week ending 15 April a total of 1020 mines were laid. Although bad weather curtailed operations an average of 270 mines were laid weekly during these last three months of the war. The areas in which mines were laid were as follows: one, the Belt eastwards as far as a line drawn from south Sweden to north Germany. This area received the largest number of mines; second, the Baltic including Swinemunde, Gdynia, Danzig; third, west Denmark, the north-west German coast line and North Sea (Heligoland, Elbe River, Jade and Weser Rivers) and the southern entrance of the Kiel Canal. The following table summarises the number of sorties flown and mines laid. (1)

<u>Month</u>	<u>A/c despatched</u>	<u>A/c effective</u>	<u>Number of Mines laid</u>	<u>A/c lost</u>
February	292	262	1354	8
March	276	254	1198	6
April	280	248	1362	3

### Operation Manna

The last major task of Bomber Command was paradoxically not concerned with destruction but was one which brought succour to thousands of starving Dutch in German occupied Holland in the last week of the European war. For several months before the end of hostilities plans had been made to deal with conditions arising from a sudden collapse of German resistance (known by the code name Eclipse). One of the tasks of the Strategic Air Forces in Eclipse was to assist with troop carrying operations that were beyond the capacity

BC/S.31964/2  
Encl. 8A and  
Bomber Cmd  
Overlord Supp  
Apps. 2 Encl.22  
June 1944

(1) A more comprehensive account of sea mining operations and its results will be found in R.A.F. narrative 'The R.A.F. in Maritime War', Vol.V.

of the air transport aircraft available. In particular, such missions were to include the feeding and evacuation of prisoners of war.

Bomber Cmd  
Night Raid  
Rept. No. 902

R.A.F. Narr.  
Lib. of N.W.  
Europe Vol. V  
Chap. 8,  
pp. 246-150

The situation anticipated at the end of hostilities never arose largely because of the rapid advance of the Allied armies into Germany. It was necessary only on one occasion to drop food to a prisoner of war camp; that took place on 24/25 April at the camp of Neu Brandenburg in north Germany. Nevertheless the preparations which had been made were put to good use in the relief of the Dutch. Their plight had been recognised for sometime and by the middle of April 1945, it became evident that, unless relief was given quickly, many would die of starvation. The planning for the dropping of food supplies and the drama of the negotiations with the German occupiers of western Holland have already been described in R.A.F. Narrative Liberation of Northwest Europe Volume V. The object of the air drops was to maintain a supply of food until the arrival of relief ships and the opening up of land routes. In connection with the relief of the Dutch a Speerbrecher blocking the entrance to IJmuiden harbour was sunk by No. 5 Group on 7 April which would enable shipping to enter without delay.

Bomber Cmd  
Day Raid  
Report No. 47

By 1 May an agreement had been reached with the Germans for the safe passage of Allied aircraft to dropping zones in western Holland. But a trial drop was made on 29 April in which 239 Lancasters from Nos. 1 and 3 Groups (which were to specialize in this task) dropped over 500 tons of rations at dropping zones at Rotterdam, the Hague and Leiden. Fourteen Mosquitos marked the zones with target indicators. The Dutch people turned out, en masse, waving Union Jacks, to watch the operation. Not more than one eighth of the total amount of rations was lost and from that date until 8 May Bomber Command dropped food supplies daily with only one exception when bad weather prohibited flying. Dropping zones were situated at Kralingsche Plas and Waalburg airfield at Rotterdam, Valkenburg airfield at Leiden and Gouda airfield and the race course at The Hague.

B.C./S. 32085/2  
and Bomber Cmd  
Overlord Supp  
Apps. Pt. 2  
Encl. 23  
June 1944

The technique of dropping food supplies had been carefully worked out some months beforehand. As there were insufficient parachutes the rations were placed in double sacks and free dropped from a height of between 300 to 500 feet; although the inner sack burst the outer one remained intact. It was also found that there was a risk of the sacks striking the tail plane if they were dropped at too high an air speed and crews had to be briefed to reduce the speed to below 150 miles per hour and to drop the food from under 500 feet. Special civilian rations were prepared and delivered by the War Office direct to bomber airfields and were dropped in addition to the prisoner of war rations originally planned.

8th A.F. Mthly  
Sum. of Ops.  
May 1945

On 1 May the Eighth Air Force began supply drops (Chowhound) with 396 Fortresses and Liberators and they continued daily until 7 May. The American dropping zones were on the eastern side of the peninsula at Amsterdam, Vogelensang, Alkmaar, Hilversum and Utrecht.

The sea route was opened on 4 May when the Swedish relief ship S.S. Hallaren which had been admitted through the Kiel Canal, reached Den Helder. On the next day the German forces in Holland surrendered with those in north Germany and preparations went ahead to open up road and

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Bomber Cmd  
O.R.B.  
April-May 1945

rail routes. The Air Forces were thus invaluable in filling the interim period until surface routes were open. From 29 April to 8 May Bomber Command flew 3,183 Lancaster sorties of which 3,156 were successful; 145 out of 158 Mosquito sorties were effective. A total of 6,684 tons of food was dropped. The Eighth Air Force flew 2,191 effective sorties and dropped over 4,180 (short) tons from 1 to 7 May.

8th Air Force  
Mthly Sum of  
Ops, May 1945

Operation Exodus

Bomber Cmd  
Overlord Supp  
Apps. Vol. 2.  
Encl. 24  
June 1944

Bomber Command also flew large numbers of prisoners of war from the continent to the United Kingdom where detailed plans had been made for their reception and subsequent disposal. The main lifts were made from Brussels/Welsbroek and Juvincourt, although in the early stages small numbers of prisoners of war were collected from other specified points. Strict instructions were issued by the Commander-in-Chief Bomber Command to the aircrews concerned, emphasizing the need for safety rather than speed during the air lifts. The first lift took place on 26 April when 42 aircraft of No. 5 Group flew home 999 ex prisoners of war. Similar flights took place on 27 and 28 April. Known as Operation Exodus, they continued daily until 1 June when it was stated that in future there would be no regular commitment for Bomber Command but that small numbers of prisoners of war would require transport to England from time to time. The last Exodus operation took place on 4 June when 49 prisoners of war returned in four Lancasters of No. 3 Group.

B. C./S. 32085  
Encl. 15A.

Bomber Cmd  
O.R.B.

Some 75,000 Allied repatriates were flown home by Bomber Command during April and May 1945 and at the conclusion of the airlift the Supreme Allied Commander, in congratulating the Commander-in-Chief Bomber Command, said that the accomplishment of this task was an achievement of great magnitude comparable to the remarkable results of the bomber offensive.

B. C./S. 32085  
Encl. 22B

In connection with Operation Exodus 1,876 Belgian refugees were flown back to Belgium by No. 3 Group in the period 12 to 26 May.

Bomber Cmd  
Overlord Supp  
Apps. Part 2  
Encl. 25 and  
B. C./S. 32085/10

The End of the War in Europe

The last heavy bomber attack of the war was directed against the Vallo oil storage depot at Tonsberg in Norway on 25/26 April. Leaflets were dropped in the last week of April on prisoner of war camps, concentration camps and hospitals warning camp commandants and other officials against the maltreatment of prisoners and civil internees. Offensive operations ceased after 2/3 May when Mosquitos raided Kiel and airfields in Schleswig Holstein. On 3 May Headquarters Bomber Command received a warning notice of a cease fire. Negotiations for a German surrender were then in progress in Field Marshal Montgomery's headquarters on Luneberg Heath. Later German plenipotentiaries signed the act of surrender at 0241 hours on 7 May at SHAEF. The terms became effective on the next day. The final signal of the war from the Air Ministry to Bomber Command stated that 'All German land and sea and air forces will cease active operations at 0001/B hours on 9 May'.

Bomber Cmd  
O.R.B.  
May 1945

A. H. B./IIH/  
241/3/599  
(G) Encl. 55A

On 30 May 1945 the Combined Chiefs of Staff dissolved the organization for the direction of the Combined Bomber Offensive. R. A. F. Bomber Command returned to the control of the Air Ministry only, No. 205 Group to the control of H. Q. M. A. A. F. The Eighth U. S. Air Force was placed under the Commanding General, U. S. Army Forces European Theatre of operations and the Fifteenth U. S. Air Force was placed under Commanding General U. S. Army Forces Mediterranean Theatre of operations.

A. H. B./ID4/23C

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CHAPTER 11

REVIEW OF THE COMBINED BOMBER OFFENSIVE  
IN THE FINAL PHASE

'I do not myself believe that any modern war can be won either at sea or on the land alone or in the air alone ..... In other words, war has changed to three dimensional, and very few people realise that.'

Sir Arthur Tedder at Press Conference 23 October 1944.

The Interdependence of the Causes for the Defeat of Germany

Protagonists of strategic bombing often make the mistake of attempting to assess the results of the combined bomber offensive in isolation. Briefly, there were four factors in the defeat of Germany in the following order: the winning of air superiority over western Europe, the over-running of German and German-occupied territories, the breakdown of the German war industry and the liquid fuel and chemical shortage.

The action of air and ground forces were to a large extent interdependent on each other. The re-entry into Europe would have been impossible without air superiority which first enabled the Allied Air Forces to survey minutely the coastal defences of northern Europe; secondly, to dislocate the railway system in northern France and the Low Countries; thirdly, to cover the armada of landing craft and other vessels while they discharged their cargoes on the Normandy coast with impunity; finally, the land campaign could not have progressed as favourably as it did without the bombing of oil targets. Conversely, the advance of the ground forces in North-west Europe, on the one hand, was responsible for the dissolution of the German early warning system and, on the other, made possible the erection of radar stations for bombing and navigational aids on the frontiers of Germany, both factors enabled the heavy bombers to make accurate and sustained attacks on the Ruhr in the winter of 1944/1945. The advances in Italy similarly enabled heavy bombers to strike at Germany effectively from the south. The choice of a bombing policy radically affected the land campaign. Had the oil plan been adopted in place of the transportation plan in the spring of 1944, there might well have been a disastrous setback in Normandy.

The oil and transportation attacks coincided with the loss of enemy occupied territories and it might appear that Germany's economic decline was due to the loss of territory rather than to bombing. France, Belgium, Luxemburg were occupied in 1944 and Upper Silesia in early 1945. By the end of March 1945, German territory had been occupied as far as the west bank of the Rhine. The B.B.S.U. estimated that the liberation of the western territories imposed a reduction of three per cent in German munitions. The Russian onslaught in the east caused a reduction of a further two per cent; the campaign west of the Rhine in 1945 about four per cent of German armaments. The direct occupation of these territories would not have affected the overall production of munitions by more than about one per cent in the third quarter of 1944; the corresponding losses of the last quarter of 1944 and the first quarter of 1945 were of the order of three and 13 per cent, respectively. The industrial decline was undoubtedly caused by bombing rather than by occupation of territory. Confirming this, Speer said after the war that he believed that the final bombing offensive against the oil industry

Ref. B.B.S.U.  
Report Strategic  
Air War against  
Germany 1939 -  
1945. p.163.

Speer  
Interrogation  
Rept. No.26.

(89446) 267

SECRET

would have brought about the collapse of Germany without military action. The Wehrmacht could not have operated without fuel and industry without transportation.

Factors affecting the Development of the Combined Bomber Offensive in 1944/1945

1. Importance of achieving Air Superiority

By the spring of 1944, the British and U.S. Air Forces had, at least in daylight, gained air superiority over western Europe. Taking advantage of the long-range Mustang fighter, U.S. heavy bombers were able to penetrate deeply into Germany and bomb hitherto invulnerable targets. By the early summer, the British night bombers, while still on occasion suffering severe losses as, for example, in the raids on Berlin and Nuremberg in March, were gaining the upper hand in the bitter struggle against the German night air defences. Improved radio counter measures, diversionary attacks and navigational and bombing aids, together with the sheer weight of a force which could muster over one thousand aircraft made night raids far more effective. The bombers were able to locate their targets and stay over them long enough to bomb accurately. Many of the improvements in technique were, ironically enough, stimulated by the preparations for Operation Overlord.

2. Effect of Operation Overlord on the Combined Bomber Offensive

The paradox of 1944 was that, in that year the Strategic Air Forces had at last reached the stage at which they were able to strike decisively at the roots of the German war effort, but operations in 1944 were subordinated to a military and naval assault, the re-entry into Europe - Operation Overlord. The Strategic Air Forces were, for this reason, placed under control of the Supreme Allied Commander on 14 April, a month and a half before D-Day. Henceforward all the Air Forces were part of a triphibious force whose object was to establish the Allied Armies in Europe, to liberate the occupied countries and to defeat the German army in the field. A prerequisite of a successful Allied landing was the winning of the build-up race between the assault forces landing in Normandy and the German reinforcements sent to expel the invaders. It was inevitable, therefore, that the transportation plan was chosen in preference to other plans which aimed at purely industrial destruction.

The bombing offensive against Germany had to be relaxed immediately before and after D-Day and less than one-fifth of the bombs dropped from April to June 1944 by Bomber Command fell on German soil. Throughout the remainder of the campaign in North West Europe the strategic bombers were called upon to take part in close support operations. However, it is certain that a number of their interventions in the land battle had very limited effects. The degree of physical destruction on personnel, vehicles and guns was slight, no matter how high the density of bomb strikes achieved. The chief value of this diversion from industrial targets was the moral stimulus afforded to the ground forces. Looking beyond the period when the heavy bombers were committed to ground support operations on first priority, it is problematic whether the 100,000 tons of bombs dropped in tactical support between 7 July 1944 (the date of the first tactical support operation after D-Day) and the close of hostilities would not have been used with better effect elsewhere.

A.M. File  
C.M.S. 342

The other diversion from the bombing of industrial targets was the Crossbow target system, placed at high priority because of the V weapon sites and installations which not only threatened the United Kingdom but were a potential menace to the Overlord embarkation ports. In the thirteen month campaign 100,000 tons of bombs were dropped on Crossbow targets which represented nine per cent of the total tonnage dropped by the heavy bombers in that period.

3. The Problem of Command of the Strategic Air Forces

The command of the Strategic Bomber Force for the role in Operation Overlord had been a particularly vexatious problem; the controversy had raged for months before preparatory operations were due to begin and had expanded from a military into a political sphere. Nevertheless, it was implicit in the Overlord plan that all the Air Forces, Strategic and Tactical, had one objective:- namely to ensure the success of the landings in Normandy. Unified control of the Strategic Air Forces, at least, was secured in the person of Sir Arthur Tedder, who had successfully applied the principle of unity of command in the Mediterranean theatre. But, after it was apparent that the Armies were firmly established on the Continent, the direction of strategic bombing operations was no longer within the capabilities of an Air Staff whose problems were primarily of a tactical nature. The bomber force had to meet numerous and conflicting demands from all quarters while agencies for intelligence and for advising on target systems, by the nature of things, proliferated. Thus, while from 15 September 1944 onwards, the heavy bombers were nominally under control of the Chief of Air Staff and the Commanding General U.S.A.A.F., committees rather than persons tended to direct the course of bombing operations. The lack of a single authority to insist on the correct sequence of target priorities was sadly evident in the final stages of the war against Germany.

4. Development of Bombing Policy: Adherence to two target systems

The opportunity to draw up a clear and unambiguous policy of strategic bombing was not seized when the Combined Chiefs of Staff withdrew the strategic bombers from the direct control of the Supreme Allied Commander. The task of the immense force in Europe consisting of 5,246 heavy bombers was still, as propounded at Casablanca, the progressive destruction and dislocation of the German military, industrial and economic systems and the direct support of land and naval forces.

The British Chiefs of Staff were apt at this time to stress the importance of oil targets supplemented by attacks on morale to the detriment of transportation targets. It was left to Sir Arthur Tedder, Air Marshal Bottomley and General Spaatz to devise a directive which was beneficial to the campaign in north-west Europe as well as to strategic bombing. Oil was top priority and second transportation, tank production, ordnance depots and motor transport production. The combined Strategic Targets Committee was to advise on suitable target systems but this Committee became, instead, a field of conflict where exponents of oil and transportation thrashed their respective policies. The Committee was heavily biased in favour of oil and had very different views on the effect of transportation attacks from SHAEF. The change of command seemed wrong from the SHAEF point of view, as

A.M. File  
C.39441/49/  
Pt.I. Encl.1A

A.H.B./1D4/238

A.M. Exercise  
Thunderbolt  
Vol. II. P.130

the Supreme Commander was then deeply concerned not only with ground operations on the western front, but with the war, particularly the air war, over the whole of Europe. On the other hand, the British Chiefs of Staff maintained that the strategic air war could best be directed from London. But there was no strong personality appointed to co-ordinate the opposing elements in London and Versailles and strategic bombing once more lacked unified control and clear policy.

A.M.W.R. Sum.  
of Bomber Command  
Ops. 1944 and  
Eighth Air Force  
Monthly Sum. of  
Ops.

This had already shown itself in the tendency of the heavy bombers not to concentrate on any single target system. Bomber Command dropped two thirds of its total tonnage in October on area targets while the Eighth Air Force devoted a greater effort to communications. At last, goaded by American proposals that the heavy bombers should be subordinated to the ground offensive in order to break the deadlock on the western front, the British Air Staff was compelled to take action and enlisted the aid of the Deputy Supreme Commander. Sir Arthur Tedder evolved a bombing policy which was a satisfactory compromise between the protagonists of an independent bomber offensive and those who wanted the strategic bomber force harnessed to operations of the ground forces. He recognised that Germany could be defeated either by strategic bombing of industrial targets or by land invasion. He did not believe that they were conflicting methods and that it was an abuse of air power to concentrate all effort on the independent offensive on the one hand and the auxiliary offensive or close support of the armies on the other. There must be, in his favourite phrase a 'common denominator', the destruction of which would affect equally German industry and the fighting forces. He chose transportation as the common denominator but did not forget the necessity to go on attacking oil.

J.I.C(44)  
450(O) Final.  
30th Oct. 1944

The British Chiefs of Staff remained convinced that oil was the most important target, particularly as the Joint Intelligence Committee had estimated that German oil production had dropped to 25 per cent of pre-attack output in September 1944, and they knew about the extraordinary efforts being made to repair bombed plants. Sir Arthur Tedder, however, was more impressed by the results of the French transportation plan and believed that it would be even more effective in Germany where considerations of bombing a civilian population did not arise. It would injure the entire economy by disrupting coal supplies, cause breakdowns to the steel industry, gas and electricity and would force the Army to consume more petrol and diesel oil. Sir Charles Portal could not deny the effectiveness of transportation attacks and on 1 November strategic targets were reduced to two, oil and communications, with the proviso that the Supreme Commander could have heavy bomber support for a major ground offensive or in an emergency. It has been seen that the concentration of two targets was immediately felt in Germany. Lord Tedder has said, since the war, that they were not 'alternative target systems but complementary and together were the one common denominator of Germany's war effort - from the political control at the top down to the supply of troops in the front line.' With such a systematic attack, pursued relentlessly, German industry was doomed. The vulnerability of oil and transportation in the German economic system had been recognised in Great Britain even before the war and had been chosen as primary objectives in 1940 and 1941 but the attack on them was ineffective because the Allies lacked the means to strike at the targets. By the autumn of 1944, it was possible to make systematic attacks on any target system.

A.M. File  
C. 39441/49  
Encl. 30A

A.H.B./II/68  
Air Power in  
War. p.51

A.H.B./ID3/  
601(C)

Sir Arthur Harris continued to argue on behalf of the destruction of individual cities and prophesied an increase in aircraft losses if he concentrated on the Ruhr. But by October 1944 losses to Bomber Command in night attacks had decreased to one per cent and the development of counter measures and deception tactics took the sting out of his argument. In five night attacks on Leuna, Politz and Brux in the winter of 1944/1945, the most distant oil targets, out of 2,570 sorties flown, only 32 aircraft were lost. Furthermore, the heavy bombs carried by the Lancasters were far more destructive than those dropped by U.S.ST.A.F. and the aiming was more accurate.

A.M.W.R. Sum.  
of Bomber Cmd.  
Ops. 1944-1945.

Ibid. and  
Eighth Air Force  
Mthly. Sum.  
of Ops.

In November 31,913 short tons of bombs were dropped on oil compared with 17,810 tons on transportation by the two Strategic Air Forces operating from England. Geilenberg had nevertheless been able to raise oil production figures because of bad weather and lack of concentration of the primary objective in October. The heavy attack on west German railways in the Battle of the Ardennes in December brought the tonnage against this type of target to 26,076 tons. In 1945 the attacks on oil and transportation continued and although there was a diversion of effort because of the potential threat of the enemy's jet fighters to the daylight bombing offensive and the schnorkel-equipped U-boat to sea communications, tonnage against the primary target increased from January onwards. Between January and March Bomber Command's bomber tonnage discharged on oil exceeded that of the Eighth Air Force by 27,826 short tons.

A.M. File  
C.39441/49/Pt.I

A.M. File  
C.39454/49

A.M.W.R. Sum.  
Bomber Cmd.  
Ops. 1945.

General Spaatz had apparently concluded that the oil offensive had been completed by the end of 1944 and from then onwards he contemplated a massive attack (Operation Clarion) against transportation which would include all the Air Forces. The increased effort against oil did not prevent Bomber Command dropping 36 per cent of its total tonnage in January 1945 and 47 per cent in February on area targets. This reflected the policy of SHAEF and the Combined Chiefs of Staff which was to prevent a last ditch stand by the Nazis and to assist the January offensive of the Russians. By the end of March it was foreseen that if these attacks persisted, the Allies would be faced with the gigantic task of feeding and housing thousands of homeless German civilians and they would be unable to accommodate their own occupation forces. Area attacks were forbidden after 6 April except in special circumstances. The strategic air war ended on 13 April when the heavy bombers were ordered to operate solely in a tactical role and to destroy the remaining communications to the National Redoubt. Equally effective results could have been achieved by a smaller force but, by then, there was no other target of sufficient importance worth bombing.

A.H.B./ID4/23D

A.M. File  
C.39441/49/Pt.II

#### 5. Limitations of the Strategic Air Forces

It is important not to forget, before proceeding further, that throughout the whole period claims on the bombing capacity of the Allied Air Forces were always numerous and usually conflicting. (The War Office, SHAEF, The Admiralty, The Ministry of Economic Warfare, The Political Warfare Executive were the principal contestants). With the aircraft available and the inevitable limitations imposed by bad weather, particularly during the winter of 1944/1945, it was never possible to provide all the weight of attack desirable or sometimes even necessary against every target system. The merits of conflicting claims had in

consequence to be assessed carefully one against the other. Inevitably certain menacing potentialities had from time to time to be left alone in order that more seriously menacing targets could be attacked. It followed that the enemy was sometimes able to take advantage of such respites in certain industries. The Allied Air Forces were never able at one time completely to smash any one branch of German war production to keep it impotent. Limited resources, conflicting claims of necessity and the weather factor made such an ideal impossible of attainment.

Allied Economic Intelligence was not always reliable. While it was accurate in specific details, such as oil, it failed to recognise the overriding fact that Germany was, until the end of 1944, potentially strong and possessed of large reserves of capacity. Further, because the raw material on which analyses were made was often scanty, it often happened that debating skill and rhetoric played a greater part in the selection of targets than scientific analysis by technical advisers. But it was essential to plan this advice against the operational capability of the bomber forces, the weather, fighter defences, flak, political considerations and so on. Notwithstanding the complex system of the control of the Strategic Air Forces, directives, target selection committees, the Commander of the Bomber Force invariably had the last word. He alone could say whether or not his bombers could attack a specific target on any one night.

B.B.S.U. Rept.  
Strategic Air  
War against  
Germany 1939 -  
1945. pp. 170 -  
171.

General Effects of the Combined Bomber Offensive on German War Production

1. Climax of German War Production

In July 1944, a month after the Allies had landed at Normandy, Germany reached the peak of her war production effort. The reasons for such an unforeseen situation were as follows. Hitler had put Speer in charge of the armament industry in February 1942 after the death of Todt (organiser of the German labour force). Speer's policy, briefly, was to inject a spirit of private enterprise into the rigid bureaucracy which controlled war industries. Production managers and technicians were formed into 'rings' and 'committees' and took over control from the cumbersome and often inefficient administrative services of the Wehrmacht. Speer's aim was to 'rationalise' production - that is to say - designs and component parts were simplified and standardised, production was concentrated into the most suitable plants and secret processes were exchanged between firms. Available manpower was combed out more ruthlessly and workers were drafted into armament centres and a stricter supervision was exerted over dumps of equipment so that demands for supplies were adequately met.

Speer had learned from <sup>the</sup> history of the years 1917 - 1918 of the importance of the technical side of war and the need to increase and maintain production. Whereas in World War I German production had reached its peak in 1917, it had sunk in the summer of 1918 to about 60 or 70 per cent of its former level, largely because of strikes and the bad morale of the workers.

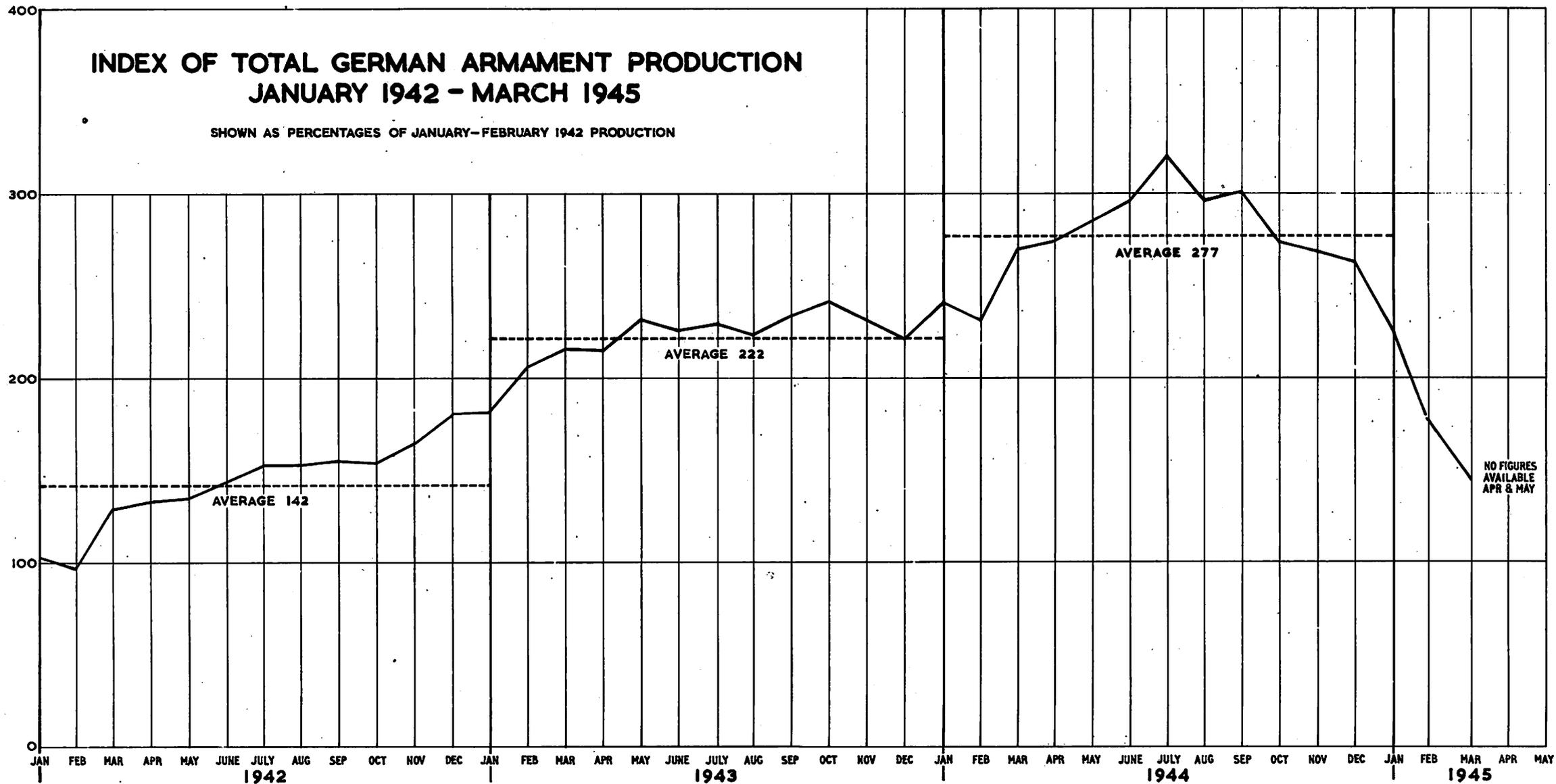
Hamburg Docs,  
Vol. 93. pp.  
3896 - 3927.

Ibid. Vol. 93  
pp. 3896 -  
3927.

Speer boasted that in two and a half years armament production had been more than trebled. Thus, the total yearly ammunition production had increased from 45,000 tons in 1941 to 213,000 tons in 1943 and 301,000 tons in July 1944. In the same period the production of tanks had increased from

# INDEX OF TOTAL GERMAN ARMAMENT PRODUCTION JANUARY 1942 - MARCH 1945

SHOWN AS PERCENTAGES OF JANUARY-FEBRUARY 1942 PRODUCTION



A.H.A. D.M.G. No. 1040

317 to 1,008 and 2,100; 3.7 anti-tank guns from 287 to 1,040 and 1,180; machine guns from 7,129 to 14,155 and 24,100. Speer called this the 'armament miracle', 'since no-one in 1943 would have dared to believe that such organised armament could be built up after the destruction caused in such places as Hamburg, Berlin, Frankfurt, Munich, Stuttgart and Schweinfurt.' But it was, in fact, the inability of the Allies to maintain attacks on any single target system that gave the Germans a chance to adapt themselves to each situation as it occurred.

See this  
Narrative  
Vol. V,  
Chap. 19

Strides were also made in fighter production as has been shown in an earlier volume. In 1943 1,220 aircraft were produced per month and in 1944 the average monthly total was increased to 2,460. By the end of February 1944, 1,300 fighter aircraft left the factories. Destruction of nearly 90 per cent of German fighter production by the Combined Bomber Force that month prompted the formation of a special Fighter Staff, first under Speer, then under Milch, Director General of Aircraft Production. They succeeded in increasing the production of fighters from 1,830 in March to 4,050 to July 1944.(1) Front line fighter strength did not, however, benefit from the effects of accelerated production.(2) The underlying reason for this phenomenal situation lay partly in errors of German air policy, partly in the growth of Allied air power, partly, the failure to develop new types of aircraft, especially fighters, until it was too late, to counter the rising Anglo-U.S. air power, partly, restrictions in training aircrew (through lack of fuel), partly, the failure of the German aircraft industry to go into full scale production until the spring of 1944 and partly, the dispersal of aircraft over the various battle fronts instead of concentration in defence of the Reich. Heavy losses were also suffered in air battles over Germany with United States long range fighters in early 1944.

## 2. Decline in Production in Second Half of 1944.

In August Speer planned a further increase in armament for the second half of the year. Weapon production was to be increased by 98 per cent, munitions by 20 per cent so was fighter production and he anticipated that 4,800 new aircraft would be produced per month by the end of the year; coal and steel production was to be redoubled. Measures taken to achieve this programme were the standardisation and simplification of equipment; the conscription of untapped resources of manpower (there were still three million craftsmen in Germany who had so far escaped conscription); the introduction of measures to stamp out

- (1) Fighter aircraft were divided into three types. The Jager (single-engined fighter), the Zerstoror (twin-engined fighter) and Schlachtflugzeuge (ground attack). The latter included reconditioned aircraft.
- (2) The following figures show the fighter defences of the Reich on three dates in 1944:-

	<u>Single Engined</u>		<u>Night</u>		<u>Twin Engined</u>	
	<u>Fighters</u>		<u>Fighters</u>		<u>Fighters</u>	
	<u>Strength</u>	<u>Serv.</u>	<u>Strength</u>	<u>Serv.</u>	<u>Strength</u>	<u>Serv.</u>
3 June 1944	789	437	732	404	116	53
7 June "	448	226	604	371	124	65
24 Nov. "	1,766	1,723	993	537	-	-

idleness and sickness in the factories; closer supervision to ensure that equipment and stores were not wasted; long term development of the basic industries was to be checked in order to accelerate the production of war equipment. Exports were to be whittled down in order to release raw materials for armaments (200,000 tons of steel were released for this purpose). Speer intended to speed up the process of articles passing from the factory to the front line. He hoped that the G.A.F. would adapt itself to the exigencies of the fuel shortage. But his armament programme hinged on adequate transportation, to provide fuel and to link the processes of manufacture particularly in the case of the dispersed industries (U-boats and aircraft).

Hamburg Docs.  
Vol.88 pp.3813 -  
3820.

Speer, while forced to admit the cold fact of Allied air superiority, believed that the Allies would continue to over estimate the damage inflicted in the bomber offensive and provide breathing space for the repair of damaged factories and plants. He said in the summer of 1944, 'The unhindered flight of the enemy's aeroplanes across Germany must not become a ground for hopelessness. We have a powerful partner, in that the enemy is also in possession of a General Staff of the Air Force. We have made catastrophic mistakes with our attacks on England.' Later in the year he invoked the aid of bad autumn weather and a reinvigorated force equipped with jet aircraft to achieve his target figures.

Hamburg Docs.  
Vol.101, pp.  
3934 - 3936.

By the middle of December, however, the Fuehrer had apparently lost faith in the fighter arm, either because there was insufficient fuel or because too many aircraft were being shot down, and ordered that the production of flak weapons was to take higher priority. Kehrl, Chief of Raw Materials and Planning, contended, in vain, that it was better to conserve fighters for the defence of industry instead of expending them in a ground attack role and pointed out that flak was not shooting down more aircraft than fighters while, in any case, flak ammunition depended on by-products of the fuel industry, nitrogen and methanol, and was more vulnerable to that industry's breakdown than were fighter aircraft.

Ibid, Vol.97  
pp. 3642 -  
3645.

Wagenfuehr  
pp.60 - 61.

By January 1945, German munition production was reduced to the level which it reached for the first time in June 1942. There were certain schemes, the 'defence' and 'infantry' programmes, for instance, in which it was possible to prolong the increased output. To quote a few examples: In December 1944 alone, 974 7.5 c.m. anti-tank guns, 232 8.8 anti-tank guns, 930 light field howitzers, 296 heavy field howitzers, 724 8.8 c.m. heavy anti-tank guns, 690 troop carriers and 290,000 tons of ammunition were produced. But these single accomplishments were of no avail because the decisive heavy weapons, howitzers, aircraft, tanks and heavy ammunition could no longer be produced in sufficient quantities. According to contemporary industrial statistics aerial attacks had reduced industrial output by three per cent in March and by as much as six per cent in October 1944. These figures did not include the areas most severely hit such as the Rhineland and Westphalia. More than one million hours were lost in this area which contained 12,000 plants and five million workers. No less than eight per cent of the industrial plants indicated that their production had decreased by approximately three-fifths, primarily on account of enemy air action.

Hamburg Docs.  
Vol.109 pp.  
3724 -3761.

Wagenfuehr  
pp.46 - 47.

3. Situation in Germany in January 1945.

Flensburg Docs.  
Vol. XVIII,  
Vol. IX  
Speer to  
Guderian.

On 27 January 1945 Albert Speer, Reichminister for War Production, in a confidential report to his closest colleagues admitted that in the last quarter of 1944 production had fallen far short of the target aimed at, because of the mounting intensity of the bombing and the loss of territory. Coal production was 28 per cent below the average of the whole year and only amounted to one half of the total requirements. The loss of the western territories and the bombing of the Ruhr and Rhineland had caused steel production to drop from a monthly average of 3.06 million tons to 1.32 million tons. The air attacks on the chemical industries were so intensive that a number of plants had been destroyed and rebuilt as much as five or six times. Not only would the basic industries such as coal, chemicals, iron, building materials, electricity and gas close down but also industries relying on them for raw materials. Only an effective air defence system could ensure their survival.

Ibid. Vol. VI

Three days later Speer wrote in a memorandum that he believed Germany would collapse within four to eight weeks because of the cutting of coal supplies, shipping, gas, electricity and food stocks. By 10 March this forecast had largely come true. Coal was piling up at the pitheads because there were not enough wagons to move it and gas and electricity plants were closing down. Industry could no longer function and the German people could only make a final gesture by holding the Rhine and Oder for as long as possible, thereby perhaps winning the respect of the Western Allies and perhaps gaining more favourable peace terms.

4. The Effects of Area Attacks on German Economy

B.B.S.U. Rept.  
Strategic Air War  
against Germany  
1939 - 1945  
pp. 96 - 98.

Before proceeding to summarise the effects of attacks on the two principal target systems of the period under review an estimate must be made of the effects of area bombing. From 17 September 1944 to the end of the war Bomber Command dropped 180,000 tons of bombs on 54 cities. It is necessary to see whether this had any effect on war production in view of the case made by Sir Arthur Harris in justification of area attacks. It became clear after the war that the large tonnage dropped on area targets neither reduced industrial output to a critical degree, nor lowered the morale of the German worker to the point at which he refused to work. The B.B.S.U. has calculated that about nine per cent of the total productive industry including mining and three per cent of war production was lost through area attack in the second half of 1944. On the other hand, it has been estimated that German war production was in itself 20 per cent less than what it would have been in the absence of air attack. Many targets bombed in this period had already been burned-out and therefore the bomb loads carried on these later raids often consisted of high explosives as contrasted with the very high proportion of incendiary bombs carried in 1943 and early 1944. In consequence the effects of the later area attacks on production were necessarily less than those of 1943.

Speer Interrog-  
ations Rept.  
No. 26.

Area attacks reacted on the German war effort in two ways. First, the diversion of labour engaged in repairing air raid damage or in dispersal schemes from more important tasks. In the late summer of 1944 between 500,000 and 800,000 workers were engaged on reconstruction work or expansion and dispersal programmes of armament industries. Second, there was a heavy drain on personnel and equipment

by air raid defence. Speer estimated that some 30 per cent of the total output of guns in 1944 were flak, between 50 per cent and 55 per cent of the electro-chemical industry was engaged in the manufacture of radar and signals equipment for defence against bomber attacks.

The coercive measures of the Nazis and strict discipline at the factories forestalled any uprising of the people. Morale undoubtedly suffered after heavy raids but the workers had no alternative but to do their duty. There was, however, a section of opinion in Germany which believed that the area attacks were worth while from the Allied point of view. It is interesting to record, at this point, the views of the German Air Ministry in April 1944 in a paper in which attention is drawn to the importance of terror attacks and suggesting that the terror attack on residential districts offered greater prospects of success than the pinpoint attack on industrial plants.

A.H.B.6 Trans.  
German Views  
on Effects of  
Allied Bombing  
pp. 1 - 2

Results of Attacks on Oil and Transportation  
Oil

1. Success of early attacks in 1944 and counter-measures initiated by Speer

Flensburg Docs.  
Vol. III  
Speer to Hitler  
30 June 1944 and  
28 Jul. 1944

On 22 June 1944, aviation fuel stocks in Germany had been reduced by 90 per cent. By July the repaired plants were yielding an output of 2,307 tons but after further attacks in the following week production dropped to a total of a mere 120 tons. Speer had always been worried about the vulnerability of oil plants and he considered it essential for the war effort to keep the hydrogenation plants in working order, but until 1944 there had been no severe shortage and the construction of synthetic oil plants to augment the meagre supplies of mineral oil had proceeded as planned. Speer warned Hitler periodically from June onwards of the effect which the shortage of fuel would have on operations on the ground and in the air. Edmund Geilenburg was appointed Commissioner General for Immediate Measures and given extensive powers to enable him to restore normal output of the oil plants. Additional protection of the plants such as flak, dummy sites, artificial smoke screens, and above all fighter protection was to be provided. A labour force was to stand by at plants so that repairs could be made quickly, 'even if the enemy return the next day and smash things up again'. But the necessary fighter force was never forthcoming. The latest fighter aircraft, including the new jet aircraft, were equipped for offensive or ground attack roles.<sup>(1)</sup> The intensified effort at the factories failed to augment the front line fighter strength and contrary to Speer's pleas for more fighters, the flak programme was given higher priority than fighter production.

Ibid  
Speer to Hitler  
30 Aug. 1944

Hamburg Docs.  
Vol. 88  
pp. 3813-3820

A.H.B./IIG/29  
ADI(K)  
Rept. No.  
373/1945

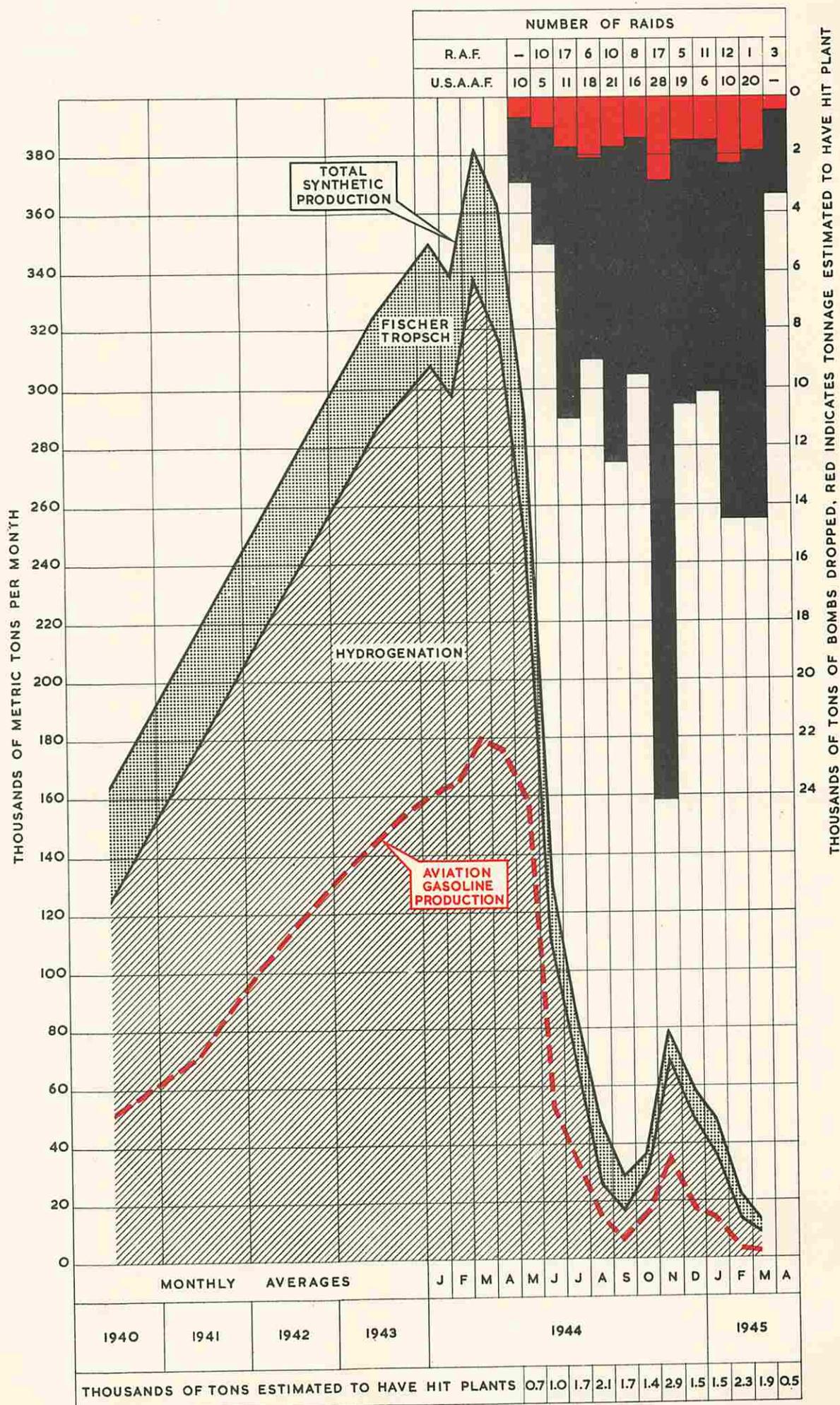
2. Decline in Oil Production in Summer of 1944

The figures of oil production quoted by Speer in his letters to Hitler during the summer and autumn of 1944 demonstrate graphically the steady decline in oil production. They are believed to be the most authoritative of the German statistics captured by the Allies. The following table shows

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(1) There is an interesting account of Hitler's interference with the development of the Me.262 entitled: 'Hitler's Blitzbomber' by E. M. Emme (U.S. Air University Documentary Research Study).

# AVIATION FUEL PRODUCTION AND TONNAGE OF BOMBS DROPPED ON SYNTHETIC FACILITIES 1944 - 1945



the monthly figures for aviation, diesel and carburettor fuel (the latter used for motor transport) from April to December 1944. The average monthly production of aviation fuel for the first three months of the year had been in the region of 168,000 tons per month.

<u>Month</u>	<u>Aviation Fuel</u>	<u>Carburettor Fuel</u>	<u>Diesel Fuel and J2. (1)</u>
April	175,000	125,000	88,900
May	156,000	93,000	74,000
June	53,000	76,000	66,000
July	29,000	56,000	62,000
August	12,000	60,000	65,000
September	9,400	48,400	77,300
October	18,000	57,000	66,000
November	41,000	50,000	73,000
December	25,000	51,000	75,000

A.H.B./IIG/29  
A.D.I.(K)  
Rept. No.  
373/1945

Figures of consumption by the G.A.F. and the Army were invariably greater than those of production. In May 1944 171,700 tons were consumed by the G.A.F. and 124,300 tons of petrol by the Army together with 36,500 tons of diesel oil. By September consumption had dropped to 51,000 tons of fuel by the G.A.F. and 94,000 tons of petrol and 38,000 tons of diesel oil by the Army. By November the G.A.F. had expended 34,000 tons, the Army 65,400 tons of petrol and 31,500 tons of diesel oil.

Stocks of fuel in hand dwindled correspondingly. There were two main reserves of aircraft fuel. The O.K.W. Reserve and the Fuehrer's Reserve, the latter to be used only in special emergencies. Between May and November the O.K.W. Reserve was reduced from 107,000 tons to 30,000 tons while the Fuehrer's Reserve which had stood at 207,000 tons at the end of May seems to have been exhausted by November.

Flensburg Docs.  
Vol. III  
5 Oct. 1944

As may be seen the crisis month was September 1944(2) when production, according to Speer, stopped completely between 11 and 19 September. Speer hoped that with the onset of the autumn, bad weather would upset flying and would thus give his repair squads a breathing space in which to renovate plants and to build up stocks. Plants, he calculated, were usually re-attacked after a period of three weeks and that would provide an opportunity to strengthen the fighter defences. But the G.A.F. was now moribund and with the Allied insistence on maintaining attacks on oil together with navigational and bombing aids that made attacks through the overcast possible and the great weight of high explosive dropped by Bomber Command, Speer's efforts were doomed to failure.

Flensburg Docs.  
Vol. II.  
Speer Interrog.  
No.26 P.4

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- (1) J.2 fuel was a mixture of carburettor and diesel fuel for use in jet aircraft.
  - (2) Another blow to German oil stocks was the loss of Roumania at the end of August.

### 3. Effects of the Fuel Shortage on Air and Ground Operations

In 1943 the Wehrmacht began to suffer from a fuel shortage largely because of the unexpected length of the Russian campaign, but the situation became desperate in the autumn of 1944. The G.A.F. was affected in three ways: fuel allocations to operational units were substantially reduced; flying training by the end of 1944 practically came to a standstill,<sup>(1)</sup> curtailment of fuel supplies to aircraft manufacturers hampered the testing of new aircraft. Such stringencies were conducive to the operational inefficiency of aircraft and aircrew. Aviation fuel stocks were built up in France and the Low Countries prior to Overlord and at the end of April 1944 amounted to 574,000 tons. But by August after the heavy fighting in the Battle of France, flying was drastically cut down with the exception of fighter operations. Thus, the large number of new aircraft available could not be used. Conservation of fuel stocks in October and November enforced by strict economy measures enabled the G.A.F. to operate in some strength during the Ardennes Offensive and the New Year's Day Raid 1945.

The Army did not feel the pinch of the fuel shortage until the autumn of 1944, although the dislocated railway system of northwest Europe had caused a heavy expenditure of fuel by road transport. In Italy Kesselring had instituted economy measures which included hauling artillery and flak by oxen. Germans in key positions, such as Speer, Rundstedt and Bayerlein, all agreed that the fuel shortage seriously affected the prospects of the Ardennes counter offensive. Rundstedt suggested that two of the main causes for the failure of the offensive were, firstly, lack of fuel and the failure to bring up available petrol in time and, secondly, the inexperience of tank and lorry drivers because of lack of fuel required for their training. Speer admitted that formations had only one or two fuel supply units at the beginning of the attack. When the railways west of the Rhine were dislocated fuel was carried long distances by road transport and as 'neither lorries nor petrol were available the supplies themselves proved insufficient'.

On the Eastern Front the situation was no better. Speer and Jodl (in charge of operational plans at O.K.W.) both agreed that the collapse of the German front in Silesia in January 1945 was due to the lack of fuel. At Baranow the Germans had assembled 1,200 tanks with which to stem the Russian drive across the Vistula but they were unable to deploy them because no petrol or oil was available.

#### Transportation

##### 1. The Dependence of Industry on Transportation

Both Speer and Wagenfuehr considered that transportation was essential to the thriving of the German war economy. Once the Allied Air Staffs began to choose transportation targets scientifically, coal and steel production and hence the whole armament industry became severely affected. Thus Speer stated, on 2 June 1944, that the maintenance of the transportation system was second in importance to oil; should transport be curtailed by as much as 20 per cent the output of industries dependent on Ruhr coal would inevitably be lowered. On 8 November after the heavy attacks on Ruhr industries and transportation Speer stated that: 'transport governs us all' and insisted that transport of coal must have absolute priority in the new Battle of the Ruhr.

(1) Air training had been the first to suffer from fuel cuts. In June 1943 only 60 - 70 per cent of the supplies demanded for the training were granted.

A.D.I.(K) Rept.  
No.374/1945  
and IA/21,  
Pp. 29 -  
83

A.H.B./IA/21  
Sect. XIII  
and Speer  
Interrog. Rept.  
No.26.

Wagenfuehr  
p.46

Hamburg Docs.  
Vol.88  
pp.3813-3820

Ibid  
Vol.100  
pp.3525-3531

2. Success of the French Transportation Plan

A.H.B.6. Trans.  
VII/125

The plan upon which depended the establishment of the Anglo-U.S. forces in Normandy and which itself had been dependent upon the gaining of air superiority in western Europe vindicated the beliefs of its promoters. The enemy was compelled to recognize that the attacks against rail communications had been planned by experts fully conversant with the running of the German railways. To quote from a report of the German Air Ministry dated 13 June 1944: 'the raids carried out in recent weeks have caused the breakdown of all main lines; the coastal defences have been cut off from the supply bases in the interior, thus producing a situation which threatens to have serious consequences. Although even the transportation of essential supplies for the civilian population have been completely stopped for the time being and only the most vital military traffic is moved large scale strategic movement of German troops by rail is practically impossible at the present time and must remain so while attacks are maintained at their present intensity'.<sup>(1)</sup> Moreover repair work was never completely successful because of the frequency of repeat attacks. The maintenance and overhaul of locomotives had also been interrupted.

The above description makes the controversy that arose in the planning of transportation attacks before and after Overlord, between those who advocated the method of 'attrition' and those who supported the method of 'interdiction' seem academic and profitless.<sup>(2)</sup> The French and Belgian railways collapsed because the machinery necessary for the organization, regulation and marshalling of traffic broke down. Like a human body a railway system is a vast organization which depends for its efficiency on thousands of human beings handling almost innumerable component parts in a well knit time schedule. Such a system is highly susceptible to delay, disorganization and dislocation if the normal routine is disturbed. It is doubtful whether the interdiction of the battlefield in Normandy could have succeeded adequately had the railway system as a whole not been crippled.

3. Attack on Transportation in Germany

Wagenfuehr  
p. 48

German transport authorities were confident in the ability of the German railway system to function under heavy bombing after the German withdrawal from France. There was a surplus of labour supplemented by conscripted foreign labour to maintain tracks; stocks had been conserved; coal was given priority at the expense of household goods; it was anticipated that the integrated system of railways and canals would ensure unlimited mobility; it was believed that the coming autumn and winter weather would make precise attacks difficult. The authorities did not foresee, that while the German railway system was more resilient than that of the French, Allied air offensive power, hitherto directed at targets over a wide area, could now be concentrated on small, compact industrial areas such as the Ruhr or the Saar Palatinate.

Ibid  
pp. 50-51

- (1) Narrator's underlining.  
(2) i.e. the A.E.A.F. transportation plan ('attrition') as opposed to the SHAEF (G.2) Plan ('interdiction'). See SHAEF/561 GK/5/Int 'Use of Air Power against Military Transport and Supplies'.

Speer  
Interrogations  
Rept. No. 35

It was, of course, the Ruhr which suffered most of all from the transportation attacks because it was impossible to despatch coal and steel from that area to the rest of Germany. In 1943 an average of 19,900 wagons of coal was shifted daily in the Ruhr, but in the first week of October 1944 the allocation had fallen to 8,700 and 7,700 wagons because of air attacks. By March 1945 the daily allocation of wagons dropped from two to three thousand wagons per day and there was no coal coming from Upper Silesia to supplement depleted stocks.

Ibid

The winter coal reserve of the German railways was thus rapidly consumed. On 10 September 1944, the reserve stood at 1,839,750 tons which was expected to last for 19 days. Two months later, on 5 November, it had fallen to 1,026,520 tons and was due to last not more than ten days. The winter reserves had been reduced by 813,000 tons, even before the crisis caused by the heavy bombing of the Ruhr in October.

Wagenfuehr  
p. 50

Speer  
Interrogations  
6th Session  
p. 4.

The raids on the Dortmund-Ems and Mittelland canals precluded an alternative system of transportation of heavy goods. Meanwhile other waterways became frozen in the winter and the Mulheim bridge at Cologne which collapsed after an U.S.ST.A.F. raid hindered shipping on the Rhine. Speer remarked at the end of the war that too long an interval elapsed between raids on the canals. Coal barges assembled in the Ruhr were rushed through in the two or three days' grace given between the completion of repairs and the next bombing, making it possible to maintain both industrial production in central Germany and the gas supply of Berlin which was dependent on the Ruhr.

By December 1944 Speer and his colleagues concluded that transportation rather than oil was the main cause of industrial collapse. The raids on the Ruhr had reduced the daily despatch of coal wagons from that area from 20,000 to six thousand; this total was less than one third of the figure originally considered as essential for war production. Speer urged that the defence of the Ruhr should be the primary consideration because it then produced at least half of Germany's armaments. He tried to arrange a closer liaison between the manufacturers and the front line troops so that equipment would literally pass direct from factory to the battlefield.

Wagenfuehr  
pp. 47-48

Within the first two months of 1945 what was known to Allied and German railway experts alike as a 'railway desert' had been created. The railway repair force had risen from 140,000 to 300,000 men. Then followed the concentrated attack on railways and bridges on the periphery of the Ruhr. By early March only one outward bound line from the Ruhr through Paderborn and Hildesheim was operating. The arteries had now become blocked. Delays in the turn-round of goods wagons increased because of the lack of motor transport to distribute loads from the sidings; trains had actually to stop through lack of coal; it became impossible to repair rail facilities before further bombing. The disruption of the railways and the collapse of the entire economy were so complete that cause and effect were barely distinguishable.

Conclusion.

Air Staff SHAEF  
Rept on Air Ops  
10 Oct 1944 -  
9 May 1945.  
p. 42.

To sum up: the air offensive launched at the enemy's war potential succeeded in the round in restricting the general war production of the enemy which would have enabled him to keep his armies in the field and fight successfully a

defensive battle. This result was achieved on what broadly may be termed strategic lines. In the field of tactical air support the heavy bomber force, whenever urgent priorities so dictated, provided a measure of air to ground co-operation without which the task of the Allied ground forces would have been immeasurably more difficult and their casualties imponderably higher. However, the basic contribution of the Air Forces to the winning of the war is clearly to be found, not in air to ground co-operation, but rather in the smashing of the enemy's war potential. On both a long term and a far reaching basis, the results of the implementation of this policy could never be immediate. The cumulative effect, however, is undeniable, as the most cursory study of the evidence reveals.

EXPANSION AND RE-EQUIPMENT OF BOMBER COMMANDAND SUPPLY OF TRAINED AIRCREWMARCH 1945 - MAY 1945Expansion and Re-equipment in 1944A.H.B./  
ID8/516A  
Pt.I

The aircrew position in Bomber Command on 31 March 1944 is summarised in the table below.

Role of Employment	Type of Aircraft	No. of standard sized Sqdns.	CREW POSITION					Planned No. of squadrons at end of Sept. 1944
			Estab-lishment	Nett Strength	Nett Surplus or Deficit	Head-less (1) crews	Estimated Nett Surplus or Deficit end of Sept. 1944	
Strategic Hvy. Bomber	Halifax II, III, V	24	692	575	-117	46	131	22
	Lancaster I, III, X	38	1,099	) 1,057	-186	29	109	49
	Lancaster II	5	144		) 105	-25	5	-
	Stirling	4½	130	105		-25	2	-
	Total	71½	2,065	1,737	-328	82	240	71
Medium Bomber	Wellington	-	-	-	697	-	-	-
Light Bomber	Mosquito	5	115	127	12	1	-38	8

A.M. File  
C.36738/48  
Pt.I  
Encl. 95B

In April 1944, as a result of a revised wastage rate which made it necessary to provide for increased aircrew replacements during the summer months, Bomber Command considered how to increase O.T.U. and H.C.U. capacity without affecting front line strength too much. Conclusions were based on a rate of aircrew wastage amounting to seven crews per squadron per month in summer and six aircrew per squadron per month in winter combined with an expansion for a total of 84 heavy squadrons by the end of 1944.

Ibid  
95A

Bomber Command's proposals regarding aircrew requirements for 1944 were submitted to Air Ministry on 19 April and were as follows:-

(i) Heavy Conversion Units

- (a) Increase of the existing nine Halifax Squadrons from 32 to 36 U.E. each.
- (b) Increase of the existing six Stirling Squadrons from 36 to 40 U.E. each.
- (c) Formation of a new Halifax H.C.U. at 36 U.E. in July 1944.
- (d) Formation of two further H.C.U.s in September and October respectively thus making a grand total of 18 H.C.U.s by the end of 1944.

(1) Crews without a captain.

(ii) Operational Training Units

(e) Formation of the equivalent of one standard O.T.U. in June 1944 by:-

(i) new  $\frac{3}{4}$  O.T.U.s at Husbands Bosworth and Gamston

(ii) reducing Nos.14 and 82 O.T.U.s at Market Harborough and Ossington from full to three-quarter size.

(f) Formation of two additional O.T.U.s in August or September 1944.

(g) Formation of threequarter O.T.U. at Leicester East in September and the reduction of No.19 O.T.U. to threequarter size when this O.T.U. re-equipped with Wellingtons.

(h) Increase of Nos.10 and 16 O.T.U.s each from threequarter to full size when runway construction was completed at Abingdon and Upper Heyford making a total of 24 O.T.U.s by the end of the year.

Ibid  
Encl 99A and  
A.H.B./ID8/120  
Pt. I

The Director General of Organization approved these proposals on 2 May as follows:-

(i) Aircraft establishment of existing H.C.U.s was to be increased by four aircraft each.

(ii) Formation of an O.T.U. in June and of a Halifax O.T.U. in July.

(iii) The programme for the remainder of the year to be used as a tentative programme for planning purposes but to be held constantly under review.

A.H.B./ID8/516A  
Pt. I

The aircrew position in Bomber Command on 3 June is contained in the following table.

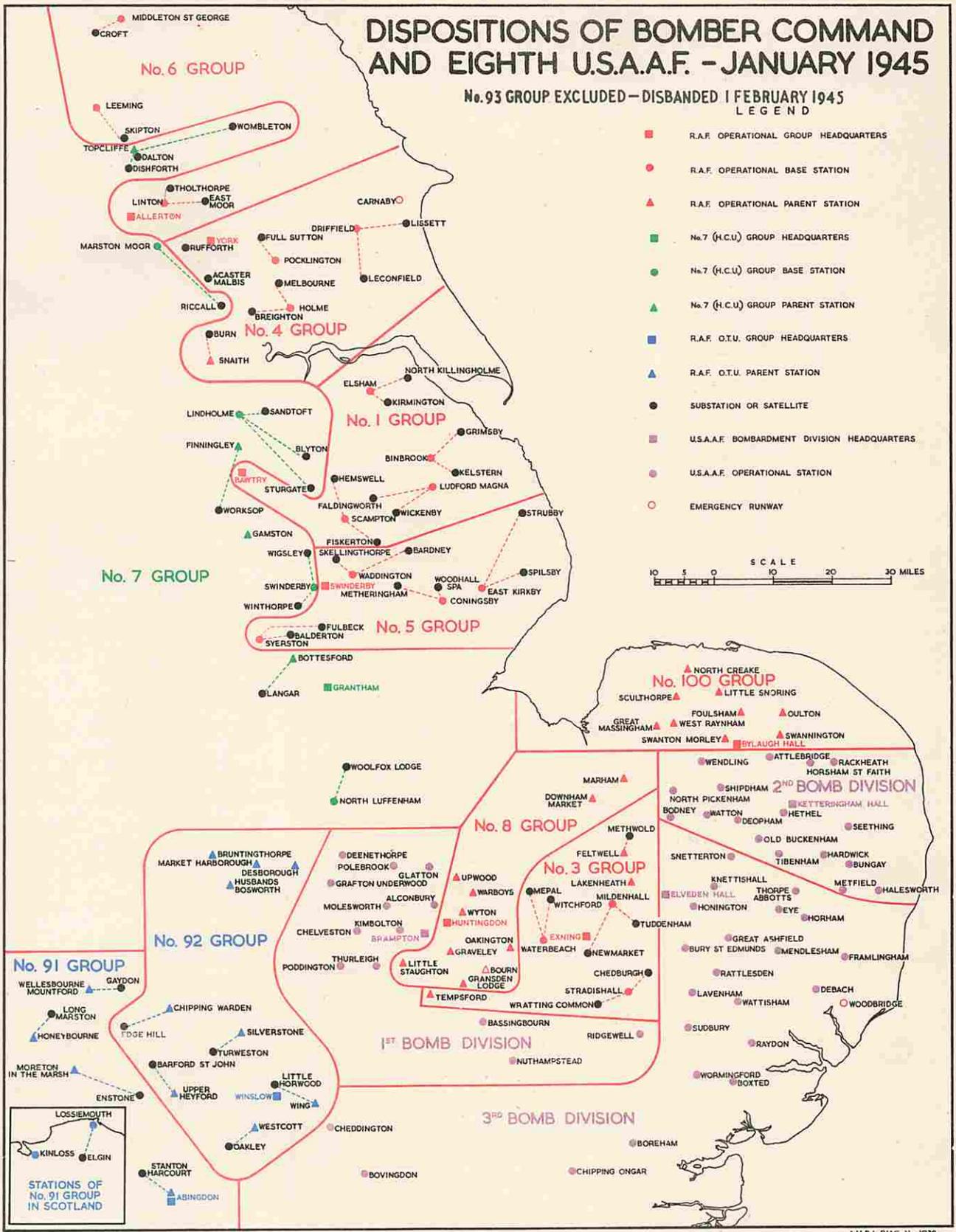
Role of Employment	Type of Aircraft	No. of Standard sized Sqdns.	CREW POSITION					Planned No. of squadrons at end of Nov. 1944
			Establishment	Nett Strength	Nett Surplus or Deficit	Headless crews	Estimated Nett Surplus or Deficit at end of Nov. 1944	
Strategic Hvy. Bomber	Halifax II, III, V	26	750	774	24	42	212	26
	Lancaster I, III, X	41	1,186	1,197	) 11	74	194	53
	Lancaster II	2½	72	72	)			
	Stirling	2	58	58	-	2	-	-
	Total	71½	2,066	2,101	35	118	406	79
Medium Bomber	Wellington	-	-	-	Reserves 693	693	1,179	-
Strategic Light Bomber	Mosquito	6½	202	147	-55	-	-6	10

A.H.B./  
ID7/167(D)

From July 1944 onwards one of the main concerns of the War Cabinet was to pare down manpower in the services as far as was consistent with the situation prevailing in the West - for by then, due to commitments on other fronts, stocks of manpower

# DISPOSITIONS OF BOMBER COMMAND AND EIGHTH U.S.A.A.F. - JANUARY 1945

No. 93 GROUP EXCLUDED - DISBANDED 1 FEBRUARY 1945  
LEGEND



LOSSIEMOUTH  
KINLOSS  
ELGIN  
STATIONS OF No. 91 GROUP IN SCOTLAND



A.M. File  
C.36738/48  
Pt. I  
Encl. 116A

were perilously low. On 23 September the Commander-in-Chief Bomber Command was informed that his heavy bomber squadrons were not to exceed a strength of 85 squadrons (56 Lancaster and 29 Halifax) by December 1944, but that as the heavy bomber requirements for the war with Japan were to be greatly reduced it was necessary in the meantime to decrease his training organization by taking the following measures:-

- (i) Increasing the number of Lancaster Finishing Schools from  $3\frac{1}{4}$  to  $3\frac{1}{2}$  in November 1944 and reducing them to two in June 1945.
- (ii) Reducing the number of medium bomber O.T.U's to 15 in November/December 1944 and to six during the month of March 1945.
- (iii) Reducing the number of H.C.U's from 17 to  $19\frac{1}{2}$  as follows:-

$16\frac{1}{2}$  in January 1945  
 $15\frac{1}{2}$  in February 1945  
 $14\frac{1}{2}$  in March 1945  
 $9\frac{1}{2}$  in May 1945

It was expected that the target date for the end of the war with Germany (then expected to be the close of 1944) would be advanced, which would, of course, entail a more rapid contraction of Bomber Command's training organisation.

#### Increase in Strategic Light Bombers

A.H.B./  
ID8/120  
Pt. I

An important feature of Bomber Command's expansion in 1944 lay in the increase in Mosquito Bomber squadrons. When expansion plans for the year were being considered in the spring of 1944, it was suggested that the unarmed Mosquito Bomber squadrons should be increased from seven to ten. The Deputy Chief of Air Staff, amongst others, believed that a very large strategic light bomber force should be built up and that if manpower resources were inadequate 'it would be better to forego a heavy bomber squadron or two of the most obsolete type'. He quoted in support of his argument the low loss rate of the Mosquito and the high bomb tonnage dropped on Germany for every Mosquito shot down in comparison to the Lancaster. While doubtful that the Mosquito would ever prove to be a substitute for the heavy bomber, the Vice Chief of Air Staff agreed, but he did not consider manpower resources permitted expansion beyond ten squadrons. The Chief of Air Staff hoped that when Bomber Command realised the advantages of day bombing in the conditions of the summer of 1944 heavy bomber losses would drop and enable the ratio of expansion to improve.

A.M. File  
S.67148  
Mins. 176 - 184

On 22 October 1944 Bomber Command asked for an increase of four Mosquito Bomber squadrons to be provided, over and above the Mosquito force already approved. At that date there were two Oboe Mosquito squadrons in No.8 Group at 30 U.E. and six Bomber squadrons at a U.E. of 20, one of which was on loan to No.5 Group. An additional squadron was to form at the end of October. On 6 December the Expansion and Re-equipment Committee approved the following programme. Bomber Command would be increased by two squadrons in December 1944 and by one each in January and February 1945. The commitment was to be met by Canadian-built Mosquitoes. Bomber Command, for its part, undertook

to roll up two existing Halifax squadrons in order to find the manpower for the new squadrons.

Ibid  
Encl. 157  
et seq:

In the summer of 1944 Bomber Command asked for an increase in the aircrew establishment of all Mosquito Squadrons in No.100 Group, from 10 to 14 crews per flight, i.e. from 20 to 28 crews per squadron. Their request was based on a monthly squadron effort of 200 sorties which, it was considered, would be the minimum required to support the heavy bomber effort during the winter months. The importance of their work, particularly in view of the strong night fighter defences over Germany and the exacting tasks demanded of the pilots in their deep penetrations into enemy territory was stressed and was strongly supported by the Directorate of Bombing Operations. But at that stage of the war it was difficult enough to scrape together the additional crews. The request was approved by the Director General of Organization for a short while but was withdrawn after representations had been made by the Air Member for Training.

A.H.B./  
ID8/516A  
Pt. I

At their meeting on 4 October 1944 the E.R.P. Committee, after further requests from Bomber Command, decided

- (i) to raise the crew establishment of the Bomber Support (Mosquito) squadrons from 20 to 23 in Flights.
- (ii) That the Aircrew State Committee should each month allocate the following month's O.T.U. outputs between Bomber Support squadrons and in night fighters in A.E.A.F. with a bias in favour of maintaining the Bomber support squadrons at 23 crews.
- (iii) That any surplus crews in No.100 Group should be transferred forthwith to A.D.G.B.

Scaling down of the Training Organization

December 1944 saw Bomber Command at the peak of its strength with 85 heavy squadrons and 17 Mosquito squadrons for bombing and bomber support. The increasing shortage of manpower precluded further expansion and no more squadrons were formed in 1945. By that time a falling loss rate and reduced aircrew wastage enabled the training organization to be substantially reduced, which allowed the operational effort to be maintained and even increased up to the very end. The table below shows the position on 29 December 1944.

Role of Employment	Type of Aircraft	No. of Standard sized Sqdns.	CREW POSITION				Estimated Nett Surplus or Deficit by May 1945	Planned No. of Squadrons at end of May 1945
			Estab <sup>m</sup> lishment	Nett Strength	Nett Surplus or Deficit	Head <sup>l</sup> less Crews		
Strategic Hvy. Bomber	Hallifax	27	783	873	90	15	28	17
	Lancaster	58	1,682	1,788	106	57	7	66
	Total	85	2,465	2,661	196	72	35	83
Strategic Light Bomber	Mosquito	10	289	316	27	-	25	14
Bomber Support	Mosquito	7	161	169	8	-	25	11
Light Fighter	Mosquito	15	345	395	50	-	23	10
	Total	32	795	880	85	-	73	35

A.M. File  
C.36738/48  
Pt. I  
Encl. 125A

By 1 November 1944 the Air Staff had reviewed the air-crew situation in the light of the stalemate on the Western Front when it was clear that the war was not likely to be concluded by the end of that year. They decided that full Phase I (German war) crew replacement was to continue until June 1945; secondly, that expansion would conform to the scaling down of aircraft production in accordance with the latest figures from M.A.P. They proposed that two Lancaster Finishing Schools should be closed down together with  $2\frac{1}{2}$  H.C.U's and  $2\frac{1}{4}$  O.T.U's thus reducing the overall capacity to

$1\frac{1}{2}$  Lancaster Finishing School  
 $14\frac{1}{2}$  H.C.U's  
12 O.T.U's

Ibid  
Encl. 132A

On 21 November instructions were sent to Bomber Command with regard to the re-equipment and disbandment of H.C.U's as follows:-

- (i) Disbandment of No.1657 (Stirling) H.C.U. with effect from 8 December 1944. Intakes ceased on 3 November 1944.
- (ii) Re-equipment of No.1669 H.C.U. from 18 U.E. Halifax II/V and 18 U.E. Lancaster I/III to 32 U.E. Lancasters I/III with effect from 24 November 1944.
- (iii) Re-equipment of No.1666 (R.C.A.F.) H.C.U. from 36 U.E. Halifax III to 36 U.E. Lancasters I/III with effect from 1 December 1944.
- (iv) Deletion of 6 U.E. Lancaster I/III/X from No.1664 (R.C.A.F.) H.C.U. with effect from 15 December 1944.

These figures allowed for the transfer of 240 Halifax and Wellington crews to Transport Command. There would be approximately 60 surplus Halifax crews between May and June 1945 and a further 180 thereafter. There would also be 480 Lancaster crews surplus to Bomber Command's requirements in July 1945 which could be used towards the expansion of Transport Command.

Ibid  
Encl. 127A

Instructions had been issued by Bomber Command to cease intakes to three O.T.U's (the equivalent of  $2\frac{1}{2}$ ) in November - dates of disbandment 10 weeks later - and to increase No.10 O.T.U. to full size by 28 November thus reducing the overall total to 12.

A.H.B./  
IIH/241/7/  
133

By November 1944 the H.C.U's, hitherto under control of Operational Groups, were concentrated under a single new Group Headquarters - No.7 (H.C.U.) Group.(1) Thus all operational and crew training was eventually organized in four Training Groups - Nos.7, 91,(2) 92, 93 - and operational groups were left free to devote their energies to the conduct of the bomber offensive.

A.M. File  
C.36738/48  
Pt. II  
Encl. 11A

On 6 April 1945 it was decided that  $3\frac{1}{2}$  O.T.U's (Nos.12, 27, 29, 30) were to stop intaking on 17 April and cease flying by 12 June. No.1663 (Halifax) H.C.U. was to cease intaking on 13 April and to cease flying by 18 May. At this

- 
- (1) The Group was reformed on 20 September 1944 at Grantham. It had been dissolved in May 1942.
  - (2) No.91 Group had been disbanded by 1 February, 1945.

time, too, Bomber Command was to revert from a 120 point tour to a 30 sorties tour by the end of April. This entailed an estimated 200 crews becoming tour expired by that time. Pathfinder Force aircrews held to a 45 sortie operational tour.

By mid-December 1944 the British manpower situation on the Western Front was so serious that the Prime Minister decided to reinforce the Army by a quarter of a million men, partly to be drawn from civilian employment and partly from the Royal Navy and the R.A.F. On 26 February Mr. Churchill asked for plans showing a reduction in air strength for the latter part of 1945. The principle adopted by the Air Staff when drawing up their estimates was that the striking force of Bomber Command should be kept at full strength until 30 June 1945 by which time it was expected that German resistance would have ceased or be negligible. As a result of a meeting held by the Chief of Air Staff on 23 March, at which all Air Officers Commanding Home Commands were present, it was decided amongst other things to cut down Bomber Command by three Halifax squadrons by the end of June at the rate of one squadron a month beginning in April, in addition to No.578 Squadron which had already been disbanded. The strength of the Mosquito bomber force was to be limited to 12 squadrons and no further expansion was to be undertaken. The Air Staff expected to save by these economy measures in addition to normal decreases in establishments 3,000 men from squadrons and 7,000 from H.C.U's and O.T.U's.

On 30 March 1944 the aircrew position in Bomber Command stood thus:-

Role of Employment	Type of Aircraft	No. of Standard sized Sqdns.	CREW POSITION				
			Establishment	Nett Strength	Surplus or Deficit	Headless crews	Nett Surplus or Deficit
Strategic Hvy. Bomber	Halifax	21	606	623	17	26	17
	Lancaster	622	1,806	2,158	352	103	352
	Lincoln						
	Total	832	2,412	2,781	369	129	369
Strategic Light Bomber	Mosquito	12	347	374	27	-	27
Bomber Support	Mosquito (Bomber Cmd.)	7	168	166	- 2	-	- 2
	(Fighter Cmd.)	5	115	137	22	-	22
Night Fighter	Fighter Cmd.	3	69	81	12	-	12
	2nd T.A.F.	6	138	157	19	-	19
	Total	21	490	541	51	-	51

#### Summary

During the summer of 1944, no less than 700 four-engined aircraft and over 1,200 medium types were engaged exclusively on crew training, more than 1,700 officers and 25,000 other ranks being employed in the H.C.U's and L.F.S's alone. This effort was a large proportion of the total resources available to Bomber Command, but that it was necessary, and justified, is proved by the fact that the operational effort was progressively increased throughout the war in spite of losses amounting to nearly 44,000 killed, some 4,000 injured and more than 10,000 prisoners of war, as well as the need for the continuous

replacement of surviving, but tour-expired, aircrews with fresh personnel.(1)

The strength and hitting power of the combined Anglo-American strategic air force at its peak consisted of 3,200 heavy and over 400 light bombers, capable of lifting a load of just under 20,000 tons of bombs. Of this total, 106 squadrons containing nearly 2,000 heavy bombers and all the light bombers, belonged to Bomber Command which, during the most intensive phase, also employed round about 1,500 training aircraft to supply the front line with crews.

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(1) An account of the training organization of Bomber Command would be incomplete without referring to the important part played by O.T.U's and H.C.U's in bomber support operations with their diversionary attacks. A number of these operations are mentioned in the Narrative and additional material will be found in R.A.F. Signals History, Vol.VII, Chap. 15.

OPERATIONAL AIRCRAFT IN BOMBER COMMAND

CHANGES IN GROUPS 1944 - 1945

1944

No. 1 Group

Jan. Operating Lancaster I/III and Wellingtons.  
Mar. Wellingtons taken off operations.  
Dec. Ended year operating with Lancaster I/III

No. 3 Group

Jan. Operating with Stirling, Lancaster II, Lancaster I/III.  
Sept. Stirlings taken off operations.  
Oct. Lancaster II's taken off operations.  
Dec. Ended year operating Lancaster I/III's.

No. 4 Group

Jan. Operating Halifaxes II's and V's. Halifax III's began  
operating.  
May Halifax II's taken off operations.  
July Halifax V's taken off operations.  
Dec. Ended year operating Halifax III's.

No. 5 Group

Jan. Operating with Lancaster I and III's.  
April One squadron of Mosquito IV's began operating.  
July Mosquito XX's operating with Mosquito IV's.  
Oct. Mosquito XXV's operating with Mosquito IV's and XX's.  
Dec. Ended year operating with Lancaster I and III's and one  
squadron of Mosquito IV/XX/XXV.

No. 6 Group

Jan. Operating with Lancaster II's, Halifax II and V's,  
Lancaster X's and Halifax III's began operating.  
May Halifax V's taken off operations.  
June Halifax VII's began operating.  
July Halifax II's taken off operations.  
Aug. Lancaster II's taken off operations.  
Dec. Ended year operating Halifax III's and VII's and  
Lancaster X's.

No. 8 Group

Operating Lancaster I/III, Halifax II's and III's,  
Mosquito IV's and IX's, Mosquito XVI and XX began  
operating.  
Feb. Halifax II's taken off operations.  
Mar. Halifax III's taken off operations. Lancaster VI's  
began operating.  
May Lancaster VI's taken off operations.  
Sept. Mosquito IV taken off operations.  
Nov. Mosquito XXV began operating.  
Dec. Ended year operating with Lancaster I/III, Mosquito IX,  
XX and XXV's.

No.100 Group

Feb. Group formed. Operating with Mosquito II's and IV's, Halifax III's and Wellingtons.  
Mar. Mosquito VI's began operating.  
April Fortresses began operating.  
May Halifax III and Mosquito IV taken off operations.  
June Mosquito XIX and Stirlings began operating.  
Sept. Liberators began operating.  
Oct. Halifax III operating again. Mosquito V began operating.  
Dec. Ended year operating with Mosquito II's, V, VI, XIX, Halifax III, Stirlings, Fortresses, Liberators.

1945

No.1 Group

Jan.-April Operating with Lancaster I/III's.

No.3 Group

Jan.-April Operating with Lancaster I/III's.

No.4 Group

Jan. Operating with Halifax III's.  
Feb. Halifax VI began operating.  
April Ended month operating with Halifax III's and VI's.

No.5 Group

Jan.-April Operating with Lancaster I/III, Mosquito IV, XX, XXV.  
Mosquito IX and XVI began operating in January.

No.6 Group

Jan. Operating with Lancaster X, Halifax III and VII's.  
Feb. Lancaster I began operating.  
Mar. Lancaster III's began operating.  
April Ended month operating with Lancaster I/III's, X, Halifax III's and VII's.

No.8 Group

Jan.-April Operating with Lancaster I/III's, Mosquito IX, XVI, XX, XXV's.

No.100 Group

Jan.-April Operating with Mosquito II, IV, V, VI, XIX, Halifax III's, Stirlings, Fortresses, Liberators. Mosquito XXX began operating in January. Mosquito V taken off operations in January.

## BOMBER COMMAND ORDER OF BATTLE

As at 1800 hours 9th March, 1944.

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL.	NON-OFL		I.E. + I.R.	TYPE	ON UNIT CHARGE	
<u>No.1 Group</u>		<u>BAWTRY</u>				
12		WICKENBY	16 + 4	LANCASTER I & III	21	
100		GRIMSBY	16 + 4	LANCASTER I & III	21	
101		LUDFORD MAGNA	24 + 6	LANCASTER I & III	32	
103		ELSHAM WOLDS	16 + 4	LANCASTER I & III	21	
166		KIRKINGTON	24 + 6	LANCASTER I & III	31	
460 (RAAF)		BINBROOK	24 + 6	LANCASTER I & III	27	
550		N. KILLINGHOLME	16 + 4	LANCASTER I & III	20	
576		ELSHAM WOLDS	16 + 4	LANCASTER I & III	21	
625		KELSTERN	16 + 4	LANCASTER I & III	20	
626		WICKENBY	16 + 4	LANCASTER I & III	22	
	300 (Pol)	FALDINGWORTH	8 + 1	WELLINGTON X	10	
			8 + 1	LANCASTER I & III	11	To re-equip. 16 + 4 Lancs.
<u>No.3 Group</u>		<u>EMING</u>				
75 (N.Z.)		MEPAL	24 + 6	STIRLING	29	
90		TUDDENHAM	24 + 6	STIRLING	28	
149		LAKENHEATH	16 + 4	STIRLING	19	
199		LAKENHEATH	16 + 4	STIRLING	19	
	218	WOOLFOX LODGE	16 + 4	STIRLING	18	
15		MILDENHALL	16 + 4	LANCASTER I & III	21	
115		WITCHFORD	24 + 6	LANCASTER II	27	
514		WATERBEACH	24 + 6	LANCASTER II	28	
622		MILDENHALL	16 + 4	LANCASTER I & III	21	
138		TEMPSFORD	14 + 2	HALIFAX V	13	
(Special)						
161		TEMPSFORD	10 + 3	LYSANDER	6	
(Special)			6 + 0	HALIFAX V	7	
			6 + 0	HUDSON III/IIIA	5	2 Mk. I
<u>No.4 Group</u>		<u>YORK</u>				
10		MELEBOURNE	24 + 6	HALIFAX II	25	
				HALIFAX III	9	
102		FOCKLINGTON	24 + 6	HALIFAX II	26	
76 (±)	76 (±)	HOLME	24 + 6	HALIFAX III	30	Opl. two flights
				HALIFAX V	1	
77		ELVINGTON	24 + 6	HALIFAX V	20	
				HALIFAX II	6	
51 (±)	51 (±)	SNAITH	24 + 6	HALIFAX III	31	Opl. two flights only
				HALIFAX II	1	
158		LISSETT	16 + 4	HALIFAX III	25	
				HALIFAX II	1	
466 (RAAF)		LECONFIELD	16 + 4	HALIFAX III	19	
				HALIFAX II	3	
578		BURN	16 + 4	HALIFAX III	20	
640		LECONFIELD	16 + 4	HALIFAX III	20	
78		BREIGHTON	24 + 6	HALIFAX III	30	
<u>No.5 Group</u>		<u>SWINDERBY</u>				
9		BARNEY	16 + 4	LANCASTER I & III	21	
44		DUNHOLME LODGE	16 + 4	LANCASTER I & III	20	
49		FISKERTON	16 + 4	LANCASTER I & III	22	
50		SKELLINGTHORPE	16 + 4	LANCASTER I & III	20	
57		EAST KIRKBY	16 + 4	LANCASTER I & III	21	
61		CONINGSBY	16 + 4	LANCASTER I & III	22	
106		METTERINGHAM	16 + 4	LANCASTER I & III	21	
207		SPILSBY	16 + 4	LANCASTER I & III	21	
463 (RAAF)		WADDINGTON	16 + 4	LANCASTER I & III	21	
467 (RAAF)		WADDINGTON	16 + 4	LANCASTER I & III	18	
619		CONINGSBY	16 + 4	LANCASTER I & III	22	
630		EAST KIRKBY	16 + 4	LANCASTER I & III	21	
617		WOODHALL SPA	16 + 4	LANCASTER I & III	32	Special Tasks

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL.	NON-OFL		I.E. + I.R.	TYPE	ON UNIT CHARGE	
<u>No. 6 Group</u> <u>R.C.A.F.</u>		<u>ALLERTON</u>				
420		THOLTHORPE	16 + 4	HALIFAX III	20	
424		SKIPTON-ON-SWALE	16 + 4	HALIFAX III	20	
425		THOLTHORPE	16 + 4	HALIFAX III	22	
427		LEEMING	16 + 4	HALIFAX III	20	
				HALIFAX V	2	
429		LEEMING	16 + 4	HALIFAX III	32	
				HALIFAX V	1	
432		EAST MOOR	16 + 4	HALIFAX III	19	
				LANCASTER II	1	
433		SKIPTON-ON-SWALE	16 + 4	HALIFAX III	20	
419		MIDDLETON ST. GEORGE	16 + 4	LANCASTER X	1	Opl. Halifax II
428		MIDDLETON ST. GEORGE	16 + 4	HALIFAX II	13	
				HALIFAX II	17	
431		CROFT	16 + 4	HALIFAX V	20	
434		CROFT	16 + 4	HALIFAX V	21	
408		LINTON	16 + 4	LANCASTER II	20	
426		LINTON	16 + 4	LANCASTER II	20	
<u>No. 8 Group</u> <u>(P.F.F.)</u>		<u>HUNTINGDON</u>				
7		OAKINGTON	24 + 6	LANCASTER I & III	28	
				LANCASTER VI	1	
35		GRAVELEY	24 + 6	LANCASTER I & III	20	
				HALIFAX III	24	
				HALIFAX II	7	
83		WYTON	16 + 4	LANCASTER I & III	22	
97		BOURN	24 + 6	LANCASTER I & III	30	
156		UPWOOD	24 + 6	LANCASTER I & III	29	
405 (RCAF)		GRANDSEN LODGE	16 + 4	LANCASTER I & III	20	
105		MARHAM	16 + 2	MOSQUITO IX/XVI	22	
				MOSQUITO IV	1	
109		MARHAM	24 + 6	MOSQUITO IX/XVI	24	
				MOSQUITO IV	8	
139		UPWOOD	16 + 2	MOSQUITO IV/XX	12	
				MOSQUITO IX/XVI	6	
627		OAKINGTON	16 + 2	MOSQUITO IV	10	
692(±)	692(±)	GRAVELEY	16 + 2	MOSQUITO IV/XX	9	Forming
<u>No. 100 Group</u> <u>(S.D.)</u>		<u>WEST RAYNHAM</u>				
	141	WEST RAYNHAM	16 + 2	MOSQUITO II	13	
	169	LITTLE SNORING	16 + 2	MOSQUITO II	17	
				BEAUFIGHTER	4	
	239	WEST RAYNHAM	16 + 2	MOSQUITO II & V	18	
192		FOULSHAM	6 + 1	WELLINGTON X	7	
			3 + 0	MOSQUITO IV	3	
			8 + 2	HALIFAX III & V	10	
			1 + 0	ANSON	1	
515		LITTLE SNORING	16 + 2	BEAUFIGHTER II/I	10	
	214	SCULTHORPE	12 + 2	FORTRESS	21	

SECRET

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BOMBER COMMAND ORDER OF BATTLE

As at 1800 hours 1st June 1944

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL	NON-OFL		I.E. + I.R.	TYPE	ON UNIT CHARGE	
<b>No.1 Group</b>		<b>BAWTRY</b>				
12		WICKENBY	16 + 4	LANCASTER I & III	21	
100		GRIMSBY	16 + 4	LANCASTER I & III	20	
101		LUDFORD MAGNA	24 + 6	LANCASTER I & III	27	
103		ELSHAM WOLDS	16 + 4	LANCASTER I & III	20	
166		KIRMINGTON	24 + 6	LANCASTER I & III	29	
460 (RAAF)		BINBROOK	24 + 6	LANCASTER I & III	32	
550		N. KILLINBOLME	16 + 4	LANCASTER I & III	20	
576		ELSHAM WOLDS	16 + 4	LANCASTER I & III	20	
625		KELSTERN	16 + 4	LANCASTER I & III	18	
626		WICKENBY	16 + 4	LANCASTER I & III	22	
300 (Po1) ½	300(Po1) ½	FALDINGWORTH	16 + 4	LANCASTER I & III	19	One flt. opl.
<b>No.3 Group</b>		<b>EXNING</b>				
90(½)	90(½)	TUDDENHAM	24 + 6	LANCASTER I & III	11	Opl. 2 flts.
				STIRLING	22	Stirling
149		METHOLD	16 + 4	STIRLING	21	
	218	WOOLFOX LODGE	16 + 4	STIRLING	19	
15		MILDENHALL	16 + 4	LANCASTER I & III	16	
75		MEPAL	24 + 6	LANCASTER I & III	26	
115		WITCHFORD	24 + 6	LANCASTER I & III	28	
514		WATERBEACH	24 + 6	LANCASTER II	24	
622		MILDENHALL	16 + 4	LANCASTER I & III	20	
138 (S.D.)		TEMPSFORD	14 + 2	STIRLING IV (S.D.)		Opl. on Halifax
				HALIFAX V	17	
161 (S.D.)		TEMPSFORD	10 + 3	LYSANDER	11	
			6 + 0	HALIFAX V	7	
			6 + 0	HUDSON III/IIIA	7	Including 2 Mk.I
<b>No.4 Group</b>		<b>York</b>				
102		POCKLINGTON	24 + 6	HALIFAX III	32	
10		MELBOURNE	24 + 6	HALIFAX III	31	
51		SNAITH	24 + 6	HALIFAX III	29	
76		HOLME	24 + 6	HALIFAX III	31	
78		BREIGHTON	24 + 6	HALIFAX III	29	
158		LISSETT	24 + 6	HALIFAX III	31	
466 (RAAF)		LECONFIELD	16 + 4	HALIFAX III	19	To Driffield 4/6
578		BURN	24 + 6	HALIFAX III	31	
640		LECONFIELD	16 + 4	HALIFAX III	20	
77 (½)	77(½)	FULL SUTTON	24 + 6	HALIFAX III	21	Opl. one flight only
				HALIFAX II/V	3	One flt. Elving-
346 (FF)		ELVINGTON	16 + 4	HALIFAX V	23	ton Non-opl.
				HALIFAX II	1	To re-equip.
						Hal.III 10/6
<b>No.5 Group</b>		<b>SWINDERBY</b>				
9		BARDNEY	16 + 4	LANCASTER I & III	19	
44 (Rhod)		DUNHOLME LODGE	16 + 4	LANCASTER I & III	20	
49		FISKERTON	16 + 4	LANCASTER I & III	22	
50		SKELLINGTHORPE	16 + 4	LANCASTER I & III	19	
57		EAST KIRKBY	16 + 4	LANCASTER I & III	20	
61		SKELLINGTHORPE	16 + 4	LANCASTER I & III	18	
106		METHERINGHAM	16 + 4	LANCASTER I & III	18	
207		SPILSBY	16 + 4	LANCASTER I & III	20	
463 (RAAF)		WADDINGTON	16 + 4	LANCASTER I & III	21	
467 (RAAF)		WADDINGTON	16 + 4	LANCASTER I & III	20	
9		DUNHOLME LODGE	16 + 4	LANCASTER I & III	20	
630		EAST KIRKBY	16 + 4	LANCASTER I & III	20	
617		WOODHALL SPA	16 + 4	LANCASTER I & III	34	Special Tasks
				MOSQUITO VI	1	
83 (FFF)		CONINGSBY	16 + 4	LANCASTER I & III	20)	
97 (FFF)		CONINGSBY	16 + 4	LANCASTER I & III	20)	On loan from
627 (FFF)		WOODHALL SPA	16 + 2	MOSQUITO IV	22)	8 Group

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL	NON-OFL		I.E. + I.R.	TYPE	ON UNIT CHARGE	
<u>No.6 Group</u> (R.C.A.F.)		<u>ALLERTON</u>				
420		THOLTHORPE	16 + 4	HALIFAX III	20	
424		SKIPTON-ON-SWALE	16 + 4	HALIFAX III	20	
425		THOLTHORPE	16 + 4	HALIFAX III	19	
427		LEEMING	16 + 4	HALIFAX III	18	
429		LEEMING	16 + 4	HALIFAX III	19	
432		EAST MOOR	16 + 4	HALIFAX III	27	
433		SKIPTON-ON-SWALE	16 + 4	HALIFAX III	21	
426		LINTON	16 + 4	HALIFAX III	19	
431		CROFT	16 + 4	HALIFAX III	21	
434		CROFT	16 + 4	HALIFAX III	20	
408		LINTON	16 + 4	LANCASTER II	29	
419		MIDDLETON ST. GEORGE	16 + 4	LANCASTER X	20	
428		MIDDLETON ST. GEORGE	16 + 4	LANCASTER X HALIFAX II	4 19	Opl. on Hal. II
<u>No.8 Group</u> (P.F.F.)		<u>HUNTINGDON</u>				
7		OAKLINGTON	16 + 4	LANCASTER I & III	20	Includes 1 Mk. VI
35		GRAVELEY	16 + 4	LANCASTER I & III	20	
83				LANCASTER I & III		Detached to 5 Grp. (q.v.)
97				LANCASTER I & III		
156		UPWOOD	16 + 4	LANCASTER I & III	19	
405 (RCAF)		GRANDEN LODGE	16 + 4	LANCASTER I & III	20	Includes 2 Mk. VI
582		LITTLE STAUGHTON	16 + 4	LANCASTER I & III	20	
635		DOWNHAM MARKET	16 + 4	LANCASTER I & III	20	
105		BOURN	24 + 6	MOSQUITO IX/XVI	30	
109		LITTLE STAUGHTON	24 + 6	MOSQUITO IX/XVI	31	
				MOSQUITO IV	1	
139		UPWOOD	16 + 2	MOSQUITO IV/XX	10	
				MOSQUITO IX	4	
571		OAKINGTON	16 + 4	MOSQUITO IX/XVI	19	
				MOSQUITO IV		Detached to 5 Group
692		GRAVELEY	16 + 2	MOSQUITO IV/XX MOSQUITO XVI	11 4	
<u>No.100 Group</u>		<u>BYLAUGH HALL</u>				
141 (B.S.)		WEST RAYNHAM	16 + 2	MOSQUITO VI	16	Mk. II held
169 (B.S.)		LITTLE SNORING	16 + 2	MOSQUITO VI	15	Mk. II held
239 (B.S.)		WEST RAYNHAM	16 + 2	MOSQUITO II	17	1 Mk. VI
	85(B.S.)	SWANNINGTON	16 + 2	MOSQUITO XIX	18	
				MOSQUITO XVII	8	
	157(B.S.)	SWANNINGTON	16 + 2	MOSQUITO XIX	16	
				MOSQUITO II	3	
515 (B.S.)		LITTLE SNORING	16 + 2	MOSQUITO VI	17	Intruder
	23	LITTLE SNORING	16 + 2	MOSQUITO VI	16	Intruder
214 (B.S.)	214 (1/2)	OULTON	12 + 2	FORTRESS	10	Opl. one Flt. only
192 (B.S.)		FOULSHAM	8 + 2	HALIFAX III	9	
			6 + 1	WELLINGTON X	8	
			6 + 1	MOSQUITO IV	5	
			1 + 0	ANSON	1	
	199	NORTH CREAKE	16 + 4	STIRLING	20	

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BOMBER COMMAND ORDER OF BATTLE

As at 1800 hours 28th December 1944.

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL.	NON-OFL.		U.E.	TYPE	ON UNIT CHARGE	
<u>No.1 Group</u>		<u>BAWTRY</u>				
12		WICKENBY	20	LANCASTER I & III	24	
100		GRIMSBY	20	LANCASTER I & III	22	
101		LUDFORD MAGNA	30	LANCASTER I & III	34	
103		ELSHAM WOLDS	20	LANCASTER I & III	24	
150		HEMSWELL	20	LANCASTER I & III	23	
153		SCAMPTON	20	LANCASTER I & III	21	
166		KIRMINGTON	30	LANCASTER I & III	29	
170		HEMSWELL	20	LANCASTER I & III	22	
300 (Po1)		FALDINGWORTH	20	LANCASTER I & III	21	
460 (RAAF)		BINBROOK	30	LANCASTER I & III	30	
550		N. KILLINGHOLME	30	LANCASTER I & III	33	
576		FISKERTON	20	LANCASTER I & III	22	
625		KELSTERN	30	LANCASTER I & III	34	
626		WICKENBY	20	LANCASTER I & III	24	
<u>No.3 Group</u>		<u>EXNING</u>				
15		MILDENHALL	20	LANCASTER I & III	22	
75		NEPAL	30	LANCASTER I & III	30	
90(±)	90(±)	TUDDENHAM	30	LANCASTER I & III	25	2 Flts. Opl.
119		WITCHFORD	30	LANCASTER I & III	51	
149		METHWOLD	30	LANCASTER I & III	32	
186		STRADISHALL	20	LANCASTER I & III	23	
195		WRAPPING COMMON	30	LANCASTER I & III	31	
218		STRADISHALL	30	LANCASTER I & III	31	
514(±)	514(±)	WATERBEACH	30	LANCASTER I & III	31	2 Flt. Opl.
622		MILDENHALL	20	LANCASTER I & III	20	
138 (S.D.)		TEMPSFORD	16	STIRLING IV (S.D.)	17)	
161 (S.D.)		TEMPSFORD	3	LYSANDER	4)	Special Duty Squadrons
			6	STIRLING IV	7)	
				HUDSON III/IIIA	7)	
<u>No.4 Group</u>		<u>YORK</u>				
10		MELBOURNE	30	HALIFAX III	29	
51		SNATH	30	HALIFAX III	28	
76		HOLME	30	HALIFAX III	31	
77		FULL SUTTON	30	HALIFAX III	29	
78		BREIGHTON	30	HALIFAX III	32	
102		POCKLINGTON	30	HALIFAX III	32	
158		LISSETT	30	HALIFAX III	30	
346 (FF)		ELVINGTON	20	HALIFAX III	21	
347 (FF)		ELVINGTON	20	HALIFAX III	21	
466 (RAAF)		DRIFFIELD	20	HALIFAX III	20	
578		BURN	20	HALIFAX III	28	
640		LECONFIELD	20	HALIFAX III	20	
<u>No.5 Group</u>		<u>SWINDERBY</u>				
9		BARDNEY	20	LANCASTER I & III	20	
44 (Rhod)		SPILSBY	20	LANCASTER I & III	20	
49		FULEBECK	20	LANCASTER I & III	20	
50		SKELLINGTHORPE	20	LANCASTER I & III	20	
57		EAST KIRKBY	20	LANCASTER I & III	21	
61		SHELLINGTHORPE	20	LANCASTER I & III	20	
106		METHERINGHAM	20	LANCASTER I & III	20	
189		FULEBECK	20	LANCASTER I & III	20	
207		SPILSBY	20	LANCASTER I & III	20	
227		BALBERTON	20	LANCASTER I & III	22	
463 (RAAF)		WADDINGTON	20	LANCASTER I & III	20	
467 (RAAF)		WADDINGTON	20	LANCASTER I & III	22	
619		STRUBBY	20	LANCASTER I & III	22	
630		EAST KIRKBY	20	LANCASTER I & III	22	
617		WOODHALL SPA	20	LANCASTER I & III	30	Special Tasks
				MOSQUITO VI	1	
83 (PFF)		CONINGSBY	20	LANCASTER I & III	20)	On loan from
97 (PFF)		CONINGSBY	20	LANCASTER I & III	19)	8 Group.
627 (PFF)		WOODHALL SPA	20	MOSQUITO IV/XI/XVI	24)	Includes 3 Mk.2.

A.M.H.R.  
30.12.44

(89446) 296

SECRET

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL.	NON-OFL		U.E.	TYPE	ON UNIT CHARGE	
<u>No. 6 Group</u> (RCAF)		<u>ALLERTON</u>				
415		EAST MOOR	20	HALIFAX III	27	
420		THOLTHORPE	20	HALIFAX III	23	
425		THOLTHORPE	20	HALIFAX III	24	
427		LEEMING	20	HALIFAX III	24	
429		LEEMING	20	HALIFAX III	23	
408		LINTON	20	HALIFAX VII	23	Includes 4 Mk. I
426		LINTON	20	HALIFAX VII	24	Includes 5 Mk. I
432		EAST MOOR	20	HALIFAX VII	22	
424		SKIPTON-ON-SWALE	20	LANCASTER I/III	-	
				HALIFAX III	26	Operating Hal. I
433		SKIPTON-ON-SWALE	20	LANCASTER I/III	-	
				HALIFAX III	23	Operating Hal. I
419		MIDDLETON-ST-GEORGE	20	LANCASTER X	20	
428		MIDDLETON-ST-GEORGE	20	LANCASTER X	20	
431		CROFT	20	LANCASTER X	22	
434(±)	434(±)	CROFT	20	LANCASTER X	19	Opl. 1 Flt. Lancs.
				HALIFAX III	19	
<u>No. 8 Group</u> (P.F.F.)		<u>HUNTINGDON</u>				
7		OAKINGTON	20	LANCASTER I & III	19	
35		GRAVELEY	20	LANCASTER I & III	18	
83				LANCASTER I & III)		Detached to Grp. (P.V.)
97				LANCASTER I & III)		
156		UPWOOD	20	LANCASTER I & III	19	
405 (RCAF)		GRANDEN LODGE	20	LANCASTER I & III	18	
582		LITTLE STAUGHTON	20	LANCASTER I & III	17	
635		DOWNHAM MARKET	20	LANCASTER I & III	17	
105		BOURN	30	MOSQUITO IX/XVI	28	
109		LITTLE STAUGHTON	30	MOSQUITO IX/XVI	28	
128		WYTON	20	MOSQUITO XVI	16	
139		UPWOOD	20	MOSQUITO XX/25	25	Includes 5 Mk. XVI
142		GRANDEN LODGE	20	MOSQUITO 25	19	
162		BOURN	20	MOSQUITO IV/XX/25	17	
571		OAKINGTON	20	MOSQUITO XVI	21	
608		DOWNHAM MARKET	20	MOSQUITO XX/25	25	
627				MOSQUITO IV/XX		Detached to 5 Group
692		GRAVELEY	20	MOSQUITO XVI	22	
<u>No. 100 Group</u>		<u>BYLAUGH HALL</u>				
23 (B.S.)		LITTLE SNORING	18	MOSQUITO VI	21	
85 (B.S.)		SWANNINGTON	18	MOSQUITO 30	16	
141 (B.S.)		WEST RAYNHAM	18	MOSQUITO VI	21	
157 (B.S.)		SWANNINGTON	18	MOSQUITO XIX	24	
169 (B.S.)		GT. MASSINGHAM	18	MOSQUITO VI	19	
239 (B.S.)		WEST RAYNHAM	18	MOSQUITO 30	18	Mk. VI held
515 (B.S.)		LITTLE SNORING	18	MOSQUITO VI	23	
171 (B.S.)		NORTH CREAKE	20	HALIFAX III	20	
				STIRLING III	4	
192 (B.S.)		FOULSHAM	17	HALIFAX III	9	
			7	MOSQUITO IV	7	
			1	ANSON	1	
				WELLINGTON	6	
199 (B.S.)		NORTH CREAKE	20	HALIFAX III	4	Operating Stir.
				STIRLING	20	
214 (B.S.)	462(RAAF)	FOULSHAM	20	HALIFAX III	23	
		OULTON	20	FORTRESS III	17	
				FORTRESS II	6	
223 (B.S.)		OULTON	16	LIBERATOR	14	
B.S.D.U.		SWANTON MORLEY	6	MOSQUITO II/VI	7	Not included in Summary
			2	MOSQUITO XIX	2	
			1	MOSQUITO 30	1	

DISTRIBUTION

- |                      |                          |  |
|----------------------|--------------------------|--|
| 1. S. of S.          | 10. D.A.F.L.             | 20. A.S.P.2                            |
| 2. C.A.S.            | 11. D.D.B. Ops.          | 21. O.F.                               |
| 3. V.C.A.S.          | 12. D.D.O. (A) O.7.a.    | 22. Aircraft State Room                |
| 4. D.C.A.S.          | 13. D.D. Plans (E)       | 23. S.4 (Stats.)                       |
| 5. A.C.A.S. (Ops.)   | 14. Duty Group Captain   | 24. C.W.R.                             |
| 6. A.C.A.S. (P)      | 15. Admin. Plans 3       | 25. H.Q. B.C. (W/Cdr. Clifford Turner) |
| 7. A.M.S.O.          | 16. B. Ops. 2 (a)        | 26. File                               |
| 8. D.B. OPS.         | 17. B. Ops. 2 (b)        | 27. Spare                              |
| 9. D. of Ops. (Tac.) | 18. Mr. J. C. Nerney (2) | 28. Spare                              |
|                      | 19.)                     |  |

A.M.W.R.  
30.12.44

(89446)297

## BOMBER COMMAND ORDER OF BATTLE

As at 1800 hours 9th May 1945

UNIT		LOCATION	AIRCRAFT			REMARKS
OPL.	NON-OPL.		U.E.	TYPE	ON UNIT CHARGE	
<u>No.1 Group</u>		<u>RAWTRY</u>				
12		WICKENBY	20	LANCASTER I & III	23	
100		ELSHAM WOLDS	20	LANCASTER I & III	21	
101		LUDFORD MAGNA	30	LANCASTER I & III	35	
103		ELSHAM WOLDS	20	LANCASTER I & III	21	
150		HEMSWELL	20	LANCASTER I & III	23	
153		SCAMPION	20	LANCASTER I & III	19	
166		KIRKINGTON	30	LANCASTER I & III	33	
170		HEMSWELL	20	LANCASTER I & III	21	
300 (Po1)		FALDINGWORTH	20	LANCASTER I & III	19	
460 (RAAF)		BINBROOK	30	LANCASTER I & III	36	
550		N. KILLINGHOLME	30	LANCASTER I & III	31	
576		FISKERTON	30	LANCASTER I & III	32	
625		SCAMPION	20	LANCASTER I & III	18	
626		WICKENBY	20	LANCASTER I & III	22	
<u>No.3 Group</u>		<u>EXNING</u>				
15		MILDENHALL	20	LANCASTER I & III	24	
75		NEPAL	30	LANCASTER I & III	34	
90		TUDDENHAM	20	LANCASTER I & III	26	
115		WITCHFORD	30	LANCASTER I & III	35	
138		TUDDENHAM	20	LANCASTER I & III	22	
149		METHWOLD	30	LANCASTER I & III	33	
186(½)	186(½)	STRADISHALL	30	LANCASTER I & III	34	2 Flts. Opl.
195		WRATTING COMMON	30	LANCASTER I & III	34	
218		CHEDEBURGH	30	LANCASTER I & III	29	
514		WATERBEACH	30	LANCASTER I & III	30	
622		MILDENHALL	20	LANCASTER I & III	23	
<u>No.4 Group</u>						
<u>TRANSPORT COMMAND</u>						
346 (FAF)		ELVINGTON	20	HALIFAX VI	25)	Transferred to T.C. for admin- istration Future of sqdns. not yet decided. Excluded from summary.
347 (FAF)		ELVINGTON	20	HALIFAX VI	22)	
<u>No.5 Group</u>		<u>SWINDERBY</u>				
9		BARDNEY	20	LANCASTER I & III	22	
44 (Rhod.)		SPILSBY	20	LANCASTER I & III	22	
49		SYERSTON	20	LANCASTER I & III	22	
50		SKELLINGTHORPE	20	LANCASTER I & III	20	
57		EAST KIRKBY	20	LANCASTER I & III	21	
61		SKELLINGTHORPE	20	LANCASTER I & III	22	
106		METHERINGHAM	20	LANCASTER I & III	24	
189		BARDNEY	20	LANCASTER I & III	23	
207		SPILSBY	20	LANCASTER I & III	21	
227		STRUBBY	20	LANCASTER I & III	22	
463 (RAAF)		WADDINGTON	20	LANCASTER I & III	20	
467 (RAAF)		WADDINGTON	20	LANCASTER I & III	21	
619		STRUBBY	20	LANCASTER I & III	22	
630		EAST KIRKBY	20	LANCASTER I & III	22	
617		WOODHALL SPA	30	LANCASTER I & III	31	Special Tasks
83 (FFF)		CONINGSBY	20	LANCASTER I & III	21)	On loan from 8 Group Includes 10 Mk. IX/XVI.
97 (FFF)		CONINGSBY	20	LANCASTER I & III	23)	
627 (FFF)		WOODHALL SPA	20	MOSQUITO IV/XX/25 LANCASTER I/III	28) 1)	

UNIT		LOCATION	AIRCRAFT			REMARKS
OFL.	NON-OFL.		U.E.	TYPE	ON UNIT CHARGE	
<u>No.6 Group</u> (R.C.A.F.)		<u>ALLERTON</u>				
415		EAST MOOR	20	HALIFAX III	15	To re-equip Lanc. X w.e.f. 10.5.45.
408		LINTON	20	Halifax VII	5	
426		LINTON	20	HALIFAX VII	20	
432		EAST MOOR	20	HALIFAX VII	21	
424		SKIPTON-ON-SWALE	20	LANCASTER I & III	21	
427		LEEMING	20	LANCASTER I & III	22	
429		LEEMING	20	LANCASTER I & III	23	
433		SKIPTON-ON-SWALE	20	Halifax III	1	
419		LANCASTER I & III	23			
420		MIDDLETON-ST-GEORGE	20	Halifax III	1	
		LANCASTER X	20			
		THOLTHORPE	20	LANCASTER X	20	
		THOLTHORPE	20	Halifax III	10	
	425	LANCASTER X	20		18	
		Halifax III	20		20	
		LANCASTER X	20		19	
428		MIDDLETON-ST-GEORGE	20	LANCASTER X	20	
431		CROFT	20	LANCASTER X	20	
434		CROFT	20	LANCASTER X	20	
<u>No.8 Group</u> (P.F.F.)		<u>HUNTINGDON</u>				
7		OAKINGTON	20	LANCASTER I & III	21	Detached to 5 Grp. (q.v.)
35		GRAVELEY	20	LANCASTER I & III	24	
83				LANCASTER I & III)		
156		UPWOOD	20	LANCASTER I & III	24	
405(R.C.A.F.)		GRANSDEN LODGE	20	LANCASTER I & III	23	
582		LITTLE STAUGHTON	20	LANCASTER I & III	21	
635		DOWNHAM MARKET	20	LANCASTER I & III	23	
105		BOURN	30	MOSQUITO IX/XVI	32	
109		LITTLE STAUGHTON	30	MOSQUITO IX/XVI	32	
128		WYTON	20	MOSQUITO XVI	25	
139		UPWOOD	20	MOSQUITO XVI	15	
142				Mosquito XX/25	9	
162		GRANSDEN LODGE	20	MOSQUITO 25	20	
163		BOURN	20	MOSQUITO XX/25	22	
571		WYTON	20	MOSQUITO 25	20	
608		OAKINGTON	20	MOSQUITO XVI	23	
		DOWNHAM MARKET	20	MOSQUITO XVI	18	
				Mosquito XX/25	4	
627				MOSQUITO IV/XX/25		
692		GRAVELEY	20	MOSQUITO XVI	3	Detached to 5 Grp.
<u>No.100 Group</u>		<u>BYLAUGH HALL</u>				
23 (B.S.)		LITTLE SNORING	18	MOSQUITO VI	19	Incl. 1 Mk. VI Incl. 1 Mk. 30 Opl. on Mosq. VI
85 (B.S.)		SWANNINGTON	18	MOSQUITO 30	19	
141 (B.S.)		WEST RAYNHAM	18	MOSQUITO 30	18	
157 (B.S.)				Mosquito VI	2	
		SWANNINGTON	18	MOSQUITO 30	19	
169 (B.S.)				Mosquito XIX	4	
		GT. MASSINGHAM	18	MOSQUITO XIX	21	
239 (B.S.)				Mosquito VI	3	
515 (B.S.)		WEST RAYNHAM	18	MOSQUITO 30	18	
		LITTLE SNORING	18	MOSQUITO XIX		
				Mosquito VI		
171 (B.S.)		NORTH CREAKE	24	HALIFAX III	25	
192 (B.S.)		FOULSHAM	17	HALIFAX III	20	
			7	MOSQUITO XVI	8	
199 (B.S.)		NORTH CREAKE	24	HALIFAX III	23	
462 (RAAF)		FOULSHAM	20	HALIFAX III	30	
214 (B.S.)		OULTON	20	FORTRESS III	20	
223 (B.S.)		OULTON	16	FORTRESS III	11	
				Liberator		
B.S.D.V.		SWANTON MORLEY	4	MOSQUITO VI	4)	
			2	MOSQUITO XIX	2)	
			3	MOSQUITO 30	4)	
				Mosquito II	1)	
						Opl. on Liberators. Not included in Summary

## TRAINING UNITS 22 JUNE 1944

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.1 Group</u>	<u>Bewtry</u>				
11 Base					
1656 Con. Unit	Lindholme	36	23	Halifax II	
1662 " "	Blyton	36	15	Halifax V	
" " "	"	"	15	Halifax III	
1667 Br. Gun Flt.	Hemswell				
1687 " " "	Hemswell				
1 L.F.S. (Lancaster Finishing School)	Hemswell	24	24	Lancaster I, III	
<u>No.3 Group</u>	<u>Exning</u>				
32 Base					
1 B.D.U. (Bombing Development Unit)	Newmarket	6	5	Halifax II	
		2	2	Halifax V	
		5	5	Halifax III	
		2	1	Lancaster III	
		1	-	Lancaster II	
		1	-	Stirling	
		1	-	Mosquito XVI	
		1	-	Mosquito XX	
		2	-	Spitfire V	
		1	2	Beaufighter I	
		1	1	Proctor	
		"	"	Mosquito IV	
1688 B.D.T. Flt. (Bomber (Defence) Training Flight)	Newmarket				
31 Base					
1657 Con. Unit	Stradishall	40	28	Stirling	
1653 " "	Chedburgh	40	31	Stirling	
1651 " "	Wratting Common	40	25	Stirling	
3 L.F.S.	Feltwell	24	16	Lancaster I, III	
<u>No.4 Group</u>	<u>York</u>				
41 Base					
1652 Con. Unit	Marston Moor	139	21	Halifax II	
		"	2	Halifax V	
1658 " "	Riccall	36	24	Halifax II	
1663 " "	Rufforth	36	13	Halifax V	
		"	8	Halifax II	
1689 B. Def. T. Flt.	Holme				
<u>No.5 Group</u>	<u>Grantham</u>				
51 Base					
1660 Con. Unit	Swinderby	40	16	Stirling	
		"	"	Halifax V	
1654 " "	Wigsley	40	13	Stirling	
1661 " "	Winthorpe	40	35	Stirling	
1690 B. Def. T. Flt.	Swinderby				
5 L.F.S.	Syerston	24	23	Lancaster I, III	
<u>No.6 Group R.C.A.F.</u>	<u>Allerton</u>				
61 Base					
1659 Con. Unit	Topcliffe	36	10	Halifax II	
1664 " "	"	"	20	Halifax V	
	Dishforth	36	24	Halifax V	
	"	"	3	Halifax II	
1666 " "	Wembleton	36	29	Halifax II	
	"	"	"	Lancaster II	
1695 B. Def. T. Flt.	Dalton				
<u>No.8 Group</u>	<u>Huntingdon</u>				
P.F.N.T.U. (Pathfinders Navigation Trg. Unit)	Warboys	12	8	Lancaster III	Night Vision Trg. School Incl.
		4	4	Halifax II	
1407 Mat. Flt.	Wyton <del>Warboys</del>	"	2	Mosquito XX	
1655 T.U.	Warboys	37	"	Mosquito XVI	
		"	4	Mosquito IV	
		1	7	Mosquito III	
		9	10	Oxford II	
1696 B.D.T. Flt.	Gransdon Lodge Ipswich	7	"	Oxford I	

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.91 Group</u>	<u>Abingdon</u>				
10 O.T.U. (3)	Abingdon	-	4	Whitley VII	
		40	22	Whitley V	
		8	7	Anson	
		4	3	Hurricane	
		-	1	Martinet	
19 O.T.U.	Kinloss	-	1	Whitley VII	
		45	48	Whitley V	
		10	7	Anson	
		4	2	Hurricane II	
		-	5	Martinet	
20 O.T.U. (1½)	Lossiemouth	-	36	Wellington X	
		81	26	Wellington III	
		6	-	Hurricane IV	
		-	6	Hurricane II	
		-	5	Martinet	
21 O.T.U.	Moreton in the Marsh	-	39	Wellington X	
		54	9	Wellington III	
		4	-	Hurricane IV	
		-	3	Hurricane I	
		-	1	Martinet	
22 O.T.U. (1½)	Wellesbourne Mountford	81	26	Wellington X	
		6	31	Wellington III	
		-	-	Hurricane III	
		-	5	Hurricane II	
		-	3	Martinet	
24 O.T.U.	Honeybourne	-	36	Wellington X	
		24	6	Wellington III	
		-	17	Whitley V	
		4	-	Hurricane II	
		-	2	Martinet	
		-	5	Anson	
1681 B.D.T. Flt.	Honeybourne	7	8	Hurricane II	
1682 " "	Moreton in the Marsh	6	5	Tomahawk	
				Hurricane	
<u>No.92 Group</u>	<u>Winslow Hall</u>				
11 O.T.U.	Westcott	54	37	Wellington X	
		4	4	Hurricane II	
		-	4	Martinet	
12 O.T.U.	Chipping Warden	-	21	Wellington X	
		54	19	Wellington III	
		-	-	Hurricane IV	
		4	3	Hurricane II	
		-	3	Martinet	
12 O.T.U.	Market	40	36	Wellington X	
14 O.T.U. (3)	Harborough	4	-	Hurricane IV	
		-	3	Hurricane II	
		-	2	Martinet	
15 O.T.U. (3)	Upper Heyford	40	7	Wellington X	
		4	20	Wellington III	
		-	-	Hurricane II	
		-	5	Martinet	
17 O.T.U.	Silverstone	54	22	Wellington X	
		4	11	Wellington III	
		-	-	Hurricane IV	
		-	3	Hurricane II	
		-	2	Martinet	
26 O.T.U.	Wing	53	22	Wellington X	
		4	18	Wellington III	
		-	-	Hurricane IV	
		-	4	Hurricane II	
		-	2	Martinet	
		-	1	Anson	
29 O.T.U.	Bruntingthorpe	54	17	Wellington X	
		4	30	Wellington III	
		-	-	Hurricane IV	
		-	4	Hurricane II	
		-	2	Martinet	
84 O.T.U.	Desborough	40	31	Wellington X	
		4	-	Hurricane II	
		-	4	Martinet	
1683 B.D.T. Flt.	Market	6	6	Hurricane II	
	Harborough	-	-	Tomahawk	
1684 " "	Wing	6	5	Hurricane II	
		-	2	Tomahawk	
<u>No.93 Group</u>	<u>Eggington</u>				
18 O.T.U.	Finningley	54	30	Wellington X	
		4	10	Wellington III	
		-	-	Hurricane IV	
		-	3	Hurricane III	
		-	-	Martinet	

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.93 Group (Contd.)</u>					
27 O.T.U.	Lichfield	54	19	Wellington X	
		4	17	Wellington III	
			-	Hurricane IV	
			4	Hurricane II	
			2	Martinet	
28 O.T.U.	Wymeswold	54	38	Wellington X	
		4	4	Wellington III	
		4	-	Hurricane IV	
			3	Hurricane II	
			3	Martinet	
30 O.T.U.	Hixon	54	23	Wellington X	
		4	12	Wellington III	
			-	Hurricane II	
			3	Martinet	
82 O.T.U. (2)	Ossington	40	23	Wellington X	
		4	12	Wellington III	
			-	Hurricane II	
			2	Martinet	
83 O.T.U. (2)	Peplow	40	23	Wellington X	
		4	2	Wellington III	
			-	Hurricane II	
			2	Martinet	
86 O.T.U.	Ganston	40	22	Wellington X	
		4	-	Wellington III	
			3	Hurricane II	
1685 B.D.T. Flt.	Ossington	6	5	Hurricane II	
1686 B.D.T. Flt.	Hixon	6	6	Hurricane II	
<u>No.100 Group</u>					
1694 T.T. Flt.	Bylaugh Hall				
1699 Fort. Trg. Flt.	Gt. Massingham Oulton				
TRAINING UNITS 28 DECEMBER 1944					
<u>No.1 Group</u>					
15 Base (1)	Bawtry				
1687 B.D.T. Flt.	Scampton				
<u>No.3 Group</u>					
32 Base	Newmarket Newmarket				
1688 B.D.T. Flt.		8	5	Halifax III	
1 B.D.U. (Bombing Development Unit)		-	1	Halifax VI	
		5	7	Lancaster I, III	
		-	1	Lancaster II	
		1	-	Mosquito XVI	
		-	1	Mosquito XX	
		-	1	Mosquito IX	
		1	-	Mosquito IV	
		2	1	Spitfire V	
	1	1	Beaufighter I		
	-	1	Proctor		
No.3 L.F.S.	Feltwell	24	22	Anson Lancaster I, III	
<u>No.4 Group</u>					
44 Base	York				
1689 B.D.T. Flt.	Holme				
<u>No.5 Group</u>					
54 Base	Swinderby				
1690 B.D.T. Flt.	Metheringham				
No.5 L.F.S.	Syerston	27	16	Lancaster I, III	

(1) Bomber Defence Training Flight.



UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.7 Group (Contd.)</u>					
1664 Con. Unit (R.C.A.F.)	Dishforth	32	31	Halifax III	
		-	23	Halifax V	
		-	5	Halifax II	
		2	1	Spitfire V	
		2	2	Hurricane II	
1666 " " (R.C.A.F.)	Wembleton	32	19	Lancaster I, III	
		-	3	Lancaster X	
		-	20	Halifax II	
		-	7	Halifax V	
		2	2	Spitfire V	
		2	2	Hurricane II	
1667 " "	Sandtoft	32	25	Lancaster I, III	
		-	21	Halifax V	
		2	2	Spitfire V	
		2	2	Hurricane II	
		-	2	Hurricane V	
1668 " "	Bottesford	36	14	Lancaster I, III	
			19	Lancaster II	
		2	2	Spitfire V	
		2	2	Hurricane II	
1669 " "	Langar	32	27	Lancaster I, III	
		-	7	Halifax V	
		-	16	Halifax II	
		2	2	Spitfire V	
		2	2	Hurricane II	
B.C. Instructor School	Finningley	22	4	Hurricane II	
			-	Wellington X	
			-	Wellington IV	
		10	3	Lancaster I, III	
		5	-	Halifax III	
		3	3	Hurricane II	
Mosquito T.U.		3	2	Spitfire V	
		43	( 4	Mosquito XXV	
			( 16	Mosquito XX	
			( -	Mosquito XVI	
			( 7	Mosquito IV	
		14	8	Mosquito III	
		30	21	Oxford II	
		2	-	Oxford I	
<u>No.91 Group</u>					
10 O.T.U.	Abingdon	54	49	Wellington I	
		6	6	Hurricane II	
		2	2	Master II	
18 "	Finningley	40	21	Wellington X	
		5	9	Wellington III	
		2	4	Hurricane II	
		-	-	Master II	
19 O.T.U. (2)	Kinloss	40	34	Wellington X	
		5	5	Hurricane II	
		2	2	Master II	
		-	2	Anson	
20 "	Lossiemouth	54	38	Wellington X	
		6	8	Wellington III	
		2	7	Hurricane II	
		2	1	Master II	
21 "	Moreton in the Marsh	54	36	Wellington X	
		6	9	Wellington III	
		2	5	Hurricane II	
		-	1	Master II	
22 "	Wellesbourne Mountford	6	48	Wellington X	
		2	4	Wellington III	
		6	8	Hurricane II	
		2	2	Master II	
24 "	Honeybourne	54	49	Wellington X	
		6	5	Wellington III	
		2	4	Hurricane II	
		2	1	Master II	
<u>No.92 Group</u>					
<u>Winslow Bucks</u>					
11 O.T.U.	Westcott	54	43	Wellington X	
		6	6	Hurricane II	
		2	2	Master II	
12 O.T.U.	Chipping Warden	54	27	Wellington X	
		6	2	Wellington III	
		2	5	Hurricane II	
		2	1	Master II	
		-	1	Martinet	
14 O.T.U. (2)	Market Harborough	40	38	Wellington X	
		3	3	Hurricane II	
		2	2	Master II	

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.92 Group (Contd.)</u>					
16 O.T.U. (Mcsq.)	Upper Heyford	-	4	Wellington X	
		-	9	Wellington III	
		-	3	Hurricane II	
		-	-	Master II	
17 O.T.U.	Silverstone	54	45	Wellington X	
		-	3	Wellington III	
		6	5	Hurricane II	
		2	2	Master II	
		-	1	Martinet	
26 O.T.U.	Wing	54	32	Wellington X	
		-	8	Wellington III	
		6	5	Hurricane II	
		2	1	Master II	
		-	1	Warwick	
		-	1	Anson	
29 O.T.U. (2)	Bruntingthorpe	40	25	Wellington X	
		-	11	Wellington III	
		5	5	Hurricane II	
84 " (2)	Desborough	40	2	Master II	
		5	30	Wellington X	
		2	5	Hurricane II	
85 " (2)	Husband's Bosworth	40	2	Master II	
		5	32	Wellington X	
		2	5	Hurricane II	
		-	2	Master II	
		-	2	Martinet	
<u>No.93 Group</u>					
27 O.T.U.	Eggington				
	Lichfield	54	29	Wellington X	
		-	14	Wellington III	
		4	5	Hurricane II	
		-	1	Master II	
30 " (2)	Hixon	40	25	Wellington X	
		-	29	Wellington III	
		5	5	Hurricane II	
		2	1	Master II	
82 "	Ossington	40	35	Wellington X	
		-	5	Wellington III	
		5	4	Hurricane II	
		2	2	Master II	
<u>TRAINING UNITS 3 MAY 1945</u>					
<u>No.1 Group</u>					
	<u>Bawtry</u>				
15 Base					
1687 B.D.T. Flt.	Hemswell				
<u>No.3 Group</u>					
1688 B.D.T. Flt.	<u>Exning</u>				
B.D.U.	Feltwell				
(Bombing Development Unit)	Feltwell	8	3	Halifax III	
		-	1	Halifax VI	
		5	9	Lancaster I, III	
		1	-	(Mosquito XVI	
		1	1	(Mosquito XX	
		2	1	Spitfire V	
		1	1	Beaufighter I	
		-	1	Proctor	
		-	-	Anson	
		-	-	Mosquito IX	
<u>No.4 Group</u>					
1689 B.D.T. Flt.	<u>York</u>				
	Holme				
<u>No.5 Group</u>					
1690 B.D.T. Flt.	<u>Swinderby</u>				
	Metheringham				
<u>No.6 Group (R.C.A.F.)</u>					
1695 B.D.T. Flt.	Allerton Park				
	Dishforth				

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No.8 Group</u>	<u>Huntingdon</u>				
1696 B.D.T. Flt. P.N.T.U. (Pathfinder Navigation Trg. Unit)	Bourn Warboys	14	( 9 1 2	Lancaster I, III Mosquito XXV Mosquito XX Mosquito XVI Mosquito IV	
		14	-	Oxford I	
		15	7	Oxford II	
1323 Flt. A.G.L.(T) Trg.	Warboys Fulbeck	10	7	Lancaster I, III	
		4	-	Lancaster I, III	
<u>No.100 Group</u>	<u>Bylaugh Hall</u>				
1694 B.D.T. Flt. 1692 (B.S.) T.U.	Great Massingham Great Massingham	16	13	Mosquito VI	
		6	7	Anson	
		2	-	Wellington XVIII	
		1	1	Oxford II	
1699 Fortress Trg. Flt.	Oulton	4	3	Fortress III	
		3	1	Fortress II	
B.S.D.U.	Swanton Morley	8	3	Halifax III	
		-	1	Halifax VI	
(Bomber Support Development Unit)		5	9	Lancaster I, III	
		1	-	Mosquito XVI	
		1	-	Mosquito XX	
		1	1	Spitfire V	
		2	1	Beaufighter I	
		1	1	Proctor	
		-	1	Anson	
		-	-	Mosquito IX	
<u>No.7 Group</u>	<u>Grantham</u>				
1651 Con. Unit	Woolfox Lodge	32	13	Lancaster I, III	
		2	-	Spitfire V	
		2	2	Beaufighter VI	
		-	2	Hurricane II	
1652 " "	Marston Moor	35	11	Halifax III	
		2	2	Spitfire V	
		2	1	Hurricane II	
		-	1	Hurricane IV	
1653 " "	N. Luffenham	32	15	Lancaster I, III	
		2	1	Spitfire V	
		2	-	Beaufighter VI	
		-	1	Hurricane II	
1654 " "	Wigsley	32	15	Lancaster I, III	
		2	2	Spitfire V	
		2	2	Hurricane II	
1656 " "	Lindholme	32	24	Lancaster I, III	
		2	2	Spitfire V	
		2	2	Hurricane II	
1659 Con. Unit (R.C.A.F.)	Topcliffe	32	27	Halifax III	
		2	1	Spitfire V	
		2	2	Hurricane II	
1660 " "	Swinderby	32	23	Lancaster I, III	
		2	2	Spitfire V	
		2	2	Hurricane II	
1661 " "	Winthorpe	32	16	Lancaster I, III	
		3	3	Spitfire V	
		3	3	Hurricane II	
1663 " "	Rufforth	32	12	Halifax III	
		2	1	Spitfire V	
		2	2	Hurricane II	
1666 " " (R.C.A.F.)	Wembleton	32	26	Lancaster I, III	
		-	3	Lancaster X	
		2	2	Spitfire V	
		2	1	Hurricane II	
1667 " "	Sandtoft	32	28	Lancaster I, III	
		2	2	Spitfire v	
		2	1	Hurricane II	
1668 " "	Bottesford	32	19	Lancaster I, III	
		2	2	Spitfire V	
		2	1	Beaufighter VI	
		-	2	Hurricane II	
Bomber Command Instructors School	Finningley	22	16	Wellington X	
		15	10	Lancaster I, III	
		2	2	Hurricane II	
		1	1	Master II	
		3	2	Spitfire V	
		-	1	Oxford	
		-	3	Halifax III	

UNIT	LOCATION	AIRCRAFT			REMARKS
		EST.	SERV.	TYPE	
<u>No. 91 Group</u>	<u>Abingdon</u>				
10 O.T.U.	Abingdon	54 6 2	47 5 3	Wellington X Hurricane II Master II	
19 " (2)	Kinloss	40 5 2	36 3 1	Wellington X Hurricane II Master II	
20 "	Lossiemouth	54 6 2	44 5 1	Wellington X Hurricane II Master II	
21 "	Moreton in the Marsh	54 6 2	38 1 4	Wellington X Wellington III Hurricane II	
22 "	Wellesbourne Mountford	54 6 2	42 4 1	Wellington X Hurricane II Master II	
24 "	Honeybourne	54 6 2	45 3 2	Wellington X Hurricane II Master II	
27 "	Lichfield	54 4 -	44 4 2	Wellington X Hurricane II Master II	Disbanding
30 " (2)	Gamston	40 5 2	29 1 3 2	Wellington X Wellington III Hurricane II Master II	
<u>No. 92 Group</u>	<u>Winslow</u>				
11 O.T.U.	Westcott	54 6 2	46 4 1	Wellington X Hurricane II Master II	
12 "	Chipping Warden	54 6 2	39 3 -	Wellington X Hurricane II Master II	
14 " (2)	Market Harborough	40 5 2	30 4 2	Wellington X Hurricane II Master II	
16 " (Mosq.)	Upper Heyford	- 40 -	11 15 1 6	Mosquito XXV Mosquito XX Mosquito XVI Mosquito IV	
17 "	Silverstone	17 30 2 54 6 2	12 12 16 47 5 -	Mosquito III Oxford II Oxford I Wellington X Hurricane II Master II	
29 O.T.U. (2)	Bruntingthorpe	40 5 2	31 4 2	Wellington X Hurricane II Master II	
84 " (2)	Desborough	40 5 2	36 5 2	Wellington X Hurricane II Master II	
85 " (2)	Husbands Bosworth	40 5 2 -	34 5 2 2	Wellington X Hurricane II Master II Martinet	

MONTHLY AVAILABILITY OF OPERATIONAL AIRCRAFTCrews and Aircraft with Crews  
1 March 1944 - 1 May 1945(A) Aircraft Fit

Month	Lancaster	Halifax	Stirling	Wellington	Mosquito	Other Aircraft	Total
1 March 1944	570	351	73	7	53	20	1,074
1 April "	522	298	57	--	67	29	973
1 May "	604	360	48	--	82	51	1,145
1 June "	634	397	30	--	90	42	1,193
1 July "	735	432	34	--	107	81	1,389
1 August "	663	430	23	--	113	100	1,329
1 September "	645	564	8	--	110	108	1,435
1 October "	872	429	--	--	115	112	1,528
1 November "	910	431	--	--	130	124	1,595
1 December "	940	450	--	--	140	135	1,665
1 January 1945	881	433	--	--	145	160	1,619
1 February "	1,007	389	--	--	165	162	1,723
1 March "	973	365	--	--	188	153	1,679
1 April "	1,250	386	--	--	207	177	2,020
1 May "	1,117	311	--	--	212	207	1,847

(B) Crews

Month	Lancaster	Halifax	Stirling	Wellington	Mosquito	Other Aircraft	Total
1 March 1944	712	534	108	5	117	37	1,513
1 April "	816	510	88	--	126	77	1,617
1 May "	850	545	75	--	150	116	1,736
1 June "	911	658	55	--	156	87	1,867
1 July "	977	720	54	--	168	174	2,093
1 August "	1,031	797	49	--	178	151	2,206
1 September "	1,119	836	12	--	206	200	2,373
1 October "	1,228	707	--	--	239	212	2,386
1 November "	1,370	869	--	--	259	239	2,737
1 December "	1,457	816	--	--	280	239	2,792
1 January 1945	1,472	756	--	--	291	296	2,815
1 February "	1,439	618	--	--	291	282	2,630
1 March "	1,508	557	--	--	307	310	2,682
1 April "	1,734	498	--	--	354	303	2,889
1 May "	1,727	459	--	--	371	320	2,877

(C) Aircraft with Crews

Month	Lancaster	Halifax	Stirling	Wellington	Mosquito	Other Aircraft	Total
1 March 1944	525	337	73	4	52	16	1,007
1 April "	479	286	57	--	67	29	918
1 May "	555	346	48	--	82	51	1,082
1 June "	621	395	30	--	89	42	1,177
1 July "	722	424	28	--	106	81	1,361
1 August "	635	390	25	--	110	96	1,256
1 September "	650	458	6	--	117	108	1,339
1 October "	843	421	--	--	115	112	1,491
1 November "	892	428	--	--	130	116	1,566
1 December "	931	434	--	--	140	120	1,625
1 January 1945	888	425	--	--	145	137	1,595
1 February "	1,078	380	--	--	165	162	1,785
1 March "	973	365	--	--	188	153	1,679
1 April "	1,038	358	--	--	201	169	1,766
1 May "	1,108	303	--	--	210	189	1,810

Note 'Other Aircraft' includes all types in No.100 Group

Source R.A.F. Bomber Command Consolidated Form 'G'.

ARMAMENTDevelopment of the Tallboy and Grand Slam bombs

R.A.F.  
Monograph,  
Armament,  
Vol. I,  
Bombs and  
Bombing  
Equipment  
Chap. 13

The Tallboy (12,000 pounds) and the Grand Slam (22,000 pounds) bombs originated in the mind of Mr. B. N. Wallis, aircraft designer of Messrs. Vickers Armstrong Limited, between 1940 and 1941.<sup>(1)</sup> At that time the bombs used by the R.A.F. were not heavy enough to inflict severe damage on the enemy and Mr. Wallis concluded that the dispersion of industry would make the bombing offensive against Germany ineffective. He spent some time evolving a theory in which he sought to show that if it were possible to destroy the main sources of energy such as coal, oil, and water upon which German industry depended the enemy's war effort could not be maintained for long. A new technique of bombing therefore became necessary, firstly, the employment of far larger bombs than had been used before and, secondly, the utilization of the pressure wave set up by a bomb in the surrounding medium to destroy the target, instead of relying on surface destruction by a direct hit. Mr. Wallis' theory was 'to inject the largest possible charge to the greatest possible depth in the medium (earth or water) that surrounds or is in contact with the target'. He believed that a ten ton bomb released from a height of 40,000 feet would fulfil his requirements.

There was then no aircraft of sufficient size to carry such a weapon to Germany nor to drop it from the height which Mr. Wallis required. As a compromise he evolved plans for small and medium sized bombs, a 4,000 pound bomb (Tallboy (S)) and a 12,000 pound bomb (Tallboy (M)) but they were in no way a substitute for his original idea. After examination of his plans the Air Staff authorized, in July 1943, the production of the medium size 12,000 pound bomb in limited numbers. They were not over-enthusiastic about the project but believed it might be used with effect against the Rothensee Ship Lift in northwest Germany, the attack of which was then being deliberated by the Directorate of Bombing Operations. Work also began on the Tallboy (L) (Large) which later became known as Grand Slam but production was cancelled towards the end of 1943 as the Air Staff were unable to find a suitable target and were unwilling to convert the necessary special aircraft to carry the bomb. Meanwhile production of Tallboy (M) was to continue and, if required, Tallboy (L) could be produced at a later date.

By the end of 1943 out of the total order for 325 Tallboys (M), of which 125 were being manufactured in the U.S.A., ten had been completed in England and were ready for filling. The remainder would be completed by May 1944. In the U.S.A. production was proceeding satisfactorily. At the end of April 1944, after much hard work involving many experiments by Mr. Wallis and his team under the auspices of M.A.P., trials were held in which the bomb was dropped from a height of 18,000 feet. The Air Staff decided that Tallboy (M) should go into operation at once. There was, by the spring of 1944, a requirement for the destruction of precise targets both in Germany and in the occupied countries

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(1) The history of the development of these two bombs which is a remarkable example of individual initiative and team work by a group of designers, technicians and manufacturers is related in R.A.F. Monograph Armament Vol. I Chap. 13 produced by the Air Historical Branch.

by very heavy bombs. After the first bomb had been successfully dropped on the Saumur Tunnel in Normandy in June the existing order of 325 Tallboys (M) was increased to 2,000, of which 1,000 were to be manufactured in the U.S.A. At that stage, only No. 617 Squadron had been modified to carry such a heavy bomb and a second squadron was now to be prepared in anticipation of a monthly expenditure of 240 bombs. Three more squadrons were to be equipped later in the year.

As soon as the bomb had been tested in action the Commander-in-Chief, Bomber Command pressed for a greater supply of 12,000 pound bombs but the complicated method of production prevented the bombs from reaching the squadrons quickly enough and, on one occasion, two weeks elapsed before a sufficient number could be accumulated to bomb the Tirpitz. Production was accelerated in the latter part of 1944 and by the end of the year 900 finished bomb cases (Tallboy M) had been produced. As already described in the text the bombs were used effectively against such targets as V weapon sites, submarine pens, bridges, dams, aqueducts, viaducts and synthetic oil plants. In September 1944 the bomb was formally introduced as 12,000 pound D.P. (Deep Penetration). This nomenclature was changed at the request of Bomber Command to M.C. (Medium Calibre) because deep penetration, due to the delayed action fuzes employed, was often prevented. The bomb, it should be remembered, was never intended to be armour piercing.

In the meantime development of the Tallboy (L) or Grand Slam, as it should now be called, continued. After examination of German-built structures in the liberated Cherbourg peninsula and as a result of operational experience with Tallboy (M) the 12,000 pound bomb was found to be too small. The Commander-in-Chief Bomber Command requested that production of the bigger bomb should be made at the expense of the medium sized one. The M.A.P. stated that it would be possible to manufacture 50 Grand Slams a month without interfering with the production of Tallboys, beginning from January 1945. The actual production of Grand Slam progressed slowly because the Air Staff wanted to cancel production in the late summer of 1944, the prevalent belief being that the war would be over by the end of the year. After strong protests, particularly from R.A.F. representatives in Washington, who had done everything possible to speed up U.S. production of the bomb, manufacture was resumed on the original scale.

The first unarmed Grand Slam was tested at the end of October 1944 and was released from a height of 2,000 feet. Production of bombs did not, however, reach 50 per month until March 1945. On the 13th of that month the first live Grand Slam was released by an aircraft flying at approximately 11,000 feet. The test fulfilled expectations and the bomb was first used operationally on the following day against the important Bielefeld viaduct. Thirteen Tallboys (M) and one Grand Slam were used but it was impossible to distinguish the results of individual bombs. Six arches of one viaduct and seven of the other were totally destroyed by three bombs - all near misses - involving the destruction of about 20,000 tons of concrete and doubtless Grand Slam caused much of this damage. In April 1945 Grand Slam was formally approved by the Air Ministry and became known as Bomb H.E. M.C. 22,000 pound.

#### Operational Employment of the Wallis Bombs.

Between June 1944 and the end of the war in Europe 854 Tallboys were dropped by Bomber Command. Although the bombs were not designed for use against concrete structures, their

quality and strength of destruction was such that they were able to inflict much damage in spite of excessive shock encountered against such targets. Analysis showed that, as Mr. Wallis had foreseen, near misses up to 40 feet were more damaging to heavy reinforced concrete than direct hits. This was caused by the severe effect of shock on the foundations and often caused collapse of the structure particularly in brick and masonry bridges. Against lattice girder bridges near misses were equally effective but damage was attributed to blast effect lifting the spans rather than earth shock affecting the piers.

From the point of view of Bomber Command the main difficulty lay not in the quality of the bomb or the numbers but in the fact that they were produced so slowly and many more targets could have been effectively attacked had more bombs been available.

Forty-one Grand Slam bombs were dropped by Bomber Command in the closing months of the war. The effects were very similar to those analysed in the Tallboy. Grand Slam caused the most effective damage from near misses and its penetration from 16,000 to 18,000 feet was estimated to be 60 to 75 feet into chalk and sand, 90 to 100 feet into clay, this being about one and a half times that of the Tallboy. This height was about half of that visualised by Mr. Wallis when he adumbrated his theory on deep penetration and earth shock. In a report on weapon effectiveness the B.B.S.U. suggested that while Grand Slam was undoubtedly the best bomb used against concrete structures, for direct hit purposes a bomb of similar explosive capacity capable of complete perforation without break up or premature detonation would have been about fifteen times as effective. Like Tallboy, Grand Slam was never intended to penetrate armour.

B.B.S.U.  
Weapon  
Effectiveness  
Panel Report

Other Bombs in Use March 1944 - May 1945

After the Wallis bombs a brief survey will be made of the armament of Bomber Command, in general noting any innovations in the period under review. Apart from the Tallboy and Grand Slam bombs the following were used.

Pounds High Explosive

8,000 H.C.  
4,000 H.C. and M.2  
2,000 H.C. and M.2, A.P.  
1,900 G.P.  
1,000 (including British M.C.,  
G.P., S.A.P. and U.S.A. A.N.-M.65,  
A.N.-M.59, A.N.-M.44).  
500 (including British M.C., G.P.,  
S.A.P. and U.S.A. A.N.-M.64).  
250 G.P. (substitute for 500 lb).  
500 J.W.(1)

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(1) Johnny Walker. Specially used in attack on Tirpitz, 15 September 1944, but its results were unknown.

Pounds Incendiary Bomb

1,000 T.I.  
250 T.I.  
30 'J' Type  
30 ordinary  
4(X) in clusters  
4 in clusters  
4 ordinary.

These bombs were evolved in the period 1942 to 1943 and their changes and developments have been traced in previous narratives.

Shortage of 1,000 pound M.C. bombs

R.A.F.  
Monograph,  
Armament,  
Vol. I  
p. 155-157

A.M. File  
C.S.22930

Webber  
W.2505  
17 Mar. 1945  
A.M. File  
S.95113

There was a very serious shortage of 1,000 pound M.C. bombs in the period 1944/45. In 1944 alone 203,000 of this kind of bomb were dropped by Bomber Command and in 1945, 36,000. This enormous consumption of bombs gave rise to a serious production problem and recourse had to be made to American type bombs, 500 pound British bombs and even 250 pound bombs. By July 1944 U.S.A. supplies of bombs suddenly stopped. The reason for the shortage was the great demand for M.C. bombs against tactical targets, oil, transportation etc. from the launching of Overlord onwards. The Air Staff tried to persuade the Commander-in-Chief Bomber Command to use less high explosive and more incendiaries and called for rigid economy in the employment of 500 pound and 1,000 pound bombs. In spite of economies by Bomber Command and efforts to increase production at home, on 17 March 1945 the Air Staff requested that more bombs of 500/1,000 pound M.C. be sent from U.S.A. as a matter of urgency, as it had been estimated that there were only 23 days expenditure of R.A.F. stocks in the U.K. The Americans held out no prospect of increased supplies and it was only the conclusion of operations in Europe that relieved the general anxiety about supply.

Bombsights - Innovations 1944 - 1945

Stabilized Automatic Bombsight

History of  
Armament in  
Bomber Command  
p. 32  
B.C.O.R.B.  
Apps. Vol. 3  
May 1945.

The first stabilized automatic bombsights were installed in aircraft of No.5 Group in the spring of 1943 replacing the automatic bombsight Mark II. The new instrument was a precision sight and was more accurate and easier to use than the unstabilized bomb-sight. The Stabilized Automatic Bombsight IIA was a development of the Mark II.

In June 1944 three of these Mark IIA bombsights were allocated to Nos. 83 and 97 Squadrons (No. 8 Group). It was proposed that the aircraft should back up initial markers accurately placed by Mosquito aircraft. At the end of September 1944 the bombsights were transferred to No. 617 Squadron. This was largely due to the greatly improved methods of windfinding which reduced the wind vector error to such an extent that the Mark XIV Bombsight proved sufficiently accurate for backing up markers. As a result of the operational experiences of No. 617 Squadron various modifications were introduced into the Stabilized Automatic Bombsight Mark IIA and by the end of the war in Europe a well trained crew obtained an average error of 80 yards from 20,000 feet when using this bombsight.

Mark XIVA Bombsight

Ibid  
pp. 29-32

This bombsight was introduced in August 1944 for Mosquitoes and installed in Halifaxes on production in December 1944. The Mark XIV bombsight was found to be unreliable at heights up to 25,000 feet and over. The Mark XIVA Bombsight had an increased height range to 25,000 feet. Instead of a computer peculiar to each aircraft (or group of aircraft) one type only was used and the correction to indicated airspeed for the particular aircraft, then incorporated in the functioning of the airspeed blade was, on the Mark XIVA, made mechanically in the airspeed tape linkage. The kernel of this mechanism was a small corrector cam peculiar to each aircraft and quickly interchangeable without the need for any retuning. The maximum angle of climb for which the computer would compute correctly was increased from 5° to 11°. The follow up rate of the sighting angle was increased from 2° to 3° per second to 1.1/3rd° or 2° per second.

The main disadvantage of the new bombsight was that the windspeed limitation in the maximum speed setting on the Mark XIVA was not acceptable. In October 1944 instructions for increasing the windspeed range to 77 miles per hour in Mark XIVA Bombsight were received. This modification was unacceptable to No. 8 (P.F.F.) Group and Air Ministry agreed to the following installation. The increased pitch freedom computer unit (permitting a maximum windspeed of 77 miles per hour) was suitably modified to incorporate the fast follow up rate of the Mark XIVA computer unit. This gave greater tactical freedom than the Mark XIVA computer.

T.I.A. Bombsight

This bombsight was the American version of the Mark XIVA and was first introduced into Bomber Command in July 1944 when Canadian built Lancasters arrived from North America fitted with the T.I.A. sight. In January 1945 T.I.A. Bombsights were installed in Mosquito aircraft in place of the Mark XIVA sights as the supply of Mark XIVA Bombsights were being monopolized by the operational heavy bomber groups.

Summary

The Mark XIV Series Bombsights which came into general use in 1944 contributed greatly to the improvement in the operational bombing accuracy of the Command during the war. With these sights it was possible for a well trained crew to produce an average error of 150 yards from 20,000 feet. The tactical freedom afforded made the bombsight the most suitable sight for the majority of Bomber Command operations. Though not a precise bombsight like the Stabilized Automatic Bombsight Mark IIA, the Mark XIV proved to be the best compromise for general use.

Ibid  
p. 36

The S.A.B.S. Mark IIA in the hands of a skilful crew proved itself to be extremely accurate and invaluable for destroying important pinpoint targets.

With both the Mark XIV Series Bombsights and the S.A.B.S. Mark IIA, design and maintenance troubles were encountered. Modifications had to be incorporated, and these, with efficient maintenance and well trained crews, overcame the difficulties and the sights on the whole functioned satisfactorily for the purposes for which they were intended.

Target Indicators

Ibid  
pp. 42 - 43

Special T.I. bombs were made for daylight operations. In the early stages smoke fillings were employed, especially yellow smoke, to mark targets and later these same bombs were used as cancellation signs to countermand any markers that fell in too close proximity to the Allied frontline. A difficulty with large scale daylight attacks was the vast clouds of dust and smoke which quickly obscured the whole target area and of the markers burning on the ground. A pigment filled marker was produced to overcome these problems. It left a puff of coloured dust in the air which was remarkably distinctive and persistent. It could also be used as an aiming mark in favourable conditions for over two minutes after functioning. Red, yellow, green and eventually blue colours were available and were selected according to the nature of the expected background.

Another version of the Target Indicator was in constant use by the Mosquito bomber force on their nightly visits to Berlin. This bomb besides a somewhat reduced number of the usual pyrotechnic candles, also contained a photo flash and some remarkable photographs were obtained by this means from aircraft flying as high as 35,000 feet. The Mosquitoes had their own navigational problems and a special route marker device was developed for them, consisting of a special Very Pistol cartridge of greater intensity and duration than the normal. This was produced in the usual three colours enabling turning points to be effectively marked without risk of confusion, and more important still, without sacrificing a bomb station.

Last of all the marking requirements was that for supply dropping operations. Ordinary T.I. bombs were used from which the explosive candles had been removed. On the first of these operations, which took place before the end of hostilities, there had not been time to remove the explosive candles and one marker fell on the Grand stand of the Hague race course, which was one of the dropping zones for that day, and burnt it to the ground, complete with the great stores of German equipment it contained, to the delight of the Dutch. It may also be noted that although on these operations the supplies were dropped from as low as 300 feet, the marking was, for accuracy's sake, done from 30,000 feet.

Aircraft Mines

Ibid  
pp. 46 - 47

Between April 1944 and March 1945, well over 17,000 mines were handled; of this total the surprisingly small number of 222 mines failed to reach the required high standard when subjected to acceptance and preparation tests. This reflects great credit on those responsible for their design and development. Lancaster and Stirling aircraft carried loads of up to six 1,500 pound mines without any modification to the aircraft.

Early in 1942 it was decided to concentrate on the 1,000 pound mine for use in Halifax aircraft, as it was uneconomical to use this aircraft for the carriage of 1,500 pound mines. Later a modification was designed which enabled this aircraft to carry a load of four of the lighter mines. The carrier used for this modification was a converted No. 3 Heavy Handley Page Carrier, but owing to its size and weight it caused many complications during loading. During 1944 an adaptor was designed which simplified the carriage of all types of mines in this aircraft.

With the introduction of the Mosquito aircraft, a special mine was designed by the Armament personnel of the Bomber Command, the direct result of which was the bottling up of many thousand tons of enemy shipping in the Kiel Canal prior to D-Day.

The main types of mines used during the European Operations were:-

- (1) Single Contact Magnetic Ground Mines
- (2) Double Contact Magnetic Ground Mines
- (3) Oscillating mines
- (4) Acoustic mines
- (5) Anti-sweep mines
- (6) Nose contact mines
- (7) Impact mines.

#### Turrets, Guns and Ammunition

As the striking power of Bomber Command increased, so did the efficiency of the German night fighter defences, and although four engined bombers carried a four gun tail turret in place of their predecessor's two gun turrets, the bomber was never in a position to take on and defeat the enemy night fighter. It was essential that in a night attack the gunner should have a clear and unrestricted view from his turret and this led to numerous modifications within the Command to the standard designs of turrets. As the night fighter increased the weight of its armour and armament, the provisioning of guns of heavier calibre than 303" became an urgent matter, but despite many protests from Bomber Command, no .5" gun turret of official design was in action before the end of the war, and it was left to the Command itself to develop with a private firm, Messrs. Rose Brothers of Gainsborough, the only .5" turret in use before May 1945.

Ibid  
pp. 49 - 52

This turret (F.N.82) possessed novel features in that apart from carrying .5" guns it provided a large field of view, since the rear portion of the cupola was left open as a direct vision opening. Furthermore, escape from the turret was extremely easy, as the direct vision opening was sufficiently large to allow the air gunner to leave the turret via the opening in the cupola. The Rose Turret was introduced into operational use in Bomber Command in July 1944 and at the end of the war 180 turrets had been built up and installed in Lancaster aircraft in No. 1 Group. The design, progressing and introduction of the Rose Turret into Bomber Command was entirely due to the efforts of the Commander-in-Chief and his subordinates, in particular the Air Officer Commanding No. 1 Group, though towards the latter stages assistance was provided by M.A.P. who arranged for the production of certain component parts by firms other than Messrs. Rose Brothers.

#### Heating of guns and Turrets

Ibid  
pp. 52 - 54

Early in the war it became apparent that the heating of guns and turrets was essential in order to maintain the efficiency of the air gunners. But not until 1944 was any progress in this matter made. The requirements as regarding the heating of turrets divided itself into two distinct channels.

- (1) The provision of electrical gunheaters for fitment to the guns themselves.
- (2) The provision of heat to the turret as a whole.

The fitting of heaters was an involved problem particularly in the case of the F.N. (.5") tail turret in which the rear of the cupola had been removed to provide a field of view. The first aircraft with ducted heating was not received by Bomber Command until August 1944. By the cessation of hostilities 50 per cent of the Lancaster aircraft in use were fitted with this device. Halifax aircraft were less fortunate and by the end of the war were still lacking in heating for the tail turret.

A.G.L.(T) (Automatic Gunlaying (Turrets))

Ibid  
pp. 54 - 58

During night combats the fighter invariably had the advantage over the bomber for the reason that the fighter could select its approach, the bulk of the bomber was at least twice as large as the fighter and visual range was about proportional to bulk. The combination of these factors resulted in the fighter always seeing the bomber at three times the range at which the bomber could see the fighter. The A.I. equipped fighter could approach the bomber without making visual contact. Any warning of an unseen fighters' approach to a bomber was of vital importance.

In October 1942 a backward looking A.I. device with which, it was hoped, blind firing would be possible, was evolved by T.R.E. Bomber Command was at once interested and after much experimenting and training 100 sets of A.G.L.(T) were ordered to be fitted in an F.N. 121 turret. The equipment was first used operationally by No. 460 Squadron (No. 1 Group) on 20/21 July 1944. No. 49 Squadron (No. 5 Group) was also equipped with A.G.L.(T) in the late summer. A good deal of teething trouble was experienced but by 18 October the Air Ministry agreed to a third squadron being equipped with the device. No. 635 Squadron from No. 8 Group was chosen, the A.G.L.(T) aircraft from No. 460 Squadron of No. 1 Group having been taken away and displaced at the disposal of No. 8 Group. The device was introduced very slowly because of the practical impossibility of fitting and maintaining the equipment in the face of the acute shortage of trained radar mechanics.

By the end of the war squadrons fitted with A.G.L.(T) were:-

No. 49 Squadron - No. 5 Group

No. 635 Squadron)  
No. 582 Squadron) - No. 8 Group  
No. 35 Squadron)

A.G.L.(T) was perhaps the greatest asset that was available in the second world war for the defence of heavy bombers at night. Unfortunately no identification was found that was completely successful. It was difficult also to keep A.G.L.(T) in a serviceable condition. With unserviceable equipment a gunner was at a distinct disadvantage owing to the restrictions in view caused by the additional equipment.

Gun performance

.303 Browning

Ibid  
pp. 59 - 60

These guns performed most reliably throughout the war, the main trouble experienced was the freezing of guns at high altitudes, but this was overcome to some extent by careful maintenance, the use of special lubricants and electrical gun heaters.

.5" Guns

The .5" Browning Gun mounted in turrets appeared at the very last stages of the war and were only used on a very limited scale. Little operational experience was obtained.

20 mm Hispano

This weapon was used on a very limited scale by Bomber Support squadrons and was fitted to Mosquito aircraft as a fixed gun and gave satisfactory service.

Ammunition .303"

Ibid  
pp. 60 - 63

On 16 May 1944 provision was made to alter the current sequence for belting .303" ammunition, to enable, should the necessity arise, a quick turn round of aircraft for day/night operations to be effected. The following table indicates the method of fitting.

Turret	Gun	Quantity	A.P.	% By types of ammunition		
				Incend.	Tracer Day	Tracer Night
REAR	Top left	ALL	70	30	-	-
	Top right	First 500 rounds	70	30	-	-
		Remainder	50	20	30	-
	Bottom Left	ALL	60	20	-	20
	Bottom Right	ALL	60	20	-	20
MID UPPER and Front	Both	First 300 rounds	60	20	-	20
		Remainder	60	20	20	-

With ammunition belts so fitted the following methods were adopted.

Night Operations

In the event of more than 300 rounds being fired from each gun of the rear turret, the top right hand gun was made 'safe' leaving three guns available for combat. Under reasonably light conditions the small percentage of day tracer would not interfere with sighting, in which case the top right hand gun could have been used. It was considered unlikely that more than 300 rounds per gun would be fired from the mid-upper or front turrets.

Day Operations

The 300 rounds of night ammunition in the top right hand gun ammunition tracks were removed before the guns were used operationally. The first 300 rounds of each belt in the mid-upper and front turrets were removed and the tanks replenished with daylight sequence before the turrets were used.

Tracer Ammunition

It was felt that with the advent of the Gyro gunsight Mark IIC the use of tracer would be unnecessary and that it might be a disadvantage. It was more than suspected that some gunners did not use their sight at all at night, but merely 'hosepiped' tracer in the general direction of the attacking fighter. On 20 February 1945 Groups were instructed to discontinue the use of tracer.

EXTRACT FROM BOMBER COMMAND PAMPHLET - METHODS OF TARGET MARKING

Are Ground Markers Really Necessary?

The answer to this question is definitely 'Yes', though there are still some crews who fail to understand why they should aim their bombs at a T.I. marker dropped by a Pathfinder instead of trying to locate the target themselves. Visual bombing is undoubtedly the ideal method, but unfortunately it requires ideal conditions, which experience has proved rarely prevail over the target. Even under ideal conditions, experience has taught us that all but the most experienced crews are often seriously mistaken in identifying the target. However bright the illumination, provided either by the moon or by flares, the presence of haze or cloud will seriously reduce the success of the attack and may render it completely abortive if markers are not used. Moreover, even in perfectly clear weather, if visual bombing is undertaken, smoke and dust from the early bombing quickly obscures the target and subsequent bomb loads are scattered. The use of T.I. markers, which provide a clear and unmistakable aiming point, visible alike through haze, smoke and thin cloud, has not only enabled us to deliver heavy attacks under weather conditions which would previously have made such attacks quite impossible, but has also resulted in a very marked improvement in the concentration of bombing. It is only since we have learnt how to achieve this concentration that we have been able to deal really devastating blows from the air resulting in the neutralization of the industrial output of many towns and cities of Germany.

The difference between our present bombing offensive and our more scattered efforts of previous years, is comparable with the difference between a bullet from a rifle and grapeshot from a sporting gun. If you fire grape-shot at your enemy you are almost certain to hit him but the chances of killing him are not very great. Our present concentrated attacks, made possible by T.I. markers, are on the other hand, analagous to rifle bullets and are more likely to kill.

One disadvantage the rifle bullet has over grape-shot is, that if only slightly inaccurate it can miss completely. The introduction of the T.I. marker therefore was not without its risks. The most serious of these was that T.I.s dropped away from the target, particularly those which fell short, were liable to divert a large proportion of the force. This happened very frequently in the early days of T.I.s but since then, with improvements in blind navigation and bombing aids and the development of more reliable marking techniques, this danger has been very much reduced. It is seldom nowadays that we miss our target given suitable weather conditions. In other words, we have learned to fire our rifle with greater accuracy.

Another danger which the use of T.I. markers has produced is that the enemy can use similar markers as decoys. There is abundant evidence to show that the Germans have taken advantage of this fact, but fortunately their markers are poor imitations. It is important, however, for all crews to be able to avoid the enemies' decoys and to do this crews must study the characteristics of our own P.F.F. markers.

Target Marking Methods at Night

Basically there are only two methods of marking a target:-

- (i) Ground marking, i.e. marking the point on the ground at which the bombs should be aimed.
- (ii) Sky marking, i.e. marking the point in the air at which bombs should be aimed so that they will hit the target.

Method 1. - NEWHAVEN (Ground Marking)

The target area is located with the aid of H2S, by special aircraft of the P.F.F. (The Blind Illuminators), who, at about six minutes before 'H' hour, proceed to illuminate it with sticks of flares. In the light of these flares the Visual Markers, who follow closely behind the Blind Illuminators, pick out the exact aiming point and mark it with large salvoes (8 or 10) of mixed Red and Green T.I.s. These Visual Markers, usually six in number, are the most reliable and experienced crews in the P.F.F. and you can depend upon it that they will place their load of T.I.s accurately upon the aiming point. If they are unable to do this the crews will not drop their T.I.s but will return them to base.

Since, in Newhaven attacks, the large salvoes of red and green T.I.s are dropped only after visual identification they will all normally be dropped before the start of the Main Force bombing, because it is only at the beginning of the attack that the necessary conditions for visual identification, i.e. absence of smoke and glare from incendiaries, and adequate flare illumination, will exist. These large salvoes will generally have burnt out by H. + 7 or at latest by H + 10, and any mixed salvoes seen after this time should be regarded with the greatest suspicion, unless, of course, the whole raid has started late.

As the main force attack may last until H + 15 or H + 20 it is necessary to provide for a continuation of the marking after the primary markers have burned out. This is done by P.F.F. Backers-up carrying secondary markers which they aim at the primary T.I.s on the aiming point. These secondary markers are normally red in colour and since they are not aimed directly at the aiming point will generally be less accurate than the salvoes of mixed red and green T.I.s.

Effect of Weather on the Newhaven technique. - It is clear from the above outline that this technique will only work under favourable weather conditions. If the target is covered with cloud or if there is considerable ground haze the visual markers will not be able to identify the aiming point visually and the salvoes of mixed red and green T.I.s will not be dropped. As this is a fairly frequent occurrence provision is made for 'Emergency Parramatta.'

Emergency Parramatta. - Blind markers, crews who have the best H2S operators available and are provided with the very latest form of H2S, are detailed to mark the aiming point at H minus 2 with green T.I., if by that time the visual markers have been unable to mark the target. These green T.I., because of the limitations of the equipment by which they are aimed, are likely to be scattered but will be centred correctly on the aiming point. The backers-up will aim their red T.I.s at the centre of the green, and Main Force crews should aim at the centre of the reds. It should be noted that a red T.I. may fall very near or on top of a green T.I., but these T.I.s must not be confused with the large salvoes of both colours dropped by the visual markers.

Method 2. - PARRAMATTA (Ground Marking)

This method which is most likely to be used under conditions where visual identification of the aiming point is not practicable, is essentially the same as the Emergency Parramatta part of Newhaven which was described above.

Primary T.I. markers, usually green in colour, are dropped by H2S aircraft at the beginning of the attack. Owing to the inaccuracies of present blind bombing equipment these T.I.s are usually rather scattered but their M.P.I. (Mean Point of Impact) should be very near the aiming point. It is the job of the 'backers-up' to decide this M.P.I. and mark it with red T.I.s for the benefit of the Main Force.

Method 3. - MUSICAL PARRAMATTA (Ground Marking)

On this type of raid, markers are dropped by Mosquitoes equipped with Oboe, which is the most accurate blind-bombing device in use. Oboe has certain limitations which effect considerably the form in which the 'musical' marking is executed. The equipment has only limited range and therefore cannot be used on long range targets. It is also only possible for a few aircraft (usually four) to use Oboe at the same time and each aircraft needs about 10 minutes for the bombing run. Aircraft are detailed in fours, each four to mark at 10 minute intervals. Markers are released only on a completely satisfactory bombing run and as technical failures in this complicated equipment still account for a number of failures, not all the aircraft detailed to mark are able to.

Oboe Mosquitoes are timed to mark the target at intervals throughout the attack starting several minutes before H-hour. They normally drop four red T.I.s each, some of which will be the longer burning variety. To keep the aiming point continuously marked and to guard against gaps in the Oboe marking, other Pathfinders will drop green T.I. on the reds. The greens will be less accurate than the reds, but if no reds are seen the centre of the greens should be bombed.

Method 4. - WANGANUI (Sky Marking)

This is chiefly used as a 'bombing through cloud' method of target marking, but may be used on attacks planned as either Newhaven or Parramatta if the P.F.F. aircraft find the target is obscured with thick cloud.

Pathfinder aircraft equipped with blind-bombing devices, release skymarker flares, either red with green stars or green with red stars, at intervals throughout the attack. These flares are placed in such a position that your bombs, if aimed accurately at them while you are on a certain heading, will fall on the aiming point.

Allowances are made for the drift of the flares while they burn, and the planned height of attack and airspeed of the aircraft attacking. It must, however, be stressed that it is most important that the Main Force aircraft bomb on the correct heading. This heading is detailed in the 'Pathfinder Method for To-night'. If you do not release your bombs on this heading you will be wide of the aiming point. The principle of centreing as explained for ground marking applies equally to sky marking. Inaccuracies of individual Pathfinder aircraft, limitations of equipment and the drift caused by the wind result in the flares appearing to be rather spread. It is, therefore, essential that Main Force crews select the centre of all release point flares visible, and bomb this point on the correct heading.

It must be realised that the spread of the skymarkers and the accuracy of this method of attack depends very critically on the wind velocity at the height of the flares. If, therefore, the skymarking method is used in a high wind, it must be expected that the markers will be spread considerably up and down wind and crews should attempt to pick the centre of the line of flares even more carefully. It should again be noted that on some occasions, individual Pathfinder aircraft drop salvos of three or four release point flares and the 'centre of the skymarkers' does not mean the centre of one salvo.

Sky marking is usually less accurate than ground marking but nevertheless can produce useful results under favourable conditions. The devastation of 1,000 acres of Cologne on the west bank of the Rhine and the excellent demolition of a large part of Leipzig were both achieved with sky marking.

Sky marking may be carried out using either H2S or OBOE. With the OBOE method (Musical Wanganui) the release point flares are dropped by

Mosquitoes and are most accurate, but as with T.I.s only a few flares can be dropped. In practice it is usual to see only one Oboe aircraft's load burning at a time.

Mixed Methods. - On many occasions, when the meteorological forecast is uncertain, the Pathfinders will release both T.I.s and skymarker flares over the target, and the choice of which to bomb will be left to you. If the cloud is thin enough to enable you to see the pattern of T.I.s through it, then you should aim at them in preference to the skymarker flares which, because of drift, are less accurate than the ground markers.

When the cloud is thick on non-Musical attacks, even though you may be able to see the glow of one of two T.I.s through the cloud, it is better to aim at the skymarker flares. The reason for this is fairly obvious if you think about it. The T.I.s which you see under conditions of thick cloud are those which lie nearest the point vertically below your aircraft, whereas the more distant T.I.s are screened by the greater thickness of cloud. You are thus unable to pick out the centre of the pattern of all the T.I.s and if you bomb on the first T.I.s which you see you are almost certain to undershoot the target. With Oboe marking however, always aim at Oboe-aimed T.I.s if you can see them.

Emergency Wanganui. - On most operations Pathfinder aircraft carry a single Wanganui flare for emergency use if cloud unexpectedly obscures the target. Under these conditions it is seldom possible to provide skymarking as continuous as when planned for in advance. It should be remembered that whenever you attack skymarkers it is imperative that you are on the correct heading at the moment of release. If no specific heading has been detailed in the 'Pathfinder Method for To-night', the flares will be dropped in such a position that the correct heading is the course to steer to make good the planned track to the target.

#### Daylight Attacks

Bomber Command aircraft are attacking a considerable number of targets in daylight. Were these attacks carried out in consistently good conditions and by only small numbers of aircraft it is possible that they could be conducted quite efficiently without any marking. In practice, however, it is tactically necessary for relatively large numbers of aircraft to bomb within a short space of time. Marking is, therefore, provided to give the Main Force a 'lead in', so that they can fly straight towards and over the target without spending any time searching for it. As the attack proceeds bomb smoke obscures the target and further markers are provided to give crews an indication of where the target is located in relation to the pall of smoke.

Marking in daylight therefore performs a slightly different function to that at night. In daylight markers are intended as a guide to the position of the aiming point, and bombs should be aimed at the aiming point if it can be identified. To assist crews, and to indicate where the aiming point lies in relation to the markers or to any other salient features in the neighbourhood, a Master Bomber broadcasts instructions on R/T.

Normal procedure on Daylight Attacks. - Oboe Mosquitoes open the attack several minutes before H-hour and mark the target with T.I.s which are fused to burst fairly high so that as they cascade to the ground they leave a distinctive trail of white smoke. The Visual Markers, one of whom is the Master Bomber, arrive at the target after the Oboe aircraft, but before the Main Force. The Visual Markers may be supported by other aircraft of the Pathfinder Force known as 'Supporters.' The Visual Markers, guided by the Oboe T.I.s, drop their markers on the aiming point if they can identify it. The colours of the markers are frequently different; Oboe T.I.s may be red, the Master Bomber's mixed red and green, and the Primary Visual Markers' yellow.

Different coloured markers are used so that the Master Bomber can direct the Main Force on to the aiming point by reference to the closest T.I. colour. Marking is sometimes maintained by further Pathfinder backing-up existing markers.

Daylight Wanganui Attacks. - Just as at night, skymarking may be used in daylight either as an emergency method if cloud obscures the ground, or occasionally as the primary method. The release point may be marked with salvoes of coloured flares as at night, but are unfortunately, not nearly so distinctive in daylight and cannot be seen from very far away. An alternative type of skymarker is being brought into use for daylight attacks. This new marker is a yellow smoke bomb which produces a cloud of smoke slightly larger than a flak burst and of a very distinctive yellow colour. The smoke cloud from this bomb takes several minutes to disperse. When these markers are used the correct aiming point will be the up-wing edge of the freshly formed smoke clouds.

As in night Wanganui attacks, the spread of the skymarkers will vary directly with the strength of the wind. Accurate bombing will be largely dependent upon all crews attacking the skymarkers on the heading detailed. This heading, which will normally be the heading required to make good the track to the target, is detailed in the 'Pathfinder Method' issued before each attack.

Daylight Oboe Formations. - Formations of aircraft are led by an Oboe equipped aircraft which may be either a Mosquito or a Lancaster, accompanied by a reserve Oboe aircraft. Each formation consists of about eight aircraft flying in pairs, in echelon to port of starboard, the pairs being in line astern and stepped down. The aircraft take off and form up behind a leader who contacts the Oboe leader and reserve at a given rendezvous. The Oboe leader, with the reserve Oboe aircraft in echelon, then heads the formation and takes over the function of leader. The non-Oboe leader flies immediately behind the Oboe reserve aircraft.

S.O.E. Operations March 1944 - May 1945

Mention must be made of the Special Duty Squadrons of Bomber Command, Nos. 138, 161 Squadrons (No. 3 Group) on occasions supported by Stirlings from No. 149 Squadron (No. 3 Group) and Nos. 214 and 199 Squadrons (No. 100 Group). The operations in which they played such a successful part have been recorded in R.A.F. Narrative Special Duty Operations in Europe. The carriage of agents, Special Air Service personnel into France and other occupied territories in the months before D-Day, the picking up of agents returning with important information, the nourishing and sustenance of various groups of the Resistance with arms, ammunition and equipment were, of course, of paramount importance before the Allies landed in Normandy.

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Between February and March 1944 38 agents were ferried and in the period March to April 1944 48 people were taken in and brought back from France and other occupied territories. Between February and April 249 men were parachuted into occupied territory and 4,256 containers were dropped. In May alone 2,276 containers were dropped.

Stirlings of No. 3 Group were employed in supplying arms and equipment to the Resistance in the Haute Savoie prior to D-Day in Normandy and General Koenig, Commander of the F.F.I. sent a personal message of thanks to the Commander-in-Chief Bomber Command expressing his gratitude for the valuable work of the crews.

Before D-Day S.A.S. troops were parachuted into France (usually in batches of six) in increasing numbers. They then operated as self contained units. They later took action on D-Day in support of the landing forces and of the airborne divisions.

After D-Day the dropping of agents and supplies continued in parts of occupied France and Belgium. The Special Duty Squadrons began to operate on moonless as well as on moonlit nights which ensured the continuity of supplies. At the end of August squadrons began to equip with Stirling aircraft although Hudsons and Lysanders continued to be used. Daylight operations became possible as soon as the Allies advanced into France and Belgium.

By the autumn of 1944 the work of the Special Duty squadrons was largely completed but in the latter stages of the war a number of operations were carried out over Denmark, Norway, Holland, Czechoslovakia and even, on occasions over Germany.

SECRET

APPENDICES

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THE EMPLOYMENT OF THE NIGHT BOMBER FORCE IN CONNECTION  
WITH THE INVASION OF THE CONTINENT FROM THE U.K.

1. "OVERLORD" must now presumably be regarded as an inescapable commitment and it is therefore necessary to consider the method by which our most powerful offensive weapon, the heavy bomber force, can be brought to bear most effectively in support of it. This paper gives a summary of the potentialities and limitations of the force from this point of view.

CHARACTER OF THE HEAVY BOMBER FORCE

2. The heavy bomber force has been developed as an independent strategic weapon. Its task is the destruction of the enemy's industrial centres and to carry this out it has been equipped with highly specialised aircraft and evolved a similarly specialised and complex operational technique which has enabled it to perform its function with efficiency and economy. It is essential that the nature and extent of this specialisation should be clearly borne in mind in all planning for the employment of the force in connection with "OVERLORD" since it constitutes an unavoidable limitation on the tasks which can be undertaken with any prospect of success.

DAY OPERATIONS

3. The first point to note is that the bomber force is trained to operate at night and at night only. It would require at least six weeks of fair weather training to convert crews to day work. Even then, the aircraft are completely unsuited for anything but night operations since armament has largely been sacrificed in the interests of range and bomb carrying capacity. Furthermore, the height at which any of the types in use could operate in formation (which is essential for day work) is so low that flak opposition alone would be lethal. Day operations are therefore absolutely out of the question and could in no circumstances be undertaken.

NIGHT OPERATIONS

4. Long experience of night operations has shown that it is impossible for night bombers working individually to carry out a successful and concentrated attack on even a large and clearly defined target, except under conditions of excellent visibility, bright moonlight and meagre opposition. Even then camouflage and the skilful use of decoys by the enemy are very likely to cause the attack to miscarry. It is therefore necessary always to use some form of Pathfinder technique. For this purpose we have OBOE and H2S by means of which Pathfinder aircraft can drop target indicator bombs. OBOE is limited by its short range (the table of range and heights is at Appendix A). OBOE Mark I is now very unreliable and the satisfactory form of OBOE Mark II (Album Leaf) is still in very short supply. Apart from technical failures such marking is accurate within about 300 to 400 yards, and it should be possible in suitable weather conditions to secure a good concentration within a minimum radius of 1,000 yards with reasonable opposition. Finally, OBOE is susceptible to jamming by the enemy and for this reason cannot be fully relied upon. It might be put out of action at any moment. H2S is unlimited in range but is not yet technically reliable and its accuracy very largely depends on the nature of the target. It gives the best results when used against isolated and densely built-up industrial areas surrounded by open country. It cannot identify small precise targets such as factories, bridges or defended zones.

5. In addition to OBOE and H2S, a further blind bombing instrument, G.H. is now becoming available though only in small numbers. This gives a slightly longer range but no greater possibility of accuracy than OBOE;

it can be employed by a number of aircraft individually and simultaneously against precision targets. The number of sets which are expected to be available in the near future, however, is inadequate to justify hopes of any considerable results against military targets being achieved by this means.

6. The heavy bomber force must therefore operate by night and night bombing cannot be successfully undertaken except with the aid of some form of blind bombing device and a Pathfinder force of highly skilled crews whose numbers are necessarily limited.

#### METHOD OF NIGHT ATTACK

7. The nature of OBOE and the limited number of H2S sets and trained crews available make it necessary for the target to be marked by the Pathfinders in such a way that it can be recognised and bombed by aircraft of the main force. Instrument bombing by individual aircraft (except P.F.F. and a small number of the main force) is not practicable.

8. The successful use of blind bombing devices demands a high standard of experience from the Pathfinder crews. It is impossible to replace these specialised crews quickly, and this precludes any type of operations, (such as attacks on bright moonlight nights against heavy fighter opposition) in which they would be subject to any undue casualty rates.

#### WEATHER RESTRICTIONS

9. The three types of heavy bombers have varying limitations for bombing above clouds. The Stirling cannot operate with clouds above 10,000 feet, the Halifax above 14,000 and the Lancaster above 17,000 if they are to have sufficient air room to keep above the clouds and see the sky markers. It is of course necessary to have fit bases and ice free areas for climbing and descending.

10. It therefore follows that the choice of target for the heavy bomber force is chiefly governed by the weather. As all night attacks must be aided by blind bombing devices it is necessary to choose an area in which the weather is suitable for their effective use. The smaller and more precise the target the more exactly must the weather conditions conform to what is required if success is to be achieved.

#### TACTICAL RESTRICTIONS

11. The choice of target on any given night is further influenced by tactical considerations. The Pathfinder Force operating in full strength can mark an OBOE target for about half an hour under good conditions. It can mark a number of targets on the same night provided that the total time of marking does not exceed 30 minutes. About twenty minutes must be allowed between targets for technical reasons connected with ground stations. By using each OBOE aircraft and crew twice in one night, provided that the duration of sortie and the length of the night permitted, it would occasionally be possible to double the above programme. With regard to H2S the most experienced crews must be used to start the attack in the right place and it would be impossible, without using crews and aircraft more than once, to mark more than two targets during the course of one night. It will therefore be seen that the need for employing the Pathfinder technique limits the number of targets which can be attacked during the course of one night. It is not possible to use the Pathfinder Force in strength for more than two nights running without greatly impairing its effectiveness. For a period of about twelve days it would be possible to work two nights out of every three without undue fatigue.

MAXIMUM MONTHLY EFFORT

12. The maximum effort which the force can sustain is approximately 5,000 sorties per month, if non-operational wastage is normal and operational wastage does not exceed 4%. This allows approximately eight full scale attacks per month.

13. These considerations largely determine whether on any given night operations are possible at all and, if they are, the general area in which they must take place. Further important restrictions, however, are imposed in summer by the hours of darkness which automatically restrict the range at which operations can be carried out. Finally, it must be remembered that the height of cloud tops is of importance in determining routes and areas of attack.

14. Thus the dates and times on which selected targets can be attacked by heavy bombers, depending as they do almost wholly on weather conditions, cannot be predicted with any approach to accuracy.

"FLEETING TARGETS"

15. It follows that the heavy bomber force, while it is an immensely powerful weapon if employed under suitable conditions against objectives which it is designed to attack, can be entirely ineffective if incorrectly used. It is also quite incapable of being brought into action quickly against "fleeting targets" since the objective when once selected cannot be changed at will. The time required to refuel and service the aircraft, to bomb up, brief crews and marshal the force is such that with maximum efficiency some seven daylight hours are the minimum necessary between the decision to bomb a given target and the take off of aircraft to attack it - and the target cannot be altered during that period without involving a new start and consequent further delay. If bombing up and other preparatory work has to be done during hours of darkness, the period of seven hours must be extended to nine or ten hours.

PROGRAMME BOMBING

16. It is obvious, therefore, from what has been stated above that standing by for a particular target on a definite date is hopelessly uneconomical. Whenever it has been tried, the result has been to miss both the particular target (because of unfavourable weather) and the opportunities for other useful attacks which have offered themselves. "Programme bombing" except over a long period and in the most general terms, is thus ruled out altogether as an operation of war. The experiences of the U.S. VIII Bomber Command have fully demonstrated the truth of this proposition.

17. Consequently anything like a planned schedule of bomber operations designed to give immediate assistance to programme to ground forces engaged in effecting a landing or operating in the field would be extremely unreliable and almost wholly futile. In the event of favourable weather conditions, a 'drenching' attack on selected beaches immediately before the assault would be practicable. If this were decided upon, however, it would be essential for all concerned to realise clearly that it could be regarded only as a contingent possibility. For reasons already stated it could not possibly form an integral part of any invasion plan. It would also, if adopted, necessarily involve so much cratering of a large area which could not be at all precisely defined that the result on enemy morale might well be outweighed by limitations of movement imposed on the attackers. In no circumstances could it be relied upon to destroy gun emplacements or cause noticeable casualties to defenders in slit trenches. 'Area' bombing of objectives further back would similarly be entirely dependent on weather conditions and would be very unlikely to achieve sufficient accuracy to be of any

material assistance to the Army. Nor is the heavy bomber force suitable for cutting railway communications at definite points. Indeed, in Western Germany, France and the Low Countries, owing to the multiplication of roads and railways and the impossibility of maintaining the requisite continuity of action in the prevailing weather conditions, such a policy is probably impracticable with any type of bomber force. It is therefore essential for any bombing designed to assist the Army to be planned on the broadest possible lines. As many alternative targets as possible should be included, so that if weather precludes the attack of any one on a given night the desired result may be achieved by the attack of others. For example, the general dislocation of the German railway system may be achieved by the attack of targets, among others, as widely separated as Cologne, Kassel and Berlin.

#### COST OF CHANGING BOMBING POLICY

18. The outstanding feature of the strategic situation at the moment is the over-riding priority which Germany must give to all methods of warding off as far as possible the bomber offensive against the home front and of mitigating its effects on industrial output and morale. The extent to which man power and production are looked up in active and passive defence measures is indeed well known and it is presumably also realised that, with the cessation of bombing attacks on the Reich which direct support of the Army before, during and after invasion would entail, the major part of these vast resources in fighters, flak, searchlights and their crews would automatically be released for use in the relatively very small invasion area. This, however, although very important, is only a part of the cost of such a change in policy.

19. The effects of strategic bombing are cumulative. The more that productive resources are put out of action, the harder it is to maintain output in those which survive. It is easy to forget, however, that the process of rehabilitation if the offensive stops or weakens is similarly cumulative. To put it shortly, the bomber offensive is sound policy only if the rate of destruction is greater than the rate of repair. It is hard to estimate the extent to which Germany would recoup industrially in say a six months' break in bombing. It would certainly be sufficient to enable her to take a very different view of her prospects on land, on sea and in the air.

20. Indeed it is true to say that if the German army survives the present crisis in Russia (and if it fails to do this, OVERLORD will in any case be superfluous), the cessation of bombing even temporarily would make her military position far from hopeless. What the Russians have done and what we ourselves hope to do on land is fundamentally made possible only by the acute shortage of man power and munitions which strategic bombing has produced, and by the preoccupation of nearly three quarters of the enemy fighter force with the defence of Germany proper. Remove the bombing and the shortages would comparatively soon be remedied at least in sufficient measure to put an entirely new complexion on the war on land.

#### MORALE

21. There could be no greater relief afforded Germany than the cessation or any ponderable reduction of the bombing of Germany proper. The entire country would go wild with a sense of relief and reborn hope, and get down to the prosecution of a purely land war with renewed determination and every hope of success.

#### CONCLUSION

22. It is thus clear that the best and indeed the only efficient support which Bomber Command can give to OVERLORD is the intensification of attacks on suitable industrial centres in Germany as and when the

opportunity offers. If we attempt to substitute for this process attacks on gun emplacements, beach defences, communications or dumps in occupied territory we shall commit the irremediable error of diverting our best weapons from the military function, for which it has been equipped and trained, to tasks which it cannot effectively carry out. Though this might give a specious appearance of 'supporting' the Army, in reality it would be the gravest disservice we could do them. It would lead directly to disaster.

(Sgd.) A. T. Harris  
Air Chief Marshal,  
Commanding-in-Chief,  
BOMBER COMMAND

BC/MS.31156/C-in-C.

13th January 1944.

## COMMENTS ON BOMBER COMMAND MEMORANDUM FOR THE EMPLOYMENT OF NIGHT BOMBERS

## IN CONNECTION WITH 'OVERLORD'

Paras. of Memorandum	Statements in C.-in-C's Memorandum	Comments by A.E.A.F.	Comments by the Air Staff
1	<p><u>Role of Bomber Command</u></p> <p>The Memorandum states without qualification that Bomber Command's task is the destruction of the enemy's industrial centres.</p>	<p>It is presumed that Bomber Command will have its role extended to include as and when required, the maximum assistance to 'OVERLORD'.</p>	<p>From a date in the preparatory phase of 'OVERLORD' yet to be selected, the primary object of Bomber Command will become the support of that operation, and all or part of the forces of Bomber Command will be at the disposal of the Supreme Commander. That support will be, in the words of the directive 'in the manner most effective'. Once the type of support required from Bomber Command has been decided - and this will be done in conjunction with advisers from Bomber Command, it will be the duty of the C.-in-C. to do his best to fulfil these tasks.</p>
2	<p><u>Limitation of Bomber Command's Operations</u></p> <p>The nature of Bomber Command's operations is limited by the highly specialised aircraft and the complex operational technique employed.</p>	<p>It is not clear why targets in FRANCE should be any less suitable than industrial centres in GERMANY, provided they are carefully selected ones, e.g. railway centres, or towns where the enemy's reserves are concentrated.</p>	<p>Although the heavy bomber force has been developed as an independent strategic force, its task is not necessarily the destruction of enemy industrial centres. The highly specialised equipment and operational technique has been evolved to enable the force to place its bombs accurately on the desired target. Although bombing accuracy so far achieved has only enabled the force to carry out area bombing by night, the aim is still to achieve the most accurate bombing possible; all technical development is to this end. The unavoidable limitations of Bomber Command in support of 'OVERLORD' are due to inability to achieve a high accuracy of bombing and not to the nature and extent of any specialisation which is taking place.</p>
3	<p><u>Day Operations</u></p> <p>Because of training, armament and ceilings when flying in formations, day operations are absolutely out of the question and could in no circumstances be undertaken.</p>	<p>It is not anticipated that our night bombers will normally be called upon for day operations.</p>	<p>Bomber Command have within the last two years carried out daylight attacks on Augsburg, Danzig, Cruesot and Milan. These were done with little previous daylight training, and if necessary squadrons could again be trained to operate in daylight probably with less than six weeks being set aside for the purpose, especially in view of the shorter ranges involved and the degree of fighter cover which would be afforded in this theatre of operations. Their armament is no less efficient than some squadrons in the Tactical Air Forces; the height at which it would be necessary to fly would be dependent on the flak opposition in the 'OVERLORD' area. Tactical Air Forces are already operating at heights and below those heights at which our heavy bombers could operate. It is considered, however, that there would be little if any call for the R.A.F. Bomber Command to operate by day since they can be effectively employed at night in support of landing operations. Moreover, American heavy bomber forces in numbers equal to those of R.A.F. Bomber Command will be available for precision daylight attacks.</p>



Paras. of Memorandum	Statements in C.-in-C's Memorandum	Comments by A.E.A.F.	Comments by the Air Staff
15	<p><u>'Fleeting Targets'</u></p> <p>The heavy bomber force is quite incapable of being brought into action quickly against 'fleeting targets'. The time required to refuel, service and bomb up the aircraft, brief the crews and marshal the force is such that with maximum efficiency some seven daylight hours are the minimum necessary between the decision to bomb a given target and take-off of aircraft. The target cannot be altered during that period without involving a new start. If the preparatory work has to be done in darkness the minimum period would be extended to nine or ten hours.</p>	<p>It is not proposed to whittle Bomber Command away by operations against 'fleeting targets'. In the main, tactical results will be achieved as a result against 'OVERLORD' strategical targets. The statement appears to refer to the 'turnround' period. For operations against important transient targets connected with 'OVERLORD' during the critical period, Bomber Command forces could be standing by and some simplified briefing procedure arranged. Under these circumstances it would seem that the period between the order to attack and the take-off could be reduced by day to something more of the order of 60 minutes.</p>	<p>This paragraph gives an exaggerated impression of the time necessary to bomb up for the attack of targets of the type likely to be attacked during the period of two weeks before and after D day. Standard bomb loads will be used and these can be prepared in advance at dispersal points. It is not correct to say that the target cannot be altered during the period of seven hours without involving a new start and consequent further delay. In bombing by marker technique the target can be changed at short notice.</p>
16 - 17	<p><u>'Programme Bombing'</u></p> <p>'Programme bombing' except over a long period and in the most general terms is ruled out altogether as an operation of war. A planned schedule of heavy bomber operations to give immediate assistance to ground forces would be extremely unreliable and almost wholly futile. Beach drenching could be regarded only as a contingent possibility and could not form an integral part of any plan. In no circumstances would heavy bombers be relied on to destroy gun emplacements, nor are they suitable for cutting railway communications.</p>	<p>It is not accepted that 'programme bombing' cannot be undertaken, in the 'OVERLORD' theatre of operations. This statement would appear to have been made without full knowledge of the tasks which the heavy bomber force would be called upon to perform in support of the Operation.</p>	<p>The drenching of beaches by heavy bomber attack will not necessarily involve the cratering of a large area of coast to an extent imposing limitations on our own troop movements. 500 lb. bombs with instantaneous or air burst fuzes should be used, and little cratering will in fact result. The effect of bombing attacks on gun emplacements has been exhaustively examined by an Inter-Service Committee, and they agreed that if guns are not provided with overhead cover a high degree of neutralization can be effected. Similarly with air burst and instantaneous fuzed bombs appreciable casualties and lowering of morale can be caused to defenders in slit trenches. Professor Zuckerman's Report on bombing of communications in Sicily and Italy shows exclusively that great effect can be achieved by heavy bombers, and that if it is to have immediate effect in the battle area the targets selected must be close to that area and not hundreds of miles away as is suggested in the C.-in-C's memorandum.</p>
18 - 20	<p><u>Cost of Changing Bomber Policy.</u></p> <p>States the case for continuing the heavy bomber offensive on GERMANY and the consequences of a six-months break in this offensive.</p>	<p>The cost of diverting the whole or part of the heavy bomber effort to the direct support of 'OVERLORD' would certainly receive the fullest consideration and the decision to do so will be taken at the highest level.</p>	<p>The general contentions of these paragraphs that the effects of strategical bombing are cumulative and that there is recovery rate as well as destructive rate, and that therefore any cessation of attacks on Germany is to be avoided is accepted. It is incorrect, however, to suggest that these arguments apply to an interruption of say two weeks or even to a temporary diminution of effort due to the needs of 'OVERLORD'. Weather conditions have many times imposed periods of interruption of the attack of Germany. It is incorrect to suggest that a relatively short interruption even of several weeks of the bombing of Germany would enable the enemy to redispense the major part of his air and ground defences and move them from central Germany to the Invasion Area.</p>

Paras. of Memorandum	Statements in C.-in-C.'s Memorandum	Comments by A.E.A.F.	Comments by the Air Staff
21	<p><u>Morale</u></p> <p>Germany would go wild with a sense of relief and reborn hope with a cessation or ponderable reduction of the bombing of GERMANY proper.</p>	<p>Failure of Operation 'OVERLORD' would result in far graver repercussions than a temporary cessation in the bombing of German centres.</p>	<p>Whilst it is entirely practicable for Bomber Command during certain phases of 'OVERLORD' materially to assist land operations, this can be done without allowing the German population to receive any appreciable respite from bombing attack. It should be possible even with the needs of 'OVERLORD' to maintain a sufficient degree of pressure on Germany so as to allow of no recovery in morale. Indeed, some such constant pressure will be necessary in order to compel the enemy to maintain fighter forces in Germany and prevent a complete concentration in the 'OVERLORD' area.</p>
22	<p><u>Conclusions</u></p> <p>The Bomber Command Memorandum concludes by stating that it is clear that the best, and indeed the only, effective support Bomber Command can give to Operation 'OVERLORD' is the intensification of the attacks against suitable industrial targets in GERMANY.</p>	<p>The desirability of maintaining the Bomber Command offensive against industrial centres in GERMANY is fully appreciated. Bomber Command must, however, be diverted in whole or part as required to the attack of suitable targets in support of Operation 'OVERLORD' in the preparatory phase, during the assault, and subsequently.</p>	<p>The comments of A.E.A.F. are agreed. The extent to which the support of Bomber Command will be required in the various phases of 'OVERLORD' will be determined by the C.C.O.S. after they have had General Eisenhower's recommendations. The C.O.S. and the C.C.O.S. are in a position to balance the respective needs of 'OVERLORD' and 'POINTBLANK' and can adjust the degree of support required from the strategical air forces, in accordance with the particular requirements at the time.</p>

D.C.A.S.  
27 Jan. 1944

PLAN FOR THE COMPLETION OF THE COMBINEDBOMBER OFFENSIVE (5 MARCH 1944)1. THE AIM

It is essential at this time to re-clarify the aim of the Strategic Air Forces. The aim can be restated, as expressed by the Combined Chiefs of Staff at Sextant, as: "the progressive destruction and dislocation of the German military, industrial and economic system, the disruption of vital lines of communication and the material reduction of German air combat strength, by the successful prosecution of the Combined Bomber Offensive from all convenient bases." Implied in this aim is the direct support of Overlord. It is essential to point out that the destruction of German Fighter production, and the diminution of the German Fighter Force in being, is an essential means of rendering the aim more readily attainable. It is also a prerequisite for Overlord. Pointblank does not terminate with the disposal of the high priority targets in the German Fighter Industry and the Ball Bearing Industry.

2. AN APPRECIATION OF THE PRESENT SITUATION

A satisfactory degree of destruction to German Fighter Force production and Ball Bearing production is well on the way to achievement. It is within the capacity of our Strategic Air Forces to continue attacks against these two industries ancillary to other operations. A prime essential in any plan must now include the rapid attrition of the German Fighter Force in being. It is felt that this can best be achieved by attacks on objectives which are so vital to the German War Machine that they must defend them with everything they have, or face the rapid reduction of their military forces to impotence. In view of the imminence of Overlord, it is appropriate here to state some of the conclusions reached as the result of the last two weeks' operations. These are briefly as follows:

- (a) Irrespective of the exact percentages of attrition and destruction to new production inflicted on the German Fighter Force in the last two weeks, the German Fighter Force will never be as strong again in the foreseeable future as it was two weeks ago.
- (b) The striking power of the heavy bombers and long-range escort fighters of the Strategic Air Forces will steadily increase.
- (c) At the peak of its strength two weeks ago, the German defense was powerless to prevent the destruction by our Air Forces of selected precision targets, widely distributed over all of Germany and Austria. In attempting to prevent the destruction of these objectives, the German defenses were unable to inflict sufficiently heavy casualties on our Forces to deter them from continuing such operations.
- (d) As a result of an evaluation of sub-paragraphs a., b., and c. above, it is concluded that Germany is powerless to prevent the destruction by our Air Forces of any system of targets which we may now select for the accomplishment of our real aim. The only factors that can prevent success are:
  - (1) A misapplication of our Forces by their direction against unprofitable target systems.
  - (2) The continued direction of our forces at previously profitable systems beyond the point where the law of diminishing returns comes into effect.

(3) Unpredictably adverse weather.

(e) In view of the urgent time factor, the attack on these new target systems must commence forthwith.

3. GUIDING PRINCIPLES:

In the formulation of any plan for the employment of the Strategic Air Forces at this time, the following principles must govern the action to be adopted:

(a) It must provide for the existence of air supremacy at the time of the assault.

(b) It must favor a Rankin.

(c) In the event that a Rankin has not materialized it must have made maximum contribution to the success of Overlord.

4. OBJECTIVES SELECTED FOR ATTACK:

All target systems have been re-examined in the light of the present situation, and systems have been selected based upon the conclusion that attacks against them are most likely to accomplish our aims. These systems most nearly of all conform to the requirements stipulated in the Guiding Principles, and provide essential tactical latitude.

(a). The selected systems listed in order of priority for attack are:

(1) PETROLEUM INDUSTRY, WITH SPECIAL EMPHASIS ON GASOLINE (PETROL) AS OPPOSED TO OIL IN GENERAL

Estimated Effects: (a). Current supplies of all petroleum products will be reduced to about 50 percent over the six months beginning with the assault on this system, and the loss will be greater in motor fuel than in lubricants. The result of policy decisions based on the anticipations of these effects will be immediate. (b). A likely form in which the Germans will choose to accept this loss will be the denial to their military forces of at least one third of their requirements, and a reduction in essential industrial consumption by about one half. (c). In order to limit the loss to this extent the Germans will be forced to put into action now-idle refining machinery in Western Europe, where it would be easily accessible to subsequent attack. (d) This reduction of German military and industrial capabilities will have the following effects: (1). The efficiency and mobility of troops on existing fronts will be seriously impaired; and the ability of the Germans safely to withdraw troops from these fronts to the West will be consequently limited. (2). This general embarrassment, affecting the capabilities of all ground forces, will be an important factor in the decision of the German High command to continue resistance after D-Day. (e). This target system offers the maximum opportunity for reducing the defensive capabilities of the German Army by heavy bomber attack outside the tactical area.

(2) GERMAN FIGHTER INDUSTRY AND THE BALL BEARING INDUSTRY

Estimated Effects: (a). It will limit monthly production of Fighters to less than 200 single-engine types, and less than 100 twin-engine types. (b). With that continuing level of production, air supremacy is assured: the G.A.F. will be incapable of offering serious opposition to other strategic operations against German targets, or of sustaining large-scale close support operations from D-Day

forward, (c). It will limit German ball bearing production to not more than 35 percent of the November 1943 level. (d). With that continuing level of production, a spreading crisis will be imposed on German industry producing aircraft of all types, and on other major forms of finished armaments, as well as upon the G.A.F. and German Army Maintenance Commands.

(3) RUBBER PRODUCTION, TYRES AND STOCKS

Estimated Effects: (a). It will limit German Rubber production to about 35,000 tons, or roughly 25 percent of the rate obtaining at 1 March 1944. (b). With that continuing level of production a spreading crisis will be imposed on the German Army which will progressively limit its mobility. (c). The effects of this crisis will be felt from about three months after the beginning of attack, and will reach its climax six to eight months after the attack. The result of policy decisions based on the anticipations of these effects will be immediate.

(4) BOMBER PRODUCTION

Estimated Effects: (a). Bomber production will be held to a level of less than 150 per month. (b). At this continuing level of production the German bomber force will be incapable of sustained operations in close support. (c). Sporadic attacks of limited objective will be within the capabilities of the German bomber force.

LAST RESORT TARGETS

Transportation centers in Germany will be attacked as targets of last resort when weather conditions do not permit the precise attack of primary targets.

(b) The above is the program for Strategic Bombing from the present time until the time required to initiate the tactical support of Overlord. It is estimated that the four systems will require 15 days' effort of visual bombing for their accomplishment by the Eighth Air Force and 10 days by the Fifteenth Air Force.

(c) Beginning at the time when a major part of the effort of the Strategic Air Forces will be required directly to assist in the ground operation, intensive operations will be carried out in the tactical area in great strength. The system selected for attack during this period is:

TRANSPORTATION AND OTHER TACTICAL TARGETS IN ACCORDANCE WITH AN AGREED PLAN FOR THE DIRECT TACTICAL SUPPORT OF OVERLORD.

During this period sufficient operations should be carried out deep into Germany to insure the retention, away from the tactical area, of large portions of the remaining German Fighter Force.

(d) Attacks against the selected systems will give the maximum support to Overlord by:

(1) Assuring air supremacy at the time of the assault.

(2) Confronting the German army with a progressively tightening fuel supply situation on all fronts, so that redistribution of strategic ground reserves and other military operations will be adversely affected by the time of assault, and thereafter.

(3) Further restricting the essential military industrial production upon which the German armed forces depend.

(4) Providing required direct support.

5. In the implementation of this plan, except for the period of direct tactical support, no action is required by the Combined Chiefs of Staff inasmuch as it is within the scope of existing directives implementing Pointblank. The machinery for individual target selection exists through the Target Committee of Air Ministry, and USSTAF. Concerted action is required, however, by the Supreme Allied Command, Air Ministry, and USSTAF in order to determine the nature of the tactical support to be rendered by the Strategic Air Forces during the tactical support period. It is, therefore, recommended that a Committee for that purpose be established by agreement of Air Ministry, Supreme Allied Command, and USSTAF.

PART 10

TARGET POTENTIALITIES OF OIL - MARCH 1944

CONCLUSION

The major question regarding oil refineries and synthetic plants as a target system has been whether the number of targets and their depth in Germany permitted attack on the requisite scale. Until the present, it appeared that it was a target system beyond Air Force capabilities. In view of the substantial destruction of German fighter production and the consequent lesser fighter opposition, this job may now be with USSTAF and RAF capabilities. If this be the case, no other target system holds such great promise for hastening German defeat.

Twenty-three synthetic plants and 31 refineries currently account for over 90 per cent of total Axis refinery and synthetic oil output. 14 synthetic plants and 13 refineries account for over 80 per cent of synthetic production and over 60 per cent of readily usual refining capacity. The effect of attack on these plants would fall more heavily on motor fuel than upon lubricant production, and it would reduce the total current supply of fuel by an estimated 50 per cent.

The loss of approximately 50 per cent of Axis output would directly and materially reduce German military capabilities through reducing tactical and strategic mobility and front-line delivery of supplies, and industrial ability to produce weapons and supplies. The impact in time of these attacks would be hastened by German policy decisions, based on anticipations of their effects.

The extension of attacks to storage facilities in Western Europe might directly impair German mobility in deploying to meet OVERLORD. Indirect benefit to OVERLORD would in any case result from the lessened mobility of German divisions in Finland and Norway, Russia, the Balkans, and Italy.

1. PRODUCTION AND STOCKS

If refineries and synthetic plants are not attacked, it is estimated that Axis production of liquid fuels and lubricants during the six months following 1 March 1944 will be 8.6 million tons, comprised as follows:

Crude and Shale oil products	4.1 million tons
Synthetic oil products	3.3 " "
Substitutes, vegetable oils, etc.	1.2 " "

Estimated stocks of finished products at 1 March 1944 aggregate about four million tons, equivalent to about three months output and consumption. These stocks include reserves and the entire distributional pipeline, approximately as follows:

Military and civil reserves	1.0 million tons		
Operating stocks at Consumption points	1.6	"	"
Stocks in transit	.6	"	"
Stocks at refineries and synthetic plants	.8	"	"
	<u>4.0</u>	"	"

Not all of these stocks could be consumed by the military if output ceased. Some of the stocks at refineries and synthetic plants would be destroyed in bombing. And some of the reserves, operating stocks, and in transit stocks would not be the particular types of products needed (e.g., industrial fuel oil would not satisfy a need for petrol or lubricants).

## 2. STRATEGIC SIGNIFICANCE OF OIL PRODUCTION

The consumption pattern for the six month period following 1 March 1944, assuming an output of 8.6 million tons, is estimated as follows:

<u>Military</u>	<u>Millions of Tons</u>	<u>Per cent.</u>
Army	2.7	31
Air Force	1.3	15
Navy	.9	11
Total Military	<u>4.9</u>	<u>57</u>
<u>Non-Military</u>		
Industrial & Civil	2.9	34
Miscellaneous	.1	1
Increase in Stocks	.7	8
	<u>3.7</u>	<u>43</u>
Total	8.6	100

The relevance of oil production for Army, Air Force and Navy operations is clear; as indicated, stocks suitable for military consumption are sufficient for only several months military operations.

Denial of oil supplies to the Axis industry and agriculture would impose very severe economic restriction of an attritional character on the economy. This is not immediately or directly relevant.

The political and morale effects of destroying Germany's ability to produce oil would be substantial. The will to resist of the German High Command and Wehrmacht, the German political leaders, and the German industrial leaders would be weakened. The will to resist of the German people would be less seriously affected, although they would no doubt regret the disappearance of oil for transportation, food production, power, heat, and industrial requirements.

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Note: Figures on output, consumption, and stocks are taken or interpolated from papers by U.S. Enemy Oil Committee and British Hartley Committee.

### 3. VULNERABILITY

Oil refineries and synthetic oil plants are moderately vulnerable to bomb damage in terms of structure, industrial process, and plant layout. They are large in size, relative to other targets, and would probably require a larger scale of attack than is necessary for, say, aircraft plants. Recuperation time for a severely damaged plant is relatively slow, six months and more.

### 4. TARGETS

To reduce output in synthetic plants and refineries to virtually zero in the six months following 1 March requires the destruction of 23 synthetic plants (about 3.3 million tons) and 31 refineries (about 3.7 million tons). The capacity of the 31 designated refineries is about  $1\frac{1}{2}$  times as large as their output; it is necessary to destroy this excess capacity as well as the capacity in operation. Additional excess capacity in France, Holland and Italy, inconveniently located, might be resorted to by the Germans as an extreme measure. Many are coastal refineries which formerly handled crude oil from ocean tankage. They are located within easy bombing range. A list of the 54 targets involved is attached.

### 5. EFFECTS

The impairment to German military and industrial capabilities and German morale which would be achieved from actually putting the 23 synthetic plants and the 31 refineries out of action, is very great. If military oil supplies could be totally denied, their resistance to Russian offensives would collapse when stocks were used up; resistance to OVERLORD could be maintained only as long as stocks endured; and GAF air opposition to USAAF and RAF activity would cease with the disappearance of stocks. Destruction of over half as much output, that is, about more than 3.5 million tons in the six months following 1 March would (a) deny to the Axis military forces one-quarter to one-third of their military requirements of about 5 million tons; and (b) reduce industrial and civilian supplies by one half. These effects would be militarily significant, directly through impairing military mobility and front line delivery of supplies, and through affecting industrial ability to produce weapons. The impact in time of these attacks would be hastened by German policy decisions based upon anticipations of their effects. Achievement of much less than half the program, however, would permit the decrease in output to be absorbed by changes in stocks, some decrease in non-military consumption, and insubstantial reductions in military consumption. It would not necessarily have significant direct or indirect military effects.

The destruction of oil production might not affect materially the opening stages of OVERLORD if the Germans choose to allocate stocks to the Western Front. Although if production facilities were destroyed these stocks could probably be profitably attacked as tactical targets, the small volume of oil required for initial OVERLORD operations could not confidently be expected to be denied the Germans.

### 6. TARGET LISTS

The following tables require a word of explanation.

Table 1 presents synthetic oil plants and their output.

Table 2 includes all Axis refineries capable of handling crude oil which are believed to be operating at more than 60,000 tons per annum. It also included five large refineries of unknown activity which represent convenient alternative capacity. Table 2, in short, is the list of primary oil objectives in the refining field.

Table 3 lists major refineries not now believed to be engaged in crude oil refining. Some are definitely known to be inoperative and some are believed destroyed or dismantled. The great majority are inconveniently located; German efforts to use them would be an extreme measure. Aerial reconnaissance of these, particularly those for which inactivity is not certain, is essential to prevent major loopholes from arising in the target systems.

Table 4 lists all other European refineries capable of operating on crude oil. Current information on their activity, which could be improved by aerial reconnaissance, is indicated. Operating plants represent useful secondary objectives or targets of opportunity. The aggregate capacity of these plants is sufficient to refine 14 per cent of crude oil output and could represent 8 per cent of total oil output. Their attack, therefore, is not an essential ingredient of the oil target system.

TABLE 1

Synthetic Oil Plants - March 1, 1944.

Location	Annual Output (in thousands of tons)	Per cent of Total Synthetic Output	Per cent of Total Synthetic and Refining Output
x 1. Brux	680	10	5
x 2. Leuna	620	9	4
x 3. Poelitz	620	9	4
x 4. Blecklammer South	520	8	4
x 5. Gelsenkirchen Nordstern	430	7	3
x 6. Scholven-Buer	380	6	3
x 7. Schwarzheide	350	5	2
x 8. Troglitz Zeitz	340	5	2
x 9. Bohlen Rotha	320	5	2
x10. Magdeburg	300	5	2
x11. Blecklammer North	270	4	2
x12. Wesseling	220	3	1
x13. Homberg	190	3	1
x14. Castrop Rauxel	150	2	1
15. Lutzkendorf	150	2	1
16. Lutzkendorf Mucheln	150	2	1
17. Holton	130	2	1
18. Krupp (Wanne Eickel)	130	2	1
19. Welheim Bottrop	120	2	1
20. Deschowitz	110	2	1
21. Essener Verein	100	2	1
22. Hoeseh	90	1	1
23. Kuhlman (Harnes)	30	1	-
24. Unknown Plants	200	3	1
	<u>6,600</u>	<u>100</u>	<u>45</u>

x Selected for immediate attack: 81 per cent.

TABLE 2

Primary Crude Oil Refinery Objectives

<u>Known to be large producers</u>	<u>Refinery</u>	<u>Capacity (In thousands of tons per annum)</u>		<u>Percentage of total usable capacity suit- ably located (In percent.)</u>	
x 1.	Astra Romana	Ploesti, Rumania	1,750	Capacity operation	14
x 2.	Concordia	Ploesti, Rumania	1,300	Major portion in use	10
x 3.	Americana	Ploesti, Rumania	1,100	Capacity operation	9
x 4.	Unirea	Ploesti, Rumania	800	Major portion in use	6
x 5.	Harburg, Germany		550	Capacity operation	4
x 6.	Petrol Block	Ploesti, Rumania	550	Major portion in use	4
x 7.	Lobau, Austria		350	Capacity operation	3
x 8.	Hannover, Misburg		300	Capacity operation	2
x 9.	Shell, Budapest, Hungary		220	Capacity operation	2
x10.	Dacia, Rumania		220	Major portion in use	2
x11.	Prahova Petrolul, Bucharest, Rumania		200	Major portion in use	2
12.	Pardubice, Czechoslovakia		180	Capacity operation	1
13.	Almas Fuzito, Hungary		170	Capacity operation	1
x14.	Bratislava		150	Capacity operation	1
15.	Columbia, Ploesti, Rumania		135	Capacity operation	1
16.	Floridsdorf, Austria		100	Capacity operation	1
17.	Bremen Oslebshausen, Germany		100	Capacity operation	1
18.	Caprag, Yugoslavia		120	Major portion in use	1
19.	Merkswiller, Pechelbronn, France		130	Major portion in use	1
20.	Drohobycz (Polmin), Poland		120	Major portion in use	1
21.	Magyar, Budapest, Hungary		90	Capacity operation	1
22.	Drohobycz, Galicia, Poland		90	Major portion in use	1
23.	Trzebzinja, Poland		90	Major portion in use	1
24.	Czechowice (Dziedzice), Poland		90	Major portion in use	1
25.	Kolin		80	Capacity operation for lube oil, not crude	1
26.	Kagran, Austria		75	Capacity operation	1
27.	Speranta, Ploesti, Rumania		400	Unknown	3
x28.	Eurotank, Hamburg, Germany		400	Unknown	3
29.	Xenia, Ploesti, Rumania		260	Unknown	2
30.	Redeventza, Rumania		230	Unknown	2
31.	Lumina Petromine, Rumania		140	Unknown	1
			<u>10,490</u>		<u>84</u>

x Selected for immediate attack: 62 per cent usable capacity suitably located.

Table 3

Major Crude Oil Refineries which are Unused or whose activity is unknown

	Capacity (In thousands of tons per annum)	
1. Confreville, France	1,600	Believed destroyed
2. Port Jerome, France	1,100	Believed destroyed
3. Martigues, France	900	Unused; inconveniently located
4. Petit-Couronne, France	800	Believed destroyed
5. Etang de Berre, France	500	Unused; inconveniently located
6. Rotterdam-Pernis	500	Very slight activity; inconveniently located
7. Pauillac	500	Believed destroyed
8. Venice, Italy	450	Activity unknown; inconveniently located
9. Dunkirk, France	410	Believed destroyed
10. L'Avera, France	400	Unused; inconveniently located
11. Aquila, Trieste, Italy	350	Activity unknown; inconveniently located
12. Bec d'Ambes, France	350	Unused; inconveniently located
13. Spezia, Italy	310	Unused; inconveniently located
14. Eban, Hamburg, Germany	300	Unused
15. Courchalettes, France	250	Activity unknown
16. Gravenchon, France	250	Believed destroyed
17. Frontignan (Sete)	200	Unused; inconveniently located
18. Leghorn, Italy	185	Believed destroyed
19. Donges, France (2 plants)	320	Unused; inconveniently located
20. Ostermoor, Hamburg, Germany	150	Unused
21. Ramsa, Fiume, Italy	120	Believed destroyed
22. Siap, Trieste, Italy	120	Activity unknown; inconveniently located
23. Antwerp (Redeventza) Belgium	120	Believed destroyed
24. Lumanowa, Poland	90	Used for storage
25. Ghent, Langerbrugge (Shell), Belgium	85	Activity unknown
26. Novy Bohumin (Oderberg), Czechoslovakia	65	Activity unknown
Total capacity exceeding refineries destroyed, or inconveniently located	940	
Percentage of total usable capacity suitably located		7 per cent.

TABLE 4

Minor Crude Oil Refineries

<u>Refinery</u>	<u>Capacity</u> (In thousands of tons per annum)	<u>Remarks</u>
<u>Rumania</u>		
Noris	50	Activity unknown
Brasso-Vacuum	35	Partial operation
<u>Austria</u>		
Schwechat	50	Capacity operation
Kornenberg	45	Capacity operation
Vosendorf	40	Capacity operation
Drossing	35	Activity unknown
<u>Hungary</u>		
Fanto Budapest	50	Capacity operation
Hazaii	50	Capacity operation
Munkacs	25	Major portion in use
Petfurdo	20	Major portion in use
Nyirbogdany	15	Major portion in use
Szoreg	10	Major portion in use

SECRET

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TABLE 4. (Contd.)  
Minor Crude Oil Refineries

<u>Refinery</u>	<u>Capacity</u> (In thousands of tons per annum)	<u>Remarks</u>
<u>Czechoslovakia</u>		
Dubova	60	Major portion in use
Prvoz (Moravska Ostrava)	55	Activity unknown
Kralupy	40	Activity unknown
<u>Yugoslavia</u>		
Smederovo	50	Activity unknown
Osijek (Ipoll)	25	Activity unknown
<u>Poland</u>		
Meglowice (Jaslo)	60	
Clinik-Mariampolski	60	Major portion in use
Drohobycz (Nafta)	35	Major portion in use
Krosno	30	Used for storage
Lwow	30	Major portion in use
<u>Italy</u>		
Fornovo Tara	50	Activity unknown; inconveniently located
<u>Germany</u>		
Dusseldorf	25	Activity unknown
Regensburg (4 targets)	80	Activity unknown
Schonberg	18	Activity unknown
Templehof	15	Activity unknown
<u>France</u>		
Autun	15	Shale oil operation
<u>Norway</u>		
Vallo-Tonsberg	50	Activity unknown; inconveniently located
<u>Belgium</u>		
Antwerp-Kiel	50	Believed destroyed
Ghent Langerbrugge	20	Activity unknown
Hoboken (Soconj)	20	Believed destroyed
Antwerp-Darse	20	Activity unknown
<u>Holland</u>		
Flushing Asphalt	<u>40(?)</u>	Activity unknown
Total, excluding the few believed destroyed or inconveniently located		
	<u>1,253</u>	
Percentage of total usable capacity suitably located		
	<u>9 per cent.</u>	

DISLOCATION OF ENEMY LINES OF COMMUNICATION

18. The dislocation of enemy lines of communication, so as to impede both the movements of reinforcements into the assault area, the movement to FRANCE of Divisions either from inside GERMANY, Occupied Territories, or from other fronts, and the maintenance of the whole enemy force in FRANCE and BELGIUM, necessitates attacks on both the rail and road systems. Every consideration points, however, to the conclusion that attacks on the latter will be of little value before D-Day, and could be economically undertaken only once enemy movement has begun on a large scale in the tactical area. The success of the attacks would then depend to a considerable extent upon the character of the local topography and upon the accuracy of our Intelligence.

19. The Intelligence view is that a large part of the enemy forces which will first oppose our landings and lodgement, will, unless prevented, move by rail. If forced to the roads, the rate of the enemy's build-up will be slowed down. Moreover, enemy supplies are already known to be widely dispersed in the "NEPTUNE" area. So far as the outcome of the initial battle is concerned, the enemy would not therefore seem to be seriously dependent on the railway system, although if denied its use he would undoubtedly be put to disadvantage. It is, however, certain that large scale reinforcements and supplies from further afield, would, unless interrupted, have to take place principally by rail. Viewed in terms of a major campaign, rather than as an isolated and initial assault, the unimpaired use of the railway system by the enemy becomes a matter of paramount importance.

20. Two main approaches to the problem of dislocating enemy rail communications have been considered. The first is the purely tactical scheme of blocking a large number of points on tracks leading to the assault area. Such attacks would have to begin on or about D-Day, so as not to jeopardise the element of surprise. The second is a strategical and longer-term attack on the larger servicing and repair centres in NORTHERN FRANCE, BELGIUM, LUXEMBOURG and possibly GERMANY, to be followed once the battle begins by the blocking of the few critical junctions which the enemy is able to improvise. The object of the preparatory attacks is to wear down the railway system, and to reduce its traffic potential (a) so that once enemy movement for the battle begins, attacks on a small number of critical traffic centres will be all the more likely to stop movement than if the system had not been previously attacked, and (b) because their effects will be cumulative, and might themselves prove critical to the enemy's movement and maintenance.

21. A tactical plan could be successful only in strictly limited circumstances. The first major condition is that large and adequate bomber forces would be available, on and after D-Day, to block between 20 and 30 points more or less simultaneously, and so keep them blocked for a matter of days or even weeks. The second is that favourable weather conditions prevailed over the whole period of operations.

22. Neither factor can be relied upon. The tactical operation would have to be launched at a time when the fight for air supremacy might well be in the critical stage, and when this and other commitments in relation to the land battle are likely to absorb the major proportion, if not the whole of the available air forces. In the circumstances, the air cannot be expected to be able to guarantee, for several days after D-Day, the undertaking of a Tactical Plan of attacks on communications which is based upon the principle of permanently blocking a large number of points on alternative railway routes, previously untouched.

23. In any event, the effort required to cut, and keep cut, some 20/30 points necessary in such a scheme would be far greater than would in the long run, probably even the short run, be required to produce most lasting effects by preliminary attacks on an equal number of major railway centres. Furthermore, once a policy of cutting lines, previously untouched, and with all repair facilities in working order, had been embarked upon, the air would be committed to a continuation of the same policy as the ground situation altered. Over and above these considerations, such a plan would at all times be dominated by the risk of the weather being unsuitable either for the launching or the continuation of operations.

24. The problem of producing effective blocks once enemy movement for the battle has begun, and subsequently, would, however, be feasible if the railway system from the German Frontier towards the assault area had previously been subjected to heavy attacks at its most vital servicing, maintenance and repair centres. Such attacks would, as indicated in the introduction to the paper, represent a process of attrition, and would have as their primary aim the elimination of a significant and selected part of the maintenance facilities within a zone leading back from the "NEPTUNE" area to the German Frontier or into Western GERMANY. In achieving these effects by bombing, other critical components of railway centres, such as locomotives and rolling stock, signalling and switch systems, water supplies, etc. etc., would inevitably suffer seriously.

25. What is primarily aimed at in this phase of strategic bombing is not the cutting of the communications in the sense that an artery is cut, but the widespread destruction of the means of communications and the means of maintaining the railway system in operation. It was the latter effect that was almost entirely responsible for the dramatic fall in the S. ITALIAN and SICILIAN railway traffic in the first phase of 1943; and for the consequent difficulties in his supply and reinforcements that played so large a part in the enemy's defeat.

26. It is not anticipated that this phase of attacks will, except possibly in a few cases, put a stop to actual movement through the railway centres for any considerable time. The enemy may be able to reinstate one or two through lines in any or all of the devastated centres adequate for his immediate tactical needs. On the other hand, it is firmly held by the railway experts that the elimination of the facilities in the railway centres will cripple the system throughout the area of attacks, and that its traffic capacity would fall to a dangerous level. Given, therefore, that the plan is effectively accomplished, the result should be that the potential of the enemy's railway system will be reduced to a level at which it should be possible, about D-Day and subsequently, to attack the residue with a good prospect of success. The effect of the strategic attacks would be progressively felt, and at the best might be a determining factor in the continuation of the struggle by the enemy. At the least the effect will be to hamper greatly the movement by rail of major reserves into FRANCE, and even this movement could be almost completely stopped after D-Day (a) by concentrating attacks, with the purpose of creating blocks, on a few vital points in the devastated railway zone, and (b) by day and night attacks on those trains which might still be kept moving through the area, and which would almost certainly be only concerned with the transport of vital supplies and reinforcements.

26. This plan has further implications. In the first place the enemy would, from the start of the attacks, be increasingly driven on to the roads, and in this way impelled to use up his petrol and motor transport. As a further result, the number of opportunity road targets vulnerable to air attack would increase greatly.

Such effects may have a considerable effect not only on the tactical battle, but also on the strategic movement of reserves and reinforcement material. In addition, it is anticipated that the proposed offensive would force the enemy to fight in the air on an extensive scale.

27. This brief statement of the problem which is based on most detailed study made with the help of the most competent authorities, shows that on the one hand an unjustifiable risk would be taken by relying on a Tactical Plan designed to create specific cuts, on and after D-Day, in a previously unimpaired railway system, and that on the other strategic preparatory bombing of major traffic centres between the assault area and the GERMAN Frontier, would not in itself stop all military movement. The latter plan would, however, have the great advantage that it definitely has lasting effects, and if successfully accomplished, would critically, and progressively, impair the enemy's capacity to maintain the campaign in FRANCE. Clearly the only reliable plan is a combination of both. Once the preparatory strategic bombing has been carried out, it should be possible to put a stop to any significant movement by maintaining traffic blocks through attacks on not more than about a dozen centres (as anticipated by the railway experts) and by attacks on trains. The effects of the preparatory strategic bombing would, furthermore, offset the risk of relying heavily on favourable weather during the tactical phase of the plan, while at the same time, by reducing the effort necessary for the tactical phase in the dislocation of communications, it would allow the major part of the air forces to be kept free for all other important commitments.

28. The immediate aim of the attack on railway centres will be to achieve a sufficiently high ground density of bombs on the targets to yield almost certain chances that hits will be scored in practically all classes of sub-targets that make up these larger servicing and repair centres (see Appendix 'B'). In selecting the centres to be attacked, the railway research experts have provided two alternative plans, the one comprising an attack on seventy-six centres leading back from the assault area as far East as the RHINE and in one or two cases East of the RHINE; and a second plan in which the target list comprises seventy-eight FRENCH and BELGIAN, and only six GERMAN Frontier railway centres. (Appendix 'C'). In both cases, the centres named have been chosen because they possess the greatest amount of servicing and repair facilities and other essential installations in the zone which is to be attacked. A secondary factor which has determined their choice is their geographical location. At least a large number of GERMAN targets will necessitate a far greater bomb life than will Plan 'B' insofar as bombing accuracy and conditions of visibility are both worse in the RHINE and RUHR areas than in BELGIUM and FRANCE. The railway experts hold that Plan 'B' would provide slightly more effective results so far as the campaign in FRANCE is concerned. Plan 'A' has the advantage that a greater weight of bombs would fall on GERMANY itself. A list of the railway targets in the South of FRANCE, which might be attacked by the Fifteenth U.S. Air Force, is given in Appendix 'B'.

29. The result of the successful accomplishment of either plan would be virtually the devastation of the larger servicing and traffic centres in the area in which the "OVERLORD" campaign will be waged. The free functioning of these centres is an essential condition for the necessary flow of rail traffic. Elimination of a number of adjacent railway centres would seriously dislocate movement in the whole region they serve, and produce the crippling effect to which reference has already been made.

30. Even were it possible for the enemy to replace destroyed and damaged locomotives and rolling stock from his resources elsewhere in EUROPE, they could not, given that the scale of damage is that estimated for, be deployed in any appreciable number through the area in which the attacks will take place because of the lack of servicing and maintenance facilities. In fact, additional locomotives would in due course become an encumbrance from the railway point of view rather than a gain.

31. Looking at the problem from a wider angle, the supply difficulties which the enemy's military machine will experience is merely an indication of the even more severe difficulties to which the civilian supply system will be subjected as a result of attacks on rail targets. For that reason the more servicing centres are destroyed in GERMANY, the more difficult will it become for the enemy to maintain his home front. Even now, before attacks have begun, the enemy is operating his railways under a considerable strain.

32. While the choice of targets has been determined, in agreement with the appropriate Army Staffs, with the object of bringing major movement to a standstill throughout NORTH-WESTERN FRANCE and BELGIUM it should be noted that if WESTERN GERMANY is attacked, the sooner will difficulties of movement impose a considerable strain on such industry as remains to the enemy in the RHINELAND. The proposed attacks on GERMAN rail centres (Plan 'A') may, in fact, contribute at least as much to the sterilisation of this area so far as its influence on the enemy's war potential is concerned, as attacks on the war industries they serve. The further, therefore, the attack on railway communications or railway centres is pushed Eastwards into GERMANY, the greater will be the effect on GERMANY's war production, and the more will GERMANY's rail potential be affected. This, however, while it contributes to the general problem of hitting the transportation system in GERMANY is not an essential contribution to the preparation for "OVERLORD". A series of major railway centres in GERMANY is listed in Appendix 'D'.

33. The scale of effort necessary to achieve the desired effects in the railway centres listed in Plan 'A' and Plan 'B' of Appendix 'C' has been calculated on the basis of a required average ground density of about four 500 lb. bomb strikes per acre, and the expected accuracy of both visual day bombing by the American Bomber forces and by Bomber Command using navigational and bombing aids. The assessment should be regarded as provisional. In determining the effective bomb lift required an average mean radial error of 500 yards has been used for all targets. This figure is about 100 yards worse than the stated operational accuracy of American heavy bombers, and about 100 yards better than the accuracy of R.A.F. Bomber Command, using OBOE ground markers. So far as can be determined the effective bomb lift that is required is about 43,000 short tons (2,000 lb.) for Plan 'A', and 40,000 short tons for Plan 'B'; in both cases the assumption being that only 500 lb. bombs are used. If heavier bombs are carried, the effective tonnage required would be in proportion to the number of strikes required.

OPERATION "OVERLORD"PLAN 'A' AND 'B' ALTERNATIVES FOR ATTACK ON  
RAILWAY CENTRESP L A N 'A'

1. The following targets are listed in order of priority within their weather zones, showing the acreage and locomotives based on each centre. For weather zones see sketch map at page 5.

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
1	1 AMIENS/LONGEAU	110	159
	2 ROUEN/SOTTEVILLE	210	115
	3 LE BOURGET	250	85
	4 CREIL	150	92
	5 PARIS LA PLAINE LA CHAPELLE	260	155
	6 VAIRES	420	66
	7 PARIS NOISY LE SEC		79
	8 JUVISY	110	25 x electric
	9 TRAPPES	192	48 x electric
	10 VILLENEUVE ST. GEORGES	400	91
	11 MANTES/CASSICOURT	140	45
	12 PARIS/BATTIGNOLLES		115
	13 BOULOGNE SUR MER	50	73
2	1 GHENT/MEIRELBEKE	100	96
	2 LILLE/FIVES	71	75
	3 LILLE/LA DELIVRANOE	260	62
	4 LENS	37	96
	5 VALENCIENNES		58
	6 COURTRAI	58	70
3	1 BRUSSELS/SCHAERBECK	510	149
	2 MONS	96	66
	3 NAMUR/BONET	175	80
	4 AULNOYE	110	101
	5 TERGNIER	190	90
	6 LAON	110	54
	7 HIRSON	130	49
	8 HAINE ST. PIERRE	110	86
	9 LOUVAIN	68	49
	10 MALINES	73	38
	11 HASSELT	100	62
4	1 LIEGE		151
	2 METZ	80	80
	3 THIONVILLE	285	80 approx.
	4 LUXEMBOURG		100 "
	5 STRASBOURG	200	80 "
	6 MULHOUSE/NORD	100	50 "
	7 BLAINVILLE	160	47
	8 NANCY	75	79
	9 SARREGUEMINES	48	50 approx.
	10 RHEIMS	64	71
	11 TROYES	78	78
	12 CHALONS SUR MARNE	76	57
	1 LE MANS x	220	127 x electric
	2 TOURS ST. PIERRE DES CORPS x	120	120 x electric

x These targets are included but are outside the weather zone.

2. The following GERMAN targets are included but are listed alphabetically as their priorities have not yet been determined:-

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
4 contd.	1 AACHEN/HAUPTBAHNHOF		
	2 AACHEN/ROTHE ERDS	50	
	3 AACHEN/WEST	34	
	4 COLOGNE/EIFELTOR	73	
	5 COLOGNE/GEREON	113	
	6 COLOGNE/GREMBERG	305	
	7 COLOGNE/KALK NORD	176	
	8 COLOGNE/NIPPES	180	
	9 DUREN		
	10 DUSSELDORF/DERENDORF	163	
	11 EHRANG	100	
	12 FRANKFURT-AM-MAIN	264	
	13 GERGLSTEIN		
	14 HANAU	57	
	15 SONENBERG		
	16 KAISERSLAUTERN	231	
	17 KARLSRUHE	275	
	18 KOBLENZ/LUTZEL	84	
	19 KOBLENZ/HOSEL	50	
	20 KOHL (S. OF TRIER)		
	21 KREFELD		
	22 LUDWIGSHAFEN	75	
	23 MAINZ/ELSCHOFESHEIN		
	24 MANNHEIM/RANGIERBAHNHOF	178	
	25 MONTZEN		
	26 MUNCHEN GLADBACH		
	27 NEUNKIRCHEN (SAAR)		
	28 NEUSS	67	
	29 OFFENBERG		
	30 OPLAINEN		
	31 SAARBRUCKEN		
	32 STOLBERG		

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
1	1 AMIENS/LONGEAU	110	159
	2 ROUEN/SOTTEVILLE	210	115
	3 LE BOURGET	250	85
	4 CREIL	150	92
	5 PARIS LA PLAINE LA CHAPELLE	260	155
	6 VAIRES	420	66
	7 PARIS NOISY LE SEC		79
	8 JUVISY	110	25 x electric
	9 TRAPPES	192	48 x electric
	10 VILLENEUVE ST. GEORGES	400	91
	11 NANTES/CASSICOURT	140	45
	12 PARIS/BATIGNOLLES		115
	13 BOULOGNE SUR MER	50	73
2	1 GHENT/MEIRELHEKE	100	96
	2 LILLE/FIVES	71	75
	3 LILLE/LA DELIVRANCE	260	62
	4 LENS	37	96
	4 VALENCIENNES		58
	6 COURTRAI	58	70
3	1 BRUSSELS/SCHAREBECK	510	149
	2 MONS	96	66
	3 NAMUR/RONET	175	80
	4 AULNOYE	110	101
	5 TERGNIER	190	90
	6 LAON	110	54
	7 HIRSON	130	49
	8 HAINE ST. PIERRE	110	86
	9 LOUVAIN	68	49
	10 MALINES	73	38
	11 HASSELT	100	62
4	1 LIEGE		151
	2 METZ	80	80
	3 THIONVILLE	285	
	4 LUXEMBOURG		
	5 STRASBOURG	200	
	6 MULHOUSE/NORD	100	
	7 BLAINVILLE	160	47
	8 NANCY	75	79
	9 SARRIGUEMINES	48	50
	10 RHEIMS	64	71
	11 TROYES	78	78
	12 CHALONS-SUR-MER	76	57
	1 LE MANS x	220	127 x electric
	2 TOURS ST. PIERRE DES CORES x	225	120 x electric

2. The following targets in GERMANY and in Occupied Territory are included and are listed below alphabetically in their weather zones as their priorities have not yet been determined:-

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
2	1 ARRAS		152
	2 BETHUNE		164
	3 CALAIS		160
	4 GAMBRAI		140
	5 DOUAI		144
	6 SOMAIN		133
	7 TOURGOING		140
	8 TOURNAI		136
3	1 AERSCHOT		125
	2 ANTWERP/DAM		174
	3 BRUSSELS/MIDI		162
	4 SUSIGNY		133
	5 CHARLEROI 1. MONTIGNIES -- 2. ST. MARTIN } 3. MONCEAU }		140
	6 OTTIGNIES		38
	7 ST. GHISLAIN		56
4	1 AACHEN/HAUPTBAHNHOF		
	2 AACHEN/ROTHE ERDE		50
	3 AACHEN/WEST		34
	4 AUDEN LE ROMAN		144
	5 BELFORT		135
	6 BERTRIX		141
	7 CHAUMONT		141
	8 COLMAR		150
	9 CONFLANS JARNY		158
	10 CULMONT CHALINDREY		131
	11 EHRANG		100
	12 EPINAL		136
	13 JEMELLE		148
	14 KONZ		
	15 LONGWY		129
	16 LUMES		144
	17 MOHON		163
	18 MONTZEN		
	19 MULHOUSE 1. MAIN STATION 2. ILE NAPOLEON		20 80

SELECTED GERMAN RAILWAY CENTRES RELATED  
TO " POINTBLANK "

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
4	1 HAMM		
	2 OSNABRUCK		
	3 SOEST		
	4 SCHWERTE		
	5 COLOGNE/KALK NORD	176	
	6 COLOGNE/GEREON	113	
	7 DUSSELDORF/DERENDORF	163	
	8 COLOGNE/GREMBERG	305	
	9 COLOGNE/NIPPES	180	
	10 COLOGNE/EIFELTOR	73	
	11 MANNHEIM/RANGIERBAHNHOF	178	
	12 FRANKFURT-AM-MAIN	264	
	13 SAARBRUCKEN		
	14 DUISBURG/WADAU		
	15 HOHENBUDBERG		
	16 DUISBURG/HAUPTSHANHOF		
	17 OSTERFELD SUD		
	18 DORTMUND		
	19 HAGEN		
	20 VOHWINKEL		
	21 KARLSRUHE	275	
	22 LUDWIGSHAFEN	75	
	23 KAISERSLAUTEN	231	
	24 OPLADEN		
	25 WANNE EICKEL		
	26 ESSEN		
	27 ESSEN FRINTROP		
5	1 WUSTERMARK		
	2 HALLE		
	3 SEELE		
	4 LEHRTE		
	5 LEIPZIG 1. WARREN		
	2. ENGELSDORF		
	3. Area North of main passenger Station		
	6xMAGDEBURG 1. BUCKAU		
	2. ROTHENSEE		
	7 SCHONEWEIDE		
	8 TEMPELHOF		
	9 LICHTENBERG - FRIEDRICHFELDE		
	10 RUMMELSBURG		
11 PANKOW			
12 SEDDIN			
13 HAINHOLTZ			
6	1xMUNICH		
	2xNURNBERG		
	3xSTUTTART 1. UNTERTURKHEIM		
2. KORNWESTHEIM			

x Target area to be defined subsequently.

RAILWAY TARGETS IN SOUTHERN GERMANY AND  
FRANCE PROPOSED FOR U.S. FIFTEENTH AIR FORCE

ZONE	TARGET	ACREAGE OF AREA	LOCOMOTIVES NORMALLY BASED
	1 AMBERIEU		120
	2 AVIGNON		150
	3 BADAN (S. OF LYON)		70
	4 CARNOULES		80
	5 CHAMBERY		40
	6 GRENOBLE		60
	7 LYON/MOUCHE		100
	8 LYON/VAISE		50
	9 LYON/VENISSIEUX		70
	10 MARSEILLES/BLANGARDE		90
	11 MARSEILLES/ST. CHARLES		80
	12 MIRAMAS		50
	13 MUNICH 1. LAIM 2. OST		
	14 NICE		80
	15 NIMES		120
	16 NUREMBERG 1. BETRIEBSWERK WEST 2. RANGIERBAHNHOF		
	17 REGENSBURG		
	18 ST. ETIENNE		100
	19 STUTTGART 1. UNTERTURKHEIM 2. KORMWESTHEIM		
	20 VILLACH		

EMPLOYMENT OF ALLIED AIR FORCES  
IN  
SUPPORT OF "O V E R L O R D"

(Ref:- D/SAC/MS.100)

1. The primary role of the Air Forces is to secure and maintain air superiority during the assault and subsequent land operations. The maximum possible direct air assistance is also required in support of the actual assault, and against enemy movements and concentrations after the initial assault. The extent to which it proves possible to give this support will depend upon the degree of air superiority which has been secured prior to D-Day.
  2. The Army view as to the role of the Air Forces prior to D-Day has been expressed by C-in-C. 21 Army Group as:-
    - "(a) Destroy the enemy Air Forces.
    - (b) Destroy and disrupt communications so as to impose delay on enemy movement toward the lodgment area."
  3. POINTBLANK is already, in its present form, making an essential and direct contribution towards OVERLORD, by weakening the G.A.F. at its sources (the factories), by forcing the G.A.F. to fight, by stretching the German Air defences both ground and air, and by drawing those defences away from the NEPTUNE area. The effect of POINTBLANK on the general enemy military and industrial strength is also an indirect contribution to OVERLORD. On all these counts the deep penetration into GERMANY which POINTBLANK involves should continue.
  4. What is now required is an adjustment of POINTBLANK, which, while maintaining the G.A.F. as the primary objective and continuing the deep penetration into GERMANY, will directly prepare the way for the assault and subsequent land campaign.
  5. If we are to derive full value from the immense air power available, the selected target system should:-
    - (a) be based on one common object towards which all the available Air Forces can be directed. We would waste much of our power if the U.S. Strategic Air Forces were to operate against one system of objectives, Bomber Command against another, and the A.E.A.F. against yet another. Concentration against one common system, by both day and night, is essential.
    - (b) Ensure economical and effective use of our forces by providing targets on which the proportion of effective hits is likely to be the maximum.
    - (c) Ensure maximum use of our forces by being flexible, i.e., by providing as wide a choice of targets as possible, and thus avoiding cancelled and abortive missions.
  6. Two plans have been formulated, one by the U.S. Strategic Air Forces, and one by the A.E.A.F.; the former may be termed the "Oil Plan" and the latter the "Transportation Plan". The Oil Plan provides for attacks on four systems in order of priority, 1st Petroleum Industry, 2nd Fighter and Ball bearing Industry, 3rd Rubber production and stocks, 4th Bomber Production. As regards the petroleum system, the technical and tactical aspects have been worked out in great detail, but there are certain facts that merit very careful attention, e.g., that the oil targets are to take priority over aircraft industry targets; that, of the 17 targets in GERMANY proper, nine involve deep penetration to east of MAGDEBURG, and five are in the RUHR, where we have been informed by the Operational Commands that flak and smoke make accurate
- (89446)359

bombing unlikely; that previous Oil plans have not worked out according to estimates, and though no doubt in this case the estimates on which the new plan rests are more accurate, there may well be new factors, the effect of which cannot be assessed - such as the probability that the new synthetic plants (which are now the biggest producers) have been extensively dispersed and protected against precisely the form of attack now envisaged. The foregoing points need not necessarily vitiate the Oil plan as a plan for an attack on GERMANY irrespective of OVERLORD, but they do affect it in relation to OVERLORD. It is difficult to see any evidence to suggest that the Oil plan can, in the short time available, seriously affect the enemy ability to meet the OVERLORD assault, or fight the immediately following campaign, and the foregoing points are all calculated to delay effective results still further.

7. The Transportation plan has as its object the dislocation of the Railway systems in the NEPTUNE area and in Western GERMANY, with a view to delaying the concentration and reinforcement of German forces in the NEPTUNE area and to weakening their fighting power in the subsequent campaign by disorganising and limiting their maintenance. It is known that enemy transportation through EUROPE, both rail and road, is already severely strained in many respects. It is known that air attacks on Railway centres have very wide repercussions throughout the Railway system (the most recent example being a seven days delay caused in the move of an S.S. Division to the South of FRANCE in January, due to a relatively small scale attack on the centre at TERGNIER). The Transportation plan is, therefore, based on systematic attacks, not against any single component of Railway organisation such as locomotives or bridges, but against the whole Railway complex which focusses at the main Railway centres. Such a plan, if put into effect at once, will disorganise and delay enemy preparations for OVERLORD (and for CROSSBOW), and should gradually canalise traffic, so that at the time of OVERLORD enemy rail traffic may be liable to complete stoppage at critical points. It is clear that no plan can provide for the complete stoppage of all rail reinforcements or maintenance, since through trains will trickle through by diversions and improvisations, but it is equally clear that the Transportation plan should disorganise and delay movement of reserves and reinforcements, and prevent the running of regular schedules for maintenance, without which an Army cannot campaign.

8. Alternative methods of meeting the Army requirement of "disorganising and delaying" have been considered. Attack on railway and road bridges has very occasionally, in a tactical area in ITALY, been successful in causing temporary delay, but, for both technical and tactical reasons, it has in general been both ineffective and highly uneconomical. Attack on railway tracks has also been considered; this method was tried to a considerable extent in ITALY (where conditions were specially favourable) but proved highly unproductive.

9. The choice, therefore, lies between the Oil Plan and the Transportation Plan. No one can question that the Oil Plan, in view of the proved ability of the U.S. Strategic Air Forces to carry out precision attacks deep in GERMANY, would ultimately have grave effects on the whole German war effort. It is difficult, however, to see evidence to support the view that it could be expected to take real effect in time for OVERLORD or the land operations following the assault. Moreover, it is not a plan in which Bomber Command can take any really effective part, and it is one in which A.E.A.F. would be unable to take any part at all. The Oil Plan is, in fact, not really an alternative to the Transportation plan as regards Bomber Command and A.E.A.F.

10. The Transportation plan is the only plan offering a reasonable prospect of disorganising enemy movement and supply in the time available, and of preparing the ground for imposing the tactical delays which can be vital once land battle is joined. It is also consistent with POINTBLANK. Since attacks on Railway centres have repercussions far beyond the immediate targets, attacks on such centres within the REICH will certainly assist in creating the general dislocation required for OVERLORD. Moreover, since the Railway system is the one common denominator of the whole enemy war effort, it may well be that systematic attack on it will prove to be the final straw.

11. This Plan also:-

- (a) Makes concentration possible: all the Air Forces, day and night, short range and long range, can in their various ways operate against the one system with one common object.
- (b) Provides excellent bombing targets: practically every bomb falling within the area of a railway centre pays its way; the proportion of ineffective hits for these targets is lower than for any other target.
- (c) Allows for flexibility: by giving a wide selection of targets and allowing Commanders freedom to develop their attacks in accordance with the weather and other tactical and technical factors affecting their particular forces.

12. RECOMMENDATIONS

- (1) That the present POINTBLANK Directive be replaced by a new POINTBLANK/OVERLORD Directive.
- (2) That when the new Directive has been agreed between the S.A.C. and C.A.S., it be issued by S.A.C., under whose direction all Allied Air Forces concerned will operate.
- (3) That the new Directive indicate the G.A.F. and selected Railway centres in the REICH and in Western EUROPE as the principal objectives for the U.S.S.A.F. and Bomber Command.
- (4) That supervision and co-ordination of the working out of the Transportation Plan be effected at S.H.A.E.F. by D.A.C., assisted by representatives of C.A.S., C.G. U.S.S.A.F., C-in-C, Bomber Command, and A. C-in-C.

(Sgd.) Tedder

Air Chief Marshal

Deputy Supreme Commander

Allied Expeditionary Force

24th March, 1944

COPY OF DIRECTIVE BY THE SUPREME COMMANDER TO U.S.ST.A.F.  
AND BOMBER COMMAND FOR SUPPORT OF "OVERLORD"  
DURING THE PREPARATORY PERIOD

OVERALL MISSION

1. The overall mission of the strategical Air Forces remains the progressive destruction and dislocation of the German military, industrial and economic system, and the destruction of vital elements of lines of communication. In the execution of this overall mission the immediate objective is first the destruction of German air combat strength, by the successful prosecution of the Combined Bomber offensive. Our re-entry on the Continent constitutes the supreme operation for 1944; all possible support must, therefore, be afforded to the Allied Armies by our Air Forces to assist them in establishing themselves in the lodgment area.

PARTICULAR MISSION

2. The first pre-requisite of success in the maintenance of the combined Bomber offensive and of our re-entry on the Continent is an overall reduction of the enemy's air combat strength and particularly his air fighter strength. The primary role of our Air Forces in the European and Mediterranean theatres is, therefore, to secure and maintain air superiority.

3. Our armies will also require the maximum possible assistance on the ground preparatory to the actual assault. This can best be given by interfering with rail communications, particularly as affecting the enemy movements and concentrations in the "OVERLORD" area. A further Directive covering the employment of the strategical air forces during the assault period and the succeeding land operations will be issued in due course.

4. The particular mission of the strategical air forces prior to the "OVERLORD" assault is:-

- (a) To deplete the German air force and particularly the German fighter forces, and to destroy and disorganise the facilities supporting them.
- (b) To destroy and disrupt the enemy's rail communications, particularly those affecting the enemy's movement towards the "OVERLORD" lodgment area.

U.S.ST.A.F.

5. Under this particular mission objectives allotted to the U.S.ST.A.F. are as follows, in present order of priority:-

- (i) Primary objective: The German Air Force with primary importance upon German fighter forces by all means available, including attrition in the air and on the ground, and attacks against the following precision targets and industrial areas and facilities supporting them:-

Equal first priority:-

- (a) German single engine fighter airframe and airframe component production.

German twin engine fighter airframe and airframe component production.

Axis-controlled ball bearing production.

Second priority:-

- (b) Installations supporting German fighter air forces.

Third priority:-

- (c) German bomber air forces and installations supporting them.

(ii) Secondary objective: The enemy rail transportation system.

6. The list of targets best calculated to achieve the primary objective will be passed to the Supreme Commander by the Air Ministry. The list of targets chosen to achieve the secondary objective and the relative priorities accorded them at present will be issued separately. These priorities will be adjusted from time to time in accordance with the situation.

7. Whenever weather or tactical conditions are unsuitable for visual attack of the primary objectives, attacks will be delivered by blind bombing technique on BERLIN or other important industrial areas. Targets will be selected so as to further the aims of attrition of the German fighter force, and the dislocation of the enemy's transportation system.

R.A.F. BOMBER COMMAND

8. In view of the tactical difficulties of destroying precise targets by night, R.A.F. Bomber Command will continue to be employed in accordance with their main aim of disorganising German industry. Their operations will, however, be designed as far as practicable to be complementary to the operations of the U.S.ST.A.F. In particular, where tactical conditions allow, their targets will be selected so as to give the maximum assistance in the aims of reducing the strength of the German Air Force, and destroying and disrupting enemy rail communications. A list of targets chosen to achieve these objectives, and showing the relative priorities accorded them at present, will be issued separately. These priorities will be adjusted from time to time in accordance with the situation.

TARGETS IN S.E. EUROPE

9. The order of priority of objectives for the employment of the strategic air forces operating in the MEDITERRANEAN and South East EUROPE is as follows:-

- (i) Emergency requirements of the Battle of ITALY.
- (ii) The objectives set out in para. 5 above.
- (iii) Targets in the BALKANS of great political and military importance.

10. In order to take advantage of favourable opportunities to attack targets of great political and military importance in S. E. EUROPE, the order of bombing priority given in para. 9 above may be altered when the situation warrants, and when results of the highest importance may be expected therefrom. The Commanding General, U.S.ST.A.F. will be kept informed of changes in the political and military importance of these objectives as affecting the priority of bombing tasks generally, and will be given timely warning of attacks against such targets in order to enable proper coordination between 15th Air Force and 8th Air Force operations.

OTHER OBJECTIVES

11. Other objectives of great or fleeting importance may present themselves and orders will be issued accordingly. Where possible, the necessary plans and preparations for these have been made. An example of this is the attack of important units of the German Fleet in harbour or at sea.

"CROSSBOW"

12. The responsibility for neutralising threats from "CROSSBOW" is laid on the Air Commander-in-Chief, A.E.A.F. Where necessary, he may call for assistance from the strategical air forces in the UNITED KINGDOM through the Deputy Supreme Allied Commander, who will issue the necessary instructions.

S.O.E. OPERATIONS

13. All S.O.E. Operations undertaken by units of Bomber Command and U.S.ST.A.F. will be in accordance with the requirements of the Supreme Allied Commander, and orders will be issued accordingly from time to time.

POLITICAL ASPECTS OF TRANSPORTATION PLAN

14. The political aspects of this plan, as affecting the French, will be kept under continuous supervision, with especial reference to the casualties to the civilian populations involved.

REVISION OF DIRECTIVE

15. This Directive will be subject to review after "OVERLORD" is established on the Continent.

By Command of General Eisenhower.

W. B. SMITH,  
Lieutenant General, GSC,  
CHIEF OF STAFF.

17th April, 1954.

OFFICIAL:

(Sgd.) J. M. ROBB  
Air Vice-Marshal  
DEPUTY CHIEF OF STAFF (AIR)

COPY OF DIRECTIVE FOR THE CONTROL OF THE  
STRATEGIC BOMBERS IN EUROPE - 25 SEPTEMBER 1944  
(Ref: CMS/608/D.C.A.S.)

Sir,

I am directed to inform you that the Combined Chiefs of Staff have recently decided that executive responsibility for the control of the strategic bomber forces in Europe shall be vested in the Chief of the Air Staff, Royal Air Force and the Commanding General, United States Army Air Forces, jointly.

2. Furthermore they have designated the Deputy Chief of the Air Staff and the Commanding General, United States Strategic Air Forces in Europe as representatives of the Chief of the Air Staff and the Commanding General, United States Army Air Forces, respectively, for the purpose of providing control and local co-ordination through consultation.
3. This change in the responsibility for the direction of your operations takes effect forthwith. In accordance with instructions issued by the Combined Chiefs of Staff your strategical operations will until further orders be governed by the directive which is attached to this memorandum. This directive is also being issued to the Commanding General, Mediterranean Allied Air Forces and the Commanding General, Eighth Air Force.
4. With regard to the direct support of land operations you are to meet promptly the requirements of the Supreme Commander, Allied Expeditionary Force either for assistance in the battle or to take advantage of related opportunities. You are responsible that the operations of your forces in close support of land operations are properly co-ordinated with the operations of the Tactical Air Forces in the theatre. In this matter you are to consult as necessary with the A.C.-in-C., Allied Expeditionary Air Force who will normally co-ordinate air action in accordance with ground force requirements.
5. With regard to the support of naval operations, the responsibility for the air attack of enemy shipping within range of shore based aircraft in the U.K. rests primarily with the Air Officer Commanding-in-Chief, Coastal Command. The strategical air forces may however be called upon to assist, in which circumstances the Air Officer Commanding-in-Chief, Coastal Command will co-ordinate offensive action by Coastal Command with that of other forces taking part in the operation. The general principles of responsibility, as set out in Bomber Command operational instruction No. 73/1944, remain unchanged. The question of detailed procedure is being examined by A.O.C.-in-C. Coastal Command and the instructions will be amended in consultation with you.
6. There may be certain other targets of great but fleeting importance which may present themselves, and orders will be issued accordingly. Where possible, however, the necessary plans and preparations for these should be made. An example of this is the attack of important units of the German Fleet in harbour or at sea.

I am, Sir,

Your obedient Servant,

(Sgd.) N. H. BOTTOMLEY  
Air Marshal,

Deputy Chief of the Air Staff.

The Air Officer Commanding-in-Chief, Bomber Command.

Copies to:- Deputy Supreme Commander, Allied Expeditionary Force,  
Air Officer Commanding-in-Chief, Coastal Command  
Air Commander-in-Chief, Allied Expeditionary Air Force,  
Commanding General, U.S. ST. A. F.

In accordance with instructions received from the Combined Chiefs of Staff, the overall mission of the Strategic Air Forces remains the progressive destruction and dislocation of the German military, industrial and economic systems and the direct support of land and naval forces.

2. Under this general mission you are to direct your strategic attacks, subject to the exigencies of weather and tactical feasibility, against the following systems of objectives:-

First priority

- (i) Petroleum industry, with special emphasis on petrol (gasoline) including storage

Second priority

- (ii) The German rail and waterborne transportation systems
- (iii) Tank production plants and depots, ordnance depots
- (iv) M.T. production plants and depots.

Counter Air Force Action

3. As a result of air action against the production, maintenance and operational facilities of the German Air Force, its fighting effectiveness has been substantially reduced. At the same time, our combined air strength has vastly increased. In these circumstances, we are no longer justified in regarding the German Air Force and its supporting industry as a primary objective for attack. Our major efforts must now be focussed directly on the vital forces of Germany's war economy. To this end, policing attacks against the German Air Force are to be adjusted so as to maintain tactical conditions which will permit of maximum impact upon the enemy. No fixed priority is therefore assigned to policing attacks against the German Air Force. The intensity of such attacks will be regulated by the tactical situation existing.

Targets and Target Priorities

4. The list of strategical targets in paragraphs 2 and 3, best calculated to achieve the aim, and the relative priorities accorded them, will be issued separately. These priorities will be adjusted from time to time in accordance with the situation.

Direct Support

5. The direct support of land and naval operations remains a continuing commitment.

Important Industrial Areas

6. When weather or tactical conditions are unsuitable for operations against specific primary objectives, attacks should be delivered on important industrial areas, using blind bombing technique as necessary.

S.O.E. Operations

7. All S.O.E./S.I.S. operations will be in accordance with existing instructions and procedure.

Co-ordination

8. The procedure as at present established for the co-ordination of operations between the various Air Forces will continue.

Air Ministry, (Deputy C.A.S.)

CMS/608

25th September, 1944

(89446)366

COPY OF NOTES ON AIR POLICY  
TO BE ADOPTED WITH A VIEW TO RAPID DEFEAT OF GERMANY

1. As I see it, there are two methods of ending this war, one is by land invasion and the other is by breaking the enemy's power and control behind the lines. I, myself, do not believe that these two courses are alternative or conflicting. I believe they are complementary. I do not believe that by concentrating our whole Air effort on the ground battle area we shall shorten the war. Nor do I believe that we would shorten the war by putting our whole Bomber effort against industrial and political targets inside GERMANY.
2. As regards the land campaign, the primary objective is the RUHR. The Army Groups have now made it clear that what they would like the Air to do is to interrupt enemy reinforcement and supply across the RHINE. As a secondary object they wish the enemy's ability to withdraw heavy equipment across the RHINE reduced to a minimum. Up to the present, the direct strategic contribution towards this has been the Oil plan, the successful attack on the DORTMUND-EMS Canal, and some attacks on Ordnance and M.T. Depots. The other action, by the tactical forces, has been line cutting and attacks on trains by fighters, and some (largely abortive) attacks on Bridges. I am not satisfied that, on these lines, we are using our Air power really effectively. The various types of operations should fit into one comprehensive pattern, whereas I feel that at present they are more like a patchwork quilt.
3. With regard to the direct attack on GERMANY, here again I feel our efforts are rather patchwork. The various targets (Oil, cities, depots, marshalling yards, canals, factories, etc.) do not together build up into a really comprehensive pattern.
4. My views as to what should, and can, be done are as follows:

The one common factor in the whole German war effort, from the political control down to the supply of troops in the front line, is communications. Leaving on one side Signal communications as being relatively invulnerable to air attack, rail, road and water communications are the one common denominator. The city populations may have gone underground but without surface communications they will starve. Industries may have gone underground but their life lines remain on the surface. Industries have been dispersed, but the more they have been dispersed the more they depend on good communications. Governmental control depends to a very great extent on efficient road and rail communications as is only too evident today in BELGIUM and FRANCE. The Army's dependence on communications needs no comment.
5. In my opinion our primary Air objective should be the enemy's communications. Road, water, and rail are interdependent and complementary, and our Air operations should play on that fact. The present Oil plan is the key to movement by road and air, and, moreover, directly affects operations in the Battle area. It is supplemented by fighter attacks on M.T. The river and canal system in WESTERN EUROPE has been examined, and targets indicated. The successful attack on the DORTMUND-EMS canal is being followed up by attacks on further vulnerable points. The practicability of mining the RHINE and thus stopping the extensive barge traffic is being examined.
6. Except for a few incidental attacks on German Railway centres, the only systematic operations against the enemy rail system have been extensive fighter-bomber line cutting attacks, covering a period of more than six weeks. There has also been a certain amount of "shooting up" of trains. Only within the past few days have these operations begun to show dividends. There have been a number of attacks on RHINE and MOSELLE rail bridges, but these have been largely abortive.

7. It is abundantly clear from French and German railway records (the latter kept with typical tidy thoroughness) that:-

- (a) It was the heavy attacks on rail centres and marshalling yards which were the main factor in paralysing the rail system in NORTHERN FRANCE, and
- (b) The effect of these attacks was far more rapid and final than had ever been anticipated.

8. It is essential not to apply too literally to GERMANY the lessons of FRANCE and BELGIUM. In occupied territories it was possible for the enemy to maintain a flow of military traffic while the non-military and economic traffic died out. In GERMANY all loss of traffic is a dead loss to the war effort. In FRANCE and BELGIUM the enemy had prepared for precisely the form of attack he experienced by introducing large bodies of special labour and railway workers. In GERMANY now all the indications are that all man power that has not been thrown into the Army is fully employed on defence digging, and that even the normal running personnel of the railways have been drastically bombed. In FRANCE and BELGIUM all available repair and salvage material and personnel could be concentrated on repair of railways: in GERMANY all such facilities are already more than fully occupied in repair and salvage of factories, public services, etc. In FRANCE and BELGIUM the programme of attacks on rail centres was severely limited, both as regards selection of targets and as regards weather conditions, by the need to avoid civilian casualties; no such limitations affect attacks on German rail centres.

9. I do not consider it necessary to spread attacks all over the German rail system. I am convinced that, with GERMANY in her present condition, we can obtain immediate results which have every prospect of being decisive. In my opinion, our main strategic concentration should be against the RUHR: rail centres, Oil targets, the canal system, and centres of population. I believe that on such a system it should be possible to maintain the attack under all conditions in which the Heavies can operate. Alternative and supplementary targets should be selected, with the same primary object in view, in the appropriate alternative weather areas of the Middle and Upper RHINE, including BAVARIA.

10. The Tactical forces' operations against trains, embankments, selected bridges, etc., will then be complementary to the strategic operations, and will continue with a far greater prospect of producing immediate effect than they have had in the past while the heart of the rail system has been relatively untouched. The Combined Strategic and Tactical Air Forces will, in fact, be operating towards one objective.

11. I believe that the execution of a coordinated campaign against the communications system of WESTERN GERMANY such as I have outlined would rapidly produce a state of chaos which would vitally affect not only the immediate battle on the West Wall, but also the whole German war effort.

(Sgd.) A. W. Tedder  
Air Chief Marshal.  
Deputy Supreme Commander.  
Allied Expeditionary Force.

DSC/TS.100  
25th October, 1944.

IV. PHOTOSTAT COPY OF COPY OF LETTER DATED 5.10.44 FROM ALBERT SPEER TO HITLER.

'MY Führer,

After the last attacks on the hydrogenation plants and refineries, repair of those works is still found to be possible in relatively short periods, as the number of men employed on this work has been increased.

If no new attacks take place we may count in October on the following quantities, which include the fuel gained from the German and Hungarian Mineral Oil Production.

Aviation fuel (September production 9400 t.)	64,400 t.
Carburettor fuel (Sept. 48,400 t.)	60,600 t.
Diesel fuel (Sept. 77,300 t.)	100,300 t.

The following quantities could be produced in November and December:-

	<u>November</u>	<u>December</u>
Aviation Petrol	91900 t.	106900 t.
J II (Fuel for the 'STRAHLJÄGER' which is composed of carburettor and Diesel fuel)	20000 t.	24000 t.
Carburettor fuel	65000 t.	66200 t.
Diesel fuel	71700 t.	87100 t.

(The reduced production of DIESEL fuel is due to time required for refining of further Mineral Oil Stocks).

These production figures include the requirements of industry and agriculture.

An exchange of Aviation Fuel and of J II against carburettor fuel is, of course, possible.

These figures represent the quantities theoretically possible after re-building and re-construction, if no further successful air attacks take place.

As, owing to the insufficient air defence, further air attacks of equal importance are to be expected, only the following production can be relied on:-

	<u>October</u>	<u>November</u>	<u>December</u>
Aviation fuel	12,000 t.	10,000 t.	9000 t.
Carburettor fuel	40,000 t.	40,000 t.	41,000 t.
Diesel fuel	75,000 t.	80,000 t.	80,000 t.

As far as the figures for Aviation fuel are concerned these might fall off still more in November and December, as the continuous new attacks disorganise the system in the plants and thereby make re-building considerably more difficult after every attack.

No higher production can be expected in the months following after these three months, on the supposition of further air attacks on the hydrogenation plants.

The underground plants for aviation fuel have not been put into operation yet, while the protected small plants for Carburettor and Diesel fuel will already produce the following:-

	<u>October</u>	<u>November</u>	<u>December</u>
Carburettor fuel	5000	10000	10000 ton
Diesel	20000	40000	40000 ton

These figures are included in above estimates.

That the estimated higher production is possible is shown in the table for the month of September, 1944 (see Supplement) which gives the estimated Daily Production of Aviation Spirit and the actual quantities produced.

The table shows also that on 10th September the prognosis became reality as several plants were working again, but it shows also that the enemy succeeded in stopping all Fuel production completely between 11th and 19th September.

By changing his method of attack, which so far has always been timed shortly after the re-starting of the plants, allowing us thus always a few days of production, to a time shortly before the re-start of work, the enemy could, without further ado bring the aviation fuel production completely to a stop.

As the following plants will re-commence work on the dates given below:-

POLITZ DHD	on	20.9	
MOOSBIERBAUM	on	2.10	
POLITZ	on	6.10	
LEUNA	on	10.10	(DHD 2.10)
BRUX	on	1.11	
BLECHHAMMER	on	8.10	

it will be necessary to build up in good time before above dates the strengthened fighter protection in such a way that at least 1000 fighters can ward off successfully the attack which is to be expected shortly.

If this is not carried out the most we can count on will be the production quantities given for continuation of air attacks.

Simultaneously with the insufficient production of fuel and at the hydrogenation plants, the picture of the production of the chemical industry so essential for gun-powder and explosives, for BUNA etc., has contained to deteriorate correspondingly, so that already now difficulties of the greatest extent in these branches can be foreseen, if we do not succeed in protecting the chemical works more efficiently.

Admittedly, orders have been given to erect concentrated AA protection at some of those plants, which were constructed with particular care (such as LEUNA, POLITZ, BRUX, BLECHHAMMER, LUDWIGSHAFEN, OPPAU). Experience has shown however, that only the fighters, in spite of heavy losses, are in a position to inflict equal punishment on the enemy.

The troops will forgo fighter support, which cannot give them essential relief nowadays if they know that in this way their fuel basis is secured and that munition supplies will not cease owing to lack of gun powder and explosives.

Front officers in the West, whose supplies of weapons, tanks and munition have improved during the last fortnight, know only one concern and question. Will it be possible to supply the fuel for future operations or will the Air attacks of the enemy prevent this?

The employing of all fighter forces at our disposal for the protection of home production has become even more vitally important since the transport situation in the RUHR regions has deteriorated quite considerably.

Whereas in September 1943 on an average 19900 waggons of coal were transported daily in the RUHR region, this transport fell off during the last days owing to air attacks to 8700 respectively 7700 waggons daily. This means that after 8-12 weeks the stocks with the industry, which amount to four weeks' supply, will be exhausted, so that during this winter an exceptionally seriously coal and consequent production crisis will arise, while on the other hand the heaps and dumps of coal in the RUHR region mount up continuously.

It must be stressed that these figures include the circulation of waggons within the RUHR region, so that the figures for coal actually sent out of the region must be reduced correspondingly.

There is therefore, for the next months only one problem: to raise the effective fighting capacity of the German fighter force to such a height as is absolutely possible, to add all available machines to its strength, and then to concentrate this fighter force for the protection of the Home Armaments and war production.

Heil mein Führer  
(Signed) SPEER!

(Full translation) (J.G.)

## R.A.F. BOMBER COMMAND

## DIARY OF OPERATIONS - MARCH 1944 TO MAY 1945

Date 1944	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
1	Crossbow Targets in France	2	-	-	-	8	Mosq.
1/2	Stuttgart	557	499	4	1778.2	All Groups	Lanc. Hal. Mosq.
	Munich	11	11	-	7.6	8	Mosq.
	Sottevast	1	-	-	-	8	Mosq.
	St. Trond	4	4	-	3.6	8	Mosq.
	Florennes	3	1	-	-	8	Mosq.
	Venlo	4	4	-	3.3	8	Mosq.
	Deelan	4	1	-	.7	8	Mosq.
	Volkel	83	2	-	-	8	Mosq.
	Leuwarden	3	2	-	1.8	8	Mosq.
	Leaflets	16	16	-	-	91	Well. Whit.
	R.C.M.	10	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	17	-	-	-	3, 100	Hal. Stir.
2/3	Meulan Les Mureaux (A/C factory)	123	109	-	491.3	4, 6, 8.	Hal. Mosq.
	Albert	15	14	-	71.7	5	Lanc.
	Munchen Gladbach	8	8	-	11.2	8	Mosq.
	Krefeld	1	1	-	-	8	Mosq.
	Aachen	3	3	-	2.7	8	Mosq.
	Special Targets in France	1	1	-	-	8	Mosq.
	Minelaying	8	6	-	35 mines	3	Stir.
	Leaflets	10	8	-	-	93	Well.
	R.C.M.	8	7	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	46	-	-	-	3, 100	Hal. Stir.
	Leaflets	5	5	-	-	8,	Fort.
						U.S.B.C.	
3/4	Berlin	16	15	-	14.7	8	Mosq.
	Dusseldorf	10	10	-	9.7	8	Mosq.
	Krefeld	1	1	-	-	8	Mosq.
	Crossbow Target	2	2	-	-	8	Mosq.
	Minelaying	45	42	-	121 mines	1, 3, 4.	Hal. Stir.
	Leaflets	9	6	-	-	91, 92	Well.
	Met. Recce.	1	1	-	-	8	Well.
	S.O.E.	54	-	-	-	3	Mosq.
							Hud. Hal.
							Stir. Lys.
4	Met. Recce.	3	-	-	-	8	Mosq.
4/5	Berlin	15	10	-	8.9	8	Mosq.
	Duisburg	6	4	-	6.1	8	Mosq.
	Aachen	1	-	-	2.5	8	Mosq.
	Sottevast	1	1	-	-	8	Mosq.
	La Ricamarie (A/c works)	15	-	-	-	5	Lanc.
	Minelaying	10	10	-	20 mines	6	Hal.
	Met Recce.	1	1	-	-	8	Mosq.
	S.O.E.	76	-	2	-	3	Hal. Huds.
							Stir.
5	Met. Recce.	1	-	-	-	8	Mosq.
5/6	Duisburg	9	9	-	11.0	8	Mosq.
	Aachen (railway centre)	1	1	-	1.8	8	Mosq.
	R.C.M.	4	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	70	-	-	-	8	Mosq. Hal.
	Leaflets	5	5	-	-	8,	Fort.
						U.S.B.C.	
6	Crossbow Targets in France	2	-	-	-	8	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.

(1) Source Bomber Command O.R.B., Bomber Command O.R.S. Repts. and A.M.W.R.  
Sum. of Bomber Command Ops.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
6/7	Trappes (railway centre)	267	263	-	1260.7	4, 6, 8.	Mosq. Hal.
	Hannover	15	13	-	16.6	8	Mosq.
	Kiel	6	5	-	4.5	8	Mosq.
	Krefeld	1	1	-	1.8	8	Mosq.
	Leaflets	5	5	-	-	8,	Fort.
	S.O.E.	30	-	-	-	U.S.B.C.	
	Special patrol	1	-	-	-	3	Hal. Hud. Lys. Stir. Hal.
7	Met. Recce (railway centre)	1	1	-	-	100	Mosq.
7/8	Le Mans (railway centre)	304	201	-	952.6	3, 4, 6,	Hal., Lanc.
	Duisburg	3	2	-	3.6	8	Mosq.
	Aachen	5	4	-	3.6	8	Mosq.
	Munchen Gladbach	6	6	-	5.4	8	Mosq.
	Krefeld	1	1	-	.9	8	Mosq.
	Leaflets	6	6	-	-	91	Well.
	R.C.M.	3	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	57	-	-	-	3, 100	Hal. Stir, Mosq. Well.
8	Crossbow Targets in France	2	-	-	-	8	Mosq.
	Met. Recce.	2	-	-	-	8	Mosq.
8/9	Special Operations	2	-	-	-	100	Mosq.
9	Crossbow Targets in France	2	-	-	-	8	Mosq.
	Met. Recce.	1	-	-	-	8	Mosq.
9/10	Dusseldorf	8	8	-	10.9	8	Mosq.
	Marignane (A/c factory)	44	43	-	159.0	5	Lanc.
	R.C.M.	2	2	-	-	100	Mosq.
10	Met. Recce.	1	-	-	-	8	Mosq.
10/11	Duisburg	29	28	-	26.5	8	Mosq.
	La Ricamarie (A/C factory)	16	16	-	69.8	5	Lanc.
	Clermont-Ferrand "	33	31	-	151.9	5	Lanc.
	Ossun "	23	23	-	97.1	5	Lanc.
	Chateauroux/Deols (A/C factory)	30	29	-	149.5	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	93	-	-	-	3	Stir. Hal. Hud. Fort.
	Leaflets	5	5	-	-	8, U.S.B.C.	
11	Met. Recce.	1	1	-	-	8	Mosq.
11/12	Hamburg	20	19	-	16.0	8	Mosq.
	Munchen Gladbach	11	11	-	12.2	8	Mosq.
	Krefeld	5	5	-	4.5	8	Mosq.
	Aachen	7	6	-	5.3	8	Mosq.
	Duisburg	4	3	-	5.4	8	Mosq.
	Minelaying	43	34	1	96 mines	3, 6.	Hal.
	Leaflets	21	20	-	-	91, 92,	Well. Whit.
	R.C.M.	4	3	-	-	100	Mosq.
	S.O.E.	12	-	-	-	3	Stir. Well.
12	Met. Recce.	1	1	-	-	8	Mosq.
12/13	Aachen	11	11	-	9.9	8	Mosq.
	Duisburg	3	3	-	5.4	8	Mosq.
13/14	Le Mans (railway centre)	222	208	1	965.0	4, 6.	Hal. Mosq.
	Frankfurt	26	25	-	26.3	8	Mosq.
	Dusseldorf	2	2	-	.9	8	Mosq.
	Oberhausen	4	4	-	3.6	8	Mosq.
	Essen	2	2	-	1.8	8	Mosq.
	Aachen	5	5	-	3.5	8	Mosq.
	Minelaying	35	25	1	108 mines	3, 4.	Stir. Hal.
	Leaflets	21	20	-	-	91, 92, 93.	Whit. Well.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
13/14	R.C.M.	4	4	-	-	100	Mosq.
	S.O.E.	23	-	-	-	3, 100	Various
	Airfields	2	-	-	-	2	Mosq.
	Leaflets	7	-	-	-	8, U.S.B.C.	Fort.
14/15	Dusseldorf	30	28	-	29.3	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	5	-	-	-	3, 100	Mosq. Hal.
15	Crossbow Target in France	2	-	-	-	8	Mosq.
15/16	Stuttgart	863	778	36	2,745.5	All Groups	Hal. Lanc. Mosq.
	Amiens (railway centre)	140	123	3	607.4	3,4, 6, 8.	Hal. Stir. Mosq.
	Woippy (A/C works)	22	-	-	-	5	Lanc.
	Munich	10	9	-	6.8	8	Mosq.
	Dusseldorf	2	2	-	1.8	8	Mosq.
	Bochum	2	2	-	1.8	8	Mosq.
	Dortmund	2	2	-	1.8	8	Mosq.
	Duisburg	1	1	-	1.8	8	Mosq.
	Airfields in Low Countries	10	9	-	7.2	8	Mosq.
	Minelaying	2	1	-	-	3	Stir.
	R.C.M.	11	8	-	-	100	Mosq.
	Met Recce	1	1	-	-	8	Mosq.
	S.O.E.	33	-	-	-	3, 100	Various
	Leaflets	7	-	-	-	8 U.S.B.C.	Fort.
	16	Crossbow Target in France	2	-	-	-	8
Met. Recce.		1	1	-	-	8	Mosq.
16/17	Amiens	130	118	-	561.4	3, 4, 6, 8.	Mosq. Stir. Hal.
	Clermont Ferrand (A/C works)	21	21	-	91.5	5	Lanc.
	Cologne	8	8	-	12.0	8	-
	Duisburg (Hamborn)	1	-	-	-	8	Mosq.
	Minelaying	3	3	-	-	3	Stir.
	R.C.M.	2	2	-	-	100	Mosq.
	Special Patrols	2	-	-	-	100	Mosq.
	17	Crossbow Target in France	2	2	-	-	8
17/18	Cologne	28	28	-	29.8	8	Mosq.
	Aachen	2	1	-	.9	8	Mosq.
	Special Patrols.	1	-	-	-	100	-
18	Crossbow Targets in France	2	2	-	-	8	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
18/19	Frankfurt	846	749	22	3,186.6	All Groups	Hal. Lanc. Mosq.
	Bergerac (A/C factory)	19	19	-	59.7	5	Lanc.
	Aachen	7	7	-	6.3	8	Mosq.
	Kassel	11	10	-	7.9	8	Mosq.
	Duisburg	2	2	-	3.6	8	Mosq.
	Dortmund	73	73	-	2.5	8	Mosq.
	Airfields in Low Countries	17	15	-	6.9	8	Mosq.
	Minelaying	98	93	-	-	232 mines	Stir. Hal.
	Leaflets	18	16	-	-	91, 93	Well.
	R.C.M.	13	11	-	-	100	Mosq.
	S.O.E.	12	-	-	-	3, 100	Various
	Leaflets	6	-	-	-	8 U.S.B.C.	Fort.
19	Met. Recce.	1	1	-	-	8	Mosq.
	Crossbow Targets in France	2	2	-	-	8	Mosq.
19/20	Berlin	9	9	-	-	8	Mosq.
	Dusseldorf	8	6	-	-	8	Mosq.
	Aachen	4	3	-	-	8	Mosq.
	Minelaying	19	17	-	48 mines	3	Stir.
	Leaflets	6	6	-	-	91	Well.
	R.C.M.	3	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrols	4	-	1	-	100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
20	Met. Recce	1	1	-	-	8	Mosq.
20/21	Munich	12	11	-	9.3	8	Mosq.
	Cologne	3	2	-	.9	8	Mosq.
	Aachen	4	4	-	3.6	8	Mosq.
	Dortmund	4	4	-	3.4	8	Mosq.
	Duisburg	2	1	-	1.8	8	Mosq.
	Angouleme	20	20	-	69.1	5	Lanc.
	S.O.E.	9	-	-	-	3	Various
21	Met. Recce.	2	2	-	-	8	Mosq.
21/22	Cologne	27	25	-	.9	8	Mosq.
	Aachen	6	5	-	4.5	8	Mosq.
	Oberhausen	3	3	-	3.6	8	Mosq.
	Minelaying	18	14	-	66 mines	3	Stir.
	R.C.M.	3	2	-	-	100	Mosq.
	Leaflets	4	4	-	-	92	Wall.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrol.	1	-	-	-	100	Various
22/23	Frankfurt	816	741	33	3232.9	All Groups	Hal. Lanc.
	Berlin	11	11	-	8.0	8	Mosq.
	Hannover	7	7	-	11.8	8	Mosq.
	Oberhausen	2	2	-	3.6	8	Mosq.
	Dortmund	2	2	-	2.2	8	Mosq.
	Leeuwarden	4	4	-	3.8	8	Mosq.
	Deelen	3	2	-	1.8	8	Mosq.
	Venlo	7	6	-	6.7	8	Mosq.
	Twente	2	2	-	2.4	8	Mosq.
	Juliaendorf	4	4	-	4.0	8	Mosq.
	Minelaying	146	135	-	321 mines	3, 4, 6	Stir. Hal.
	Leaflets	20	18	-	-	92, 93	Wall.
	Serrate	16	11	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrols	16	-	-	-	100	Various
23	Met. Recce.	1	1	-	-	8	Mosq.
23/24	Laon (railway centre)	143	72	2	292.7	3, 4, 6, 8	Stir. Hal.
	Lyons	20	14	-	64.5	5	Lanc.
	Dortmund	13	13	-	20.8	8	Mosq.
	Oberhausen	2	1	-	1.8	8	Mosq.
	Minelaying	2	2	-	10 mines	3	Stir.
	Leaflets	6	6	-	-	91	Whit.
	R.C.M.	4	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Intruders	6	-	-	-	2	Mosq.
	Leaflets	5	5	-	-	8,	Forts.
	Special Patrols	5	-	-	-	U.S.B.C.	Various
24	Met. Recce.	2	2	-	-	8	Mosq.
24/25	Berlin	811	660	72	2493.1	All Groups	Hal. Lanc.
	Munster	2	2	-	1.8	8	Mosq.
	Duisburg	2	1	-	1.8	8	Mosq.
	Kiel	11	8	-	13.2	8	Mosq.
	Venlo	4	1	-	.9	8	Mosq.
	St. Trond	4	3	-	2.7	8	Mosq.
	Juvincoourt	3	2	-	1.8	8	Mosq.
	Twente	4	1	-	.9	8	Mosq.
	Leeuwarden	4	3	-	7.3	8	Mosq.
	R.C.M.	10	7	-	-	100	Mosq.
	Diversionsary Sweep	147	-	-	-	Gps. & C.T.U's	Various
	Leaflets	5	5	-	-	8, U.S.B.C.	Fort.
25	Met. Recce	1	-	-	-	8	Mosq.
	S.O.E.	13	-	-	-	3, 100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
25/26	Aulnoye (railway centre)	192	183	-	808.8	All Groups	Hal. Lanc. Stir., Mosq.
	Berlin	10	7	-	5.9	8	Mosq.
	Hamm	2	2	-	1.8	8	Mosq.
	Lyons	2	2	-	54.9	5	Lanc.
26	Met. Recce.	1	1	-	-	8	Mosq.
26/27	Essen	705	668	9	2833.5	All Groups	Hal. Lanc. Mosq.
	Courtrai (railway centre)	109	102	-	474.0	3, 4, 6, 8.	Hal. Stir Mosq.
	Hannover	22	22	-	26.2	8	Mosq.
	Juliendorf	3	2	-	1.8	8	Mosq.
	Aachen	3	3	-	5.4	8	Mosq.
	Minelaying	20	17	-	64 Mines	3	Stir.
	Leaflets	12	11	-	-	91	Well.
	R.C.M.	13	0	-	-	100	Mosq.
	S.O.E.	12	-	-	-	3, 100	Various
27/28	Duisburg	14	13	-	18.8	8	Mosq.
	Krefeld	3	3	-	5.4	8	Mosq.
29	Met. Recce.	1	1	-	-	8	Mosq.
29/30	Paris (Vaires) (railway centre)	84	77	1	312.9	4, 6, 8	Hal. Mosq.
	Lyons	19	19	-	54.1	5	Lanc.
	Kiel	32	30	-	35.9	8	Mosq.
	Cologne	4	4	-	3.6	8	Mosq.
	Aachen	5	4	-	3.1	8	Mosq.
	Krefeld	11	11	-	14.3	8	Mosq.
30	Met. Recce.	1	1	-	-	8	Mosq.
30/31	Nurnburg	795	616	94	2460 1	All Groups	Hal. Lanc. Mosq.
	Cologne	9	9	-	11.7	8	Mosq.
	Aachen	6	5	-	3.7	8	Mosq.
	Dortmund	1	1	-	1.8	8	Mosq.
	Kassel	19	19	-	21.2	8	Mosq.
	Oberhausen	3	2	-	3.6	8	Mosq.
	Deelan	2	2	-	1.8	8	Mosq.
	Juliendorf	2	1	-	.9	8	Mosq.
	Twente	4	4	-	2.7	8	Mosq.
	Volkal	3	3	-	-	8	Mosq.
	Juvincourt	2	1	-	.9	8	Mosq.
	Minelaying	55	54	-	148 mines	3, 4, 6,	Hal. Stir.
	Leaflets	8	8	-	-	92	Well.
	R.C.M.	19	15	-	-	100	Mosq.
	S.O.E.	22	-	-	1	3, 100	Various
31 Mar/ 1 Apr.	Essen	3	3	-	5.4	8	Mosq.
	Leaflets	15	14	-	-	91, 92, 93	Whit. Well.
	S.O.E.	28	-	-	-	3	Various
1/2	Hannover	35	35	-	-	8	Mosq.
	Aachen	7	7	-	-	8	Mosq.
	Krefeld	6	5	-	-	8	Mosq.
	(Crossbow Target)	2	2	-	-	8	Mosq.
	Minelaying	34	34	-	129 mines	4, 6	Hal.
	R.C.M.	4	4	-	-	100	Mosq.
	S.O.E.	10	-	-	-	3, 100	Various
4/5	Cologne	41	41	-	-	8	Mosq.
	Essen	4	4	-	-	8	Mosq.
	Aachen	5	5	-	-	8	Mosq.
	Duisburg-Rheinhausen	3	3	-	-	8	Mosq.
	Krefeld	2	2	-	-	8	Mosq.
	La Glacerie	2	2	-	-	8	Mosq.
5	Met. Recce	1	1	-	-	8	Mosq.
5/6	Toulouse	148	141	1	-	5	Lanc. Mosq.
	Minelaying	24	23	-	86 mines	3	Stir.
	S.O.E.	37	-	-	-	3	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>April</u>							
6	Met. Recce	1	1	-	-	8	Mosq.
6/7	Hamburg	35	32	1	-	8	Mosq.
	Duren	3	3	-	-	8	Mosq.
	Rheinhausen (Duisburg)	2	2	-	-	8	Mosq.
	Hagen	2	2	-	-	8	Mosq.
	Wuppertal	2	-	-	-	8	Mosq.
	Aachen	2	2	-	-	8	Mosq.
	Essen	1	1	-	-	8	Mosq.
	Cologne	2	2	-	-	8	Mosq.
	Special Patrols	3	-	-	-	100	Various
7	Met. Recce	2	1	-	-	8	Mosq.
7/8	Minelaying	12	12	-	36 mines	4	Hal.
	R.C.M.	4	4	-	-	100	Mosq.
	Special Patrols	1	-	-	-	100	Various
8	Met. Recce	1	1	-	-	8	Mosq.
8/9	Essen	40	40	-	-	8	Mosq.
	Osnabruck	3	3	-	-	8	Mosq.
	Duisburg	3	3	-	-	8	Mosq.
	Minelaying	8	8	-	16 mines	4	Hal.
	Special Patrols	2	-	-	-	100	Various
9	Met. Recce	1	1	-	-	8	Mosq.
9/10	Villeneuve St. George (railway centre)	225	213	-	993.8	1, 3, 4, 6, 8	Mosq. Lanc. Hal.
	Lille " "	239	227	1	1054.7	3, 4, 6,	Stir. Hal. Mosq.
	Mannheim	36	36	-	-	8	Mosq.
	Osnabruck	2	2	-	-	8	Mosq.
	Duisburg	3	3	-	-	8	Mosq.
	Dusseldorf	1	1	-	-	8	Mosq.
	Cologne	2	2	-	-	8	Mosq.
	Minelaying	103	98	9	439 mines	1, 5	Lanc.
	Leaflets N. France	9	9	-	-	92, 93	Well.
	R.C.M.	16	14	-	-	100	Mosq.
	S.O.E.	61	-	-	-	3	Various
10/11	Tergnier (railway centre)	157	155	10	692.0	4	Hal.
	Ghent ( " " )	122	118	-	615.3	6	Hal.
	Aulnoye " "	132	129	7	790.8	1	Lanc.
	Laon " "	148	147	1	766.6	3, 6, 8.	Lanc.
	Tours " "	180	173	1	947.2	5	Lanc.
	St. Cyr (G.A.F. Signals)	18	18	-	80.8	5	Lanc. Mosq.
	Hannover	36	36	-	45.3	8	Mosq.
	Duisburg	2	2	-	3.6	8	Mosq.
	Minelaying	8	6	-	24 mines	3	Stir.
	Leaflets N. France	17	15	-	-	92, 93	Well.
	R.C.M. and Intruders	8	6	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	54	-	3	-	3, 100	Various
11/11	Met. Recce	1	1	-	-	8	Mosq.
11/12	Aachen (railway centre)	350	342	9	1938.5	1, 3, 5, 8	Lanc. Mosq.
	Hannover	36	36	-	45.0	8	Mosq.
	Osnabruck	3	3	-	2.0	8	Mosq.
	Duisburg-Hamborn	3	2	-	3.6	8	Mosq.
	Airfields in France	9	8	-	-	8	Mosq.
	Minelaying	43	37	-	108 mines	3, 4, 6	Stir. Hal.
	Leaflets	8	8	-	-	91	Well.
	R.C.M.	7	6	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	33	-	-	-	3, 100	Various
12/13	Osnabruck	39	39	-	47.0	8	Mosq.
	Minelaying	50	45	-	146 mines	3, 4, 6	Stir. Hal.
	Leaflets N. France	11	9	-	-	92, 93	Well.
	Fighter Support	2	2	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	21	-	2	-	3	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonrage	Groups	Aircraft
April							
13/14	Duren	6	6	-	5.1	8	Mosq.
	Dortmund	3	3	-	-	8	Mosq.
	Berlin	29	22	2	25.7	8	Mosq.
	Minelaying	16	15	-	48 mines	3, 6	Stir. Hal.
14	Met. Recce	2	2	-	-	8	Mosq.
17	Met. Recce	1	1	-	-	8	Mosq.
17/18	Cologne	26	24	-	32.0	8	Mosq.
	Le Mans (railway centre)	2	-	-	-	8	Mosq.
	Minelaying	20	20	1	52 mines	3, 4, 6	Stir. Hal.
	Leaflets N. France	4	4	-	-	3, 92	Stir. Well.
	Fighter Support	2	2	-	-	100	Mosq.
18	Met. Recce	1	1	-	-	8	Mosq.
18/19	Noisy le Sec. (railway centre)	163	162	4	1874.7	6, 8	Lanc. Hal.
	Tergnier "	163	159	6	719.6	4, 8	Lanc. Hal.
	Tergnier and Noisy le Sec.	8	5	-	-	8	Mosq.
	Rouen (railway centre)	289	281	-	1538.1	1, 3, 8	Mosq. Lanc.
	Juvisy (railway centre)	209	203	1	1105.7	5, 8	Mosq. Lanc.
	Berlin	24	24	-	28.5	8	Mosq.
	Osnabruck	2	2	-	1,3	8	Mosq.
	Le Mans	2	-	-	-	8	Mosq.
	Minelaying	168	160	3	497 mines	1, 3, 4, 5, 6	Stir. Lanc. Hal.
	Leaflets N. France	46	46	-	-	91, 92, 93	Well.
	Fighter Support and Intruder	32	27	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	Special Patrols	9	-	-	-	100	Various
20	Met. Recce	3	2	-	-	8	Mosq.
20/21	Cologne (railway centre)	379	358	4	1767.0	1, 3, 6, 8	Lanc. Mosq.
	Ottignies (railway centre)	196	190	1	916.2	4	Hal. Lanc.
	Paris (La Chapelle) (railway centre)	269	260	6	1265.4	5, 8	Mosq. Lanc. Mosq.
	Lens	175	170	1	849.4	6, 8	Lanc. Mosq. Hal.
	Berlin	8	8	-	6.0	8	Mosq.
	Chambly	14	4	1	16.1	3	Stir.
	Minelaying	38	35	-	154 mines	3, 4, 6	Stir. Hal.
	Leaflets	27	26	1	-	91, 92, 93	Whit. Well.
	Fighter Patrols	25	17	2	-	100	Mosq.
	Intruders	8	6	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	16	-	-	-	3, 100	Various
21/22	Cologne	24	22	-	32.5	8	Mosq.
	Minelaying	58	58	-	183 mines	3, 4, 6	Stir. Hal.
	Leaflets N. France	15	14	-	-	3, 93	Stir. Well.
	S.O.E.	13	-	-	-	3, 100	Various
22	Met. Recce	3	1	-	-	8	Mosq.
22/23	Dusseldorf (railway centre)	596	567	29	2150.5	1, 3, 4, 6, 8	Hal. Lanc. Mosq.
	Laon ( " " )	181	169	9	715.2	3, 4, 6, 8	Stir. Hal. Lanc. Mosq.
	Brunswick	265	255	4	741.3	1, 5	Lanc. Mosq.
	Mannheim	17	17	-	22.4	8	Mosq.
	Crossbow Target	2	-	-	-	8	Mosq.
	Leaflets N. France	19	17	-	-	3, 92, 93	Stir. Well.
	Intruders	7	7	-	-	100	Mosq.
	Fighter Patrols	19	15	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	Special Patrols	10	-	-	-	100	Various
23	Met. Recce	1	1	-	-	8	Mosq.
23/24	Brussels	12	11	-	35.3	5	Stir.
	Mannheim	25	25	-	34.2	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft	
April 23/24	Minelaying	113	107	5	319 mines	1, 3, 4, 5, 6	Hal. Stir. Lancs.	
	Leaflets N. France	6	6	-	-	93	Well.	
	Fighter Support	4	4	-	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	S.O.E.	12	-	-	-	3, 100	Various	
24	Met. Recce	1	1	-	-	8	Mosq.	
24/25	Karlsruhe	637	591	12	2171.2	1, 3, 4, 6, 8	Hal. Lanc. Mosq.	
	Munich	260	254	9	712.2	1, 5	Lanc. Mosq.	
	Dusseldorf	23	21	-	33.2	8	Mosq.	
	Milan	6	5	-	3.3	5	Lanc.	
	Chambly	4	3	-	9.4	3	Stir.	
	Minelaying	18	16	-	32 mines	6	Hal.	
	R.C.M.	29	24	-	-	100	Mosq.	
	S.O.E.	18	-	1	-	3, 100	Various	
	25/26	Cologne	4	3	-	5.4	8	Mosq.
Minelaying		25	22	-	100 mines	3	Stir.	
Leaflets N. France		9	9	-	-	91, 92	Well.	
Met. Recce		1	1	-	-	8	Mosq.	
26	Crossbow targets in France	2	-	-	-	8	Mosq.	
26/27	Essen	493	432	7	1878.2	1, 3, 4, 6, 8	Hal. Lanc. Mosq.	
	Schweinfurt	226	215	21	668.0	1, 5	Lanc. Mosq.	
	Villeneuve-St. George (railway centre)	217	202	1	852.0	4, 6, 8	Hal. Lanc. Mosq.	
	Chambly	10	-	-	-	3	Stir.	
	Hamburg	16	16	-	19.9	8	Mosq.	
	Minelaying	22	15	-	49 mines	3, 6, 4	Hal. Stir.	
	Leaflets N. France	21	21	-	-	91, 92, 93,	Whit. Well	
	R.C.M.	33	24	2	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	S.O.E.	22	-	-	-	3, 100	Various	
	Intruders	35	-	-	-	2, ADGB	Mosq.	
	27	Met. Recce	2	2	-	-	8	Mosq.
		27/28	Montzen (railway centre)	144	135	15	607.7	4, 6, 8
	Aulnoye ( " " )		233	213	1	930.6	4, 6, 8	Hal. Lanc. Mosq.
Friedrichshafen	323		311	18	1102.4	1, 3, 6, 8	Lanc. Mosq.	
Stuttgart	24		24	-	30.5	8	Mosq.	
Minelaying	8		8	-	16 mines	6	Hal.	
R.C.M.	25		28	1	-	100	Mosq.	
Met. Recce	1		1	-	-	8	Mosq.	
S.O.E.	55		-	1	-	3, 100	Various	
Diversionsary Sweep	159		-	-	-	Groups + O.T.U.s.	Various	
28	Crossbow target in France		2	2	-	-	8	Mosq.
28/29	St. Medard-en-Jalles (Explosive works)	92	26	-	67.9	5	Lanc. Mosq.	
	Oslo	55	54	-	208.2	5	Lanc. Mosq.	
	Hamburg	26	25	-	36.2	8	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	S.O.E.	42	-	-	-	3, 100	Various	
29	Crossbow targets in France	2	2	-	-	8	Mosq.	
	Met. Recce	2	2	-	-	8	Mosq.	
29/30	St. Medard-en-Jalles (Explosive works)	73	71	-	274.0	5	Lanc. Mosq.	
	Clermont-Ferrand (A/C Factory) (A/C Factory)	59	57	-	216.0	5	Lanc. Mosq.	
	Acheres	4	2	-	3.6	8	Mosq.	
	Oberhausen	8	7	-	12.5	8	Mosq.	
	Minelaying	38	35	-	94 mines	3, 4, 6	Stir. Hal.	
	Leaflets N. France	9	9	-	-	93	Well.	
	R.C.M.	6	5	-	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	S.O.E.	25	-	-	-	3, 100	Various	

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>April</u>							
30	Crossbow target in France	2	2	-	-	8	Mosq.
30/1	Acheres (railway centre)	128	122	-	529.5	4, 8	Hal. Lanc.
	Maintenon (ammo. dump)	116	115	-	630.0	1	Mosq. Lanc.
	Somain (railway centre)	142	135	1	594.6	6, 8	Hal. Mosq.
	Saarbrucken	28	27	-	40.8	8	Lanc.
	Duren	5	4	-	5.4	8	Mosq.
	Minelaying	48	46	-	107 mines	4, 6	Mosq.
	R.C.M.	14	13	-	-	100	Hal.
	S.O.E.	50	-	-	-	3, 100	Mosq. Various
<u>May</u>							
1	Crossbow Target	2	2	-	1.8	8	Mosq.
	Met. Recce	2	2	-	-	8	Mosq.
1/2	Lyons	75	73	-	352.5	1	Lanc.
	Chamoly	120	113	5	530.5	3, 9	Stir. Lanc.
	Malines (railway centre)	132	120	2	535.6	4, 8	Mosq. Hal. Lanc.
	Tours ( " " )	50	50	-	221.5	5	Lanc. Mosq.
	Toulouse( " " )	139	136	-	289.8	5	Lanc. Mosq.
	St. Ghislaine (railway centre)	137	123	2	556.2	6, 8	Hal. Lanc.
	Ludwigshafen	28	28	-	-	8	Mosq.
	Minelaying	35	35	-	150 mines	3, 4, 6.	Mosq. Stir. Hal.
	R.C.M.	16	15	1	-	100	Mosq.
	S.O.E.	49	-	-	-	3, 100	Various
2	Minelaying	1	1	-	-	8	Mosq.
2/3	Leverkusen	29	21	-	35.0	8	Mosq.
	Acheres	37	3	-	4.5	8	Mosq.
	Minelaying	9	9	-	49 mines	3	Stir.
	Special Patrols	2	-	-	-	100	Mosq.
3	Crossbow Target	2	2	-	2.7	8	Mosq.
3/4	Mailly le Camp (Tank Depot)	362	254	42	1716.1	1, 5, 8.	Lanc. Mosq.
	Montdidier (railway centre)	92	88	4	401.8	8	Lanc. Mosq.
	Chateaudun	14	9	-	10.5	8	Mosq.
	Ludwigshafen	27	27	-	37.1	8	Mosq.
	Minelaying	32	31	-	62 mines	4, 6	Hal.
	Leaflets N. France	34	33	-	-	91, 92, 93.	Whit. Well.
	R.C.M.	6	5	1	-	100	Mosq.
	Intruders	7	5	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	26	-	-	-	3, 100	Various.
4	Met. Recce	1	1	-	-	8	Mosq.
4/5	Ludwigshafen	28	28	-	38.8	8	Mosq.
	Leverkusen	4	2	-	3.6	8	Mosq.
	Minelaying	20	16	-	43 mines	4, 6	Hal.
	Met. Recce	1	1	-	-	8	Mosq.
5/6	Minelaying	28	27	-	73 mines	3, 4, 6	Hal. Stir.
	Leaflets N. France	6	6	-	-	91	Well.
	S.O.E.	30	-	-	-	3	Various
6	Met. Recce	1	1	-	-	8	Mosq.
6/7	Aubigne	52	51	1	274.8	1	Lanc.
	Mantes-Gassicourt (railway centre)	149	143	3	629.8	4, 8	Mosq. Lanc. Hal.
	Sable-sur-Sarthe	68	67	-	331.0	5	Lanc. Mosq.
	Chateaudun	2	-	-	-	8	Mosq.
	Ludwigshafen	28	28	-	40.6	8	Mosq.
	Leverkusen	5	2	1	3.6	8	Mosq.
	Minelaying	14	13	-	36 mines	3, 6	Stir. Hal.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>May</u>							
7	Serqueux	2	-	-	-	8	Mosq.
7/8	Salbris	62	60	7	271.1	5	Lanc. Mosq.
	Rennes	50	49	-	266.7	1	Lanc.
	St. Valery	64	61	-	253.8	6, 8	Hal. Mosq.
	Chateaudun	4	4	-	7.1	8	Mosq.
	Tours	61	59	1	256.3	5	Lanc. Mosq.
	Nantes	99	92	1	446.9	3, 8	Lanc. Mosq.
	Leverkusen	28	27	-	39.0	8	Mosq.
	Minelaying	42	38	-	109 mines	3, 4, 5, 6	Stir, Hal. Lanc.
	R.C.M.	12	12	-	-	100	Mosq.
	Met. recce	1	1	-	-	9	Mosq.
	S.O.E.	44	-	2	-	3, 100	Various
8	Serqueux	2	1	-	1.8	8	Mosq.
8/9	Brest	64	64	1	307.0	5	Lanc. Mosq.
	Berneval (Bty)	39	31	-	131.3	4, 8	Hal. Mosq.
	Cap Gris Nez (Bty)	38	33	-	188.5	3, 8	Lanc. Mosq.
	Osnabruck	28	26	-	34.8	8	Mosq.
	Oberhausen	2	2	-	3.6	8	Mosq.
	Morsalines (Bty)	39	35	-	138.8	4, 8	Hal. Mosq.
	Haine St. Pierre (Bty)	125	119	9	481.6	6, 8	Lanc. Hal. Mosq.
	Minelaying	38	38	-	95 mines	3, 4, 6.	Stir. Hal.
	Leaflets N.France	26	25	-	-	91, 92, 93	Whit. Well.
	R.C.M.	10	10	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	45	-	-	-	3, 100	Various
9	Serqueux (railway centre)	2	2	-	-	8	Lanc. Mosq.
9/10	Anney (Ballbearings Works)	43	38	-	112.3	5	Lanc. Mosq.
	Gennevilliers ( " " )	64	61	5	318.4	5, 8	Lanc. Mosq.
	Merville (Bty)	56	56	-	308.3	5	Lanc.
	Calais (Bty)	53	53	-	217.2	6	Lanc. Hal.
	Mardick (Bty)	53	53	1	306.9	1	Lanc.
	Calais and Mardick (Bty)	8	4	-	-	8	Mosq.
	Morsalines (Bty)	54	53	-	231.3	4	Hal.
	St. Valery	52	50	-	214.4	6	Lanc. Hal.
	Morsalines and St. Valery	8	3	-	-	8	Mosq.
	Chateaudun (A/F)	6	5	-	8.9	8	Mosq.
	Berlin	30	29	-	33.0	8	Mosq.
	Berneval (Bty)	61	54	-	250.8	4, 8	Hal. Mosq.
	Cap Gris Nez (Bty)	69	64	-	347.2	3, 8	Lanc. Mosq.
	Minelaying	25	25	-	71 mines	3, 4, 6	Stir. Hal.
	R.C.M.	3	3	-	-	100	Mosq.
	Intruders	8	5	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	Leaflets	17	14	1	-	91, 93	Well.
	S.O.E.	53	-	3	-	3, 100	Various
10	Met. Recce	2	2	-	-	8	Mosq.
10/11	Lens (railway centre)	125	121	-	534.5	4, 8	Hal. Lanc. Mosq.
	Lille (railway centre)	89	85	12	418.9	5	Lanc. Mosq.
	Ghent (railway centre)	126	118	-	425.6	6, 8	Lanc. Hal. Mosq.
	Dieppe (Bty)	68	64	-	339.4	1, 8	Lanc. Mosq.
	Courtrai (railway centre)	98	93	-	533.8	3, 8	Lanc. Mosq.
	Chateaudun (ammo dump)	2	-	-	-	8	Mosq.
	Ludwigshafen	29	27	-	37.5	8	Mosq.
	Minelaying	26	25	1	80 mines	1, 3, 4, 6	Hal. Lanc. Stir.
	Leaflets	26	24	-	-	91, 93	Whit. Well.
	R.C.M.	9	7	-	-	100	Mosq.
	Intruder	10	6	-	-	100	Mosq.
	S.O.E.	33	-	-	-	3, 100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>May</u>							
11/12	Hasselt (railway centre)	128	39	5	231.2	1, 8	Lanc. Mosq.
	Louvain (railway centre)	110	101	4	559.2	3, 8	Lanc. Mosq.
	Colline-Beaumont (bty)	59	45	-	198.0	4, 8	Hal. Mosq.
	Trouville (bty)	59	48	-	188.4	4, 8	Hal. Mosq.
	Boulogne (bty)	135	122	2	472.9	6, 8	Lanc. Hal. Mosq.
	Bourg-Leopold (Camp)	201	96	5	508.7	5, 8	Lanc. Mosq.
	Minelaying	12	10	-	33 mines	3, 6	Stir. Hal.
	R.C.M.	6	6	-	-	100	Mosq.
	Met. Recce	1	1	-	-	100	Mosq.
	S.O.E.	1	-	-	-	3, 100	Various
12	Met. Recce	1	1	-	-	8	Mosq.
12/13	Hasselt (railway centre)	111	105	7	437.2	4, 8	Lanc. Hal. Mosq.
	Louvain (railway centre)	120	103	5	356.7	6, 8	Lanc. Hal. Mosq.
	Chateaudun	8	2	-	3.6	8	Mosq.
	Brunsbüttel (Kiel area)	12	12	-	14.3	8	Mosq.
	Minelaying	65	61	1	180 mines	1, 3, 6, 8	Stir. Hal. Lanc.
	Leaflets	8	8	-	-	91	Well.
	R.C.M.	12	11	-	-	100	Mosq.
	Intruders	2	2	-	-	8	Mosq.
	Met. Recce	2	2	-	-	8	Mosq.
	Special Patrols	10	-	-	-	100	Various
13	Met. Recce	1	1	-	-	8	Mosq.
14	Met. Recce.	3	3	-	-	8	Mosq.
14/15	Cologne	29	27	-	38.4	8	Mosq.
	Courtrai	5	3	-	2.7	8	Mosq.
	Chateaudun	4	4	-	7.1	8	Mosq.
	Leverkusen	41	36	-	3.6	8	Mosq.
	Minelaying	12	11	-	26 mines	3, 6	Stir. Hal.
	Leaflets	10	10	-	-	93	Well.
	Met. Recce	2	2	-	-	8	Mosq.
	Special Patrols	1	-	-	-	100	Mosq.
15	Met. Recce	1	1	-	-	8	Mosq.
15/16	Ludwigshafen	30	30	-	43.9	8	Mosq.
	Leverkusen	3	2	-	5.4	8	Mosq.
	Caen/Carpignat (A/F)	10	5	-	4.5	8	Mosq.
	Minelaying	43	30	3	126 mines	1, 3, 4, 6	Hal. Lanc. Stir.
	Leaflets	24	23	1	-	92, 93	Well.
	R.C.M.	2	1	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	7	-	-	-	3, 100	Various
16/17	Berlin	29	28	-	33.8	8	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
18	Met. Recce	1	1	-	-	8	Mosq.
18/19	Chateaudun	2	-	-	-	8	Mosq.
	Orly (A/F)	8	2	-	1.6	8	Mosq.
	Mondeville (Steel works)	5	4	-	7.1	8	Mosq.
	Met. Recce	2	2	-	-	8	Mosq.
	Special Patrols	7	-	-	-	100	Various
19	Crossbow Target in France	2	2	-	2.7	8	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft	
<u>May</u>								
19/20	Orleans (railway centre)	122	112	1	617.7	1, 8	Lanc. Mosq.	
	Le Mans (railway centre)	116	110	3	555.5	3, 8	Lanc. Mosq.	
	Tours (railway centre)	117	107	-	477.4	5	Lanc. Mosq.	
	Boulogne (railway centre)	143	134	-	562.3	4, 8	Lanc. Hal.	
	Cologne	29	29	-	44.0	8	Mosq.	
	Mont Couple (Radar station)	44	31	1	125.4	8	Lanc. Mosq.	
	Le Clipon (Bty)	64	61	-	208.4	6, 8	Hal. Mosq.	
	Merville (Bty)	63	59	-	218.2	6	Lanc. Hal.	
	Amiens (railway centre)	121	40	1	152.7	5, 8	Lanc. Mosq.	
	Minelaying	28	27	-	79 mines	3, 4, 6	Stir. Hal.	
	Leaflets	12	11	1	-	93	Well.	
	R.C.M.	8	8	-	-	100	Mosq.	
	Intruders	23	23	-	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	Special Patrols	10	-	-	-	100	Mosq.	
	20	Met. Recce	1	1	-	-	8	Mosq.
		Letreport (Radar station)	2	-	-	-	8	Mosq.
20/21	Dusseldorf	30	30	-	52.9	8	Mosq.	
	Reisholz	14	9	-	16.1	8	Mosq.	
	Minelaying	16	13	-	32 mines	3, 6	Stir. Hal.	
	R.C.M.	5	5	-	-	100	Mosq.	
	Intruders	4	-	-	-	100	Mosq.	
	Leaflets	7	7	-	-	93	Well.	
21	Letreport (Radar station)	2	2	-	2.7	8	Mosq.	
	Met. Recce	3	3	-	-	8	Mosq.	
21/22	Duisburg	532	487	29	2219.9	1, 3, 5, 8	Lanc. Mosq.	
	Courtrai (A/F)	8	7	-	6.3	8	Mosq.	
	Hannover	25	24	-	37.5	8	Mosq.	
	Minelaying	107	99	3	501 mines	4, 5, 6	Hal. Lanc.	
	R.C.M.	28	24	-	-	100	Mosq.	
	Intruders	7	7	-	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	Special Patrols	9	-	-	-	100	Various	
	22	Met. Recce	2	2	-	-	8	Mosq.
22/23	Dortmund	375	329	18	1655.6	1, 3, 6, 8	Lanc. Mosq.	
	Brunswick	235	215	13	613.6	1, 5	Lanc. Mosq.	
	Orleans (railway centre)	128	112	1	617.7	4, 8	Lanc. Hal.	
	Le Mans (railway centre)	133	116	2	388.4	6, 8	Lanc. Hal.	
	Ludwigshafen	26	24	-	55.6	8	Mosq.	
	Courtrai (A.R)	9	8	-	7.1	8	Mosq.	
	Minelaying	54	50	-	199 mines	3, 4, 6	Stir. Lanc.	
	Leaflets	25	23	1	-	91, 92	Whit. Well.	
	R.C.M.	21	19	-	-	100	Mosq.	
	Intruders	8	6	-	-	100	Mosq.	
	Met. Recce	1	1	-	-	8	Mosq.	
	Special Patrols	9	-	-	-	100	Various	
	23/24	Dortmund	24	24	-	37.6	8	Mosq.
		Berlin	16	16	-	23.0	8	Mosq.
		Lison (railway centre)	6	6	-	7.8	8	Mosq.
Minelaying		30	26	-	98 mines	1, 3, 4, 6	Lanc. Hal.	
R.C.M.		2	2	-	-	100	Mosq.	
Met. Recce		1	1	-	-	8	Mosq.	
Leaflets N. France		8	8	-	-	93	Well.	
S.O.E.	6	-	-	-	3, 100	Well. Hal.		
24	Met. Recce	2	2	-	-	8	Mosq.	

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>May</u>							
24/25	Aachen (railway centre)	432	409	25	2036.5	1, 4, 3, 6, 8	Lanc. Hal. Mosq.
	Colline-Beaumont (Bty)	55	53	-	220.4	4, 8	Hal. Mosq.
	Trouville (Bty)	59	57	-	181.4	6, 8	Hal. Mosq.
	Le Clipon (Bty)	58	54	-	302.5	1, 8	Lanc. Mosq.
	Boulogne (Bty)	52	50	-	278.4	3, 8	Lanc. Mosq.
	Eindhoven (Philips Works)	63	-	-	-	5	Lanc. Mosq.
	Antwerp (Motor plant)	51	46	-	195.8	5, 8	Lanc. Mosq.
	Berlin	15	13	-	18.8	8	Mosq.
	Minelaying	25	23	-	83 mines	3, 4	Stir. Hal.
	R.C.M. + Intruders	39	36	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Leaflets	23	21	-	-	91, 93	Whit. Well.
	Special Patrols	6	-	-	-	100	Various
25	Met. Recce	1	1	-	-	8	Mosq.
26	Met. Recce	1	1	-	-	8	Mosq.
26/27	Ludwigshafen	30	30	2	46.2	8	Mosq.
	Aachen (railway centre)	11	11	-	19.6	8	Mosq.
	Lison (railway centre)	8	6	-	8.9	8	Mosq.
	Minelaying	42	42	-	188 mines	3, 4, 5, 6	Hal. Lanc. Stir.
	R.C.M.	7	6	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
27/28	Aachen (railway centre)	170	166	12	907.6	1, 3, 8	Lanc. Mosq.
	Bourg-Leopold (camp)	331	323	10	1216.4	1, 4, 6, 8	Lanc. Hal. Mosq.
	Merville (Bty)	57	55	1	298.2	1	Lanc.
	Nantes (railway centre)	104	53	-	255.1	5	Lanc. Mosq.
	Berlin	23	21	-	27.6	8	Mosq.
	Morsalines (Bty)	67	64	-	316.8	5, 8	Lanc. Mosq.
	Le Clipon (Bty)	53	52	-	173.2	4, 6, 8	Hal. Mosq.
	Boulogne (Bty)	43	42	-	226.4	3, 8	Lanc. Mosq.
	St. Valery-en-Caux	50	48	1	208.9	5	Lanc. Mosq.
	Rennes (A/F)	83	81	1	303.4	8	Lanc. Mosq.
	Dusseldorf	6	5	-	2.9	8	Mosq.
	Minelaying	60	59	1	266 mines	3, 4, 5, 6, 8	Hal. Stir. Lanc.
	R.C.M.	32	29	1	-	100	Mosq. Fort.
	Leaflets	7	7	-	-	93	Well.
	Intruders	10	7	1	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	13	-	-	-	3, 100	Various
28/29	Angers (railway centre)	126	118	1	472.2	3, 8	Lanc. Mosq.
	Mardick (Bty)	58	49	-	188.4	8	Lanc. Mosq.
	St. Martin de Varreville (Bty)	77	72	-	356.4	5, 8	Lanc. Mosq.
	Ludwigshafen	31	29	-	42.9	8	Mosq.
	Eu (Bty)	56	56	-	290.7	1	Lanc.
	Leval (railway centre)	6	4	-	5.4	1	Lanc.
	Minelaying	16	16	-	64 mines	3, 4, 6	Stir. Hal.
	Intruders	6	1	-	-	100	Mosq.
	Leaflets N. France	14	13	-	-	93	Well.
	S.O.E.	27	-	-	-	3, 100	Various
29	Met. Recce	1	1	-	-	8	Mosq.
29/30	Hannover	31	29	-	40.4	8	Mosq.
	Mardick (Bty)	4	4	-	3.6	8	Mosq.
	Xanten	46	39	-	9.9	8	Mosq.
	Minelaying	6	5	-	16 mines	4, 6	Hal.
	Met. Recce	1	1	-	-	8	Mosq.
30	Met. Recce	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>May</u>							
30/31	Boulogne (Bty)	54	51	-	190.0	3, 8	Lanc. Mosq.
	Leverkusen (Chemical Works)	30	28	-	42.4	8	Mosq.
	Minelaying	12	12	-	40 mines	3	Stir.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	11	-	-	-	3	Various
31	Met. Recce.	3	2	-	-	8	Mosq.
31 May/ 1 June	Trappes (railway centre)	219	202	4	872.0	1, 3, 4 8	Lanc. Hal. Mosq.
	Tergnier (railway centre)	115	101	2	538.7	1, 8	Lanc. Mosq.
	Mont Couple (Radar station)	115	106	-	474.1	6, 8	Lanc. Hal. Mosq.
	Saumur (railway centre)	86	49	-	240.4	5	Lanc. Mosq.
	Maisy (Bty)	68	6	-	.9	5	Lanc. Mosq.
	Au Fevre (W/T Stn.)	129	122	-	451.7	6, 8	Lanc. Hal. Mosq.
	Minelaying	28	23	1	106 mines	3, 4, 5, 6	Stir. Lanc. Hal.
	Leaflets N. France	12	9	-	-	93	Well.
	R.C.M. + Intruders	29	26	1	-	100	Fort. Mosq.
	S.O.E.	19	-	-	-	3, 100	Various
1	Met. Recce	3	3	-	-	8	Mosq.
1/2	Saumur (railway centre)	58	53	-	259.2	5	Lanc. Mosq.
	Ferme d'Urville (Radar Stn.)	109	100	-	434.4	4, 8	Hal. Mosq.
	Aarhus	6	3	-	1.8	8	Mosq.
	Minelaying	18	18	-	57 mines	4, 6, 8	Hal. Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
	S.O.E.	40	-	1	-	3	Various
2	Met. Recce.	1	1	-	-	-	-
2/3	Trappes (railway centre)	128	124	16	480.8	1, 4, 8	Lanc. Hal. Mosq.
	Dieppe/Bernevalle Grand (Radar Station)	107	104	-	541.6	1, 8	Lanc. Mosq.
	Coastal Batteries	336	217	1	974.2	All Groups	Lanc. Hal. Mosq.
	Leverkusen	23	23	-	33.3	8	Mosq.
	Laval	1	1	-	1.8	8	Mosq.
	Lison	3	3	-	5.4	8	Mosq.
	Minelaying	53	44	-	184 mines	3, 4, 6	Stir. Hal.
	Leaflets N. France	11	10	-	-	92, 93	Well.
	R.C.M.	18	18	-	-	100	Fort. Mosq.
	S.O.E.	49	-	-	-	3, 100	Various
3	Met. Recce.	1	1	-	-	8	Mosq.
3/4	Ferme d'Urville (Radar Station)	100	99	-	509.3	5, 8	Lanc. Mosq.
	Coastal Batteries	135	133	-	677.6	1, 3, 8	Lanc. Mosq.
	Ludwigshafen	20	20	-	30.1	8	Mosq.
	Argentan	5	5	-	8.9	8	Mosq.
	Minelaying	57	57	-	235 mines	3, 4, 6	Hal. Lanc. Stir.
	R.C.M.	9	6	-	-	100	Mosq.
	Special Patrols	4	-	-	-	100	Various
	Intruders	14	-	-	-	2 A.D.G.B.	Mosq.
4	Met. Recce.	1	1	-	-	8	Mosq.
4/5	Coastal Batteries	259	247	-	898.4	1, 4, 5, 6, 8	Hal. Lanc. Mosq.
	Cologne	20	18	-	32.1	8	Mosq.
	Argentan	6	4	-	7.1	8	Mosq.
	Minelaying	7	5	-	26 mines	3, 4	Hal. Lanc.
	R.C.M.	6	5	-	-	100	Mosq.
	S.O.E.	21	-	-	-	3, 100	Various
5	Met. Recce.	3	3	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
June							
5/6	Coastal Batteries	1136	1047	6	5268.2	All Groups	Hal. Lanc. Mosq.
	Diversions	111	-	3	-	1, 3, 5, 100	Lanc. Various
	R.C.M. Intruders	52	48	2	-	100	Mosq. Various
	S.O.E.	5	-	-	-	3	Various
6	Met. Recce.	3	3	-	-	8	Mosq.
6/7	Caen	129	126	6	438.8	5, 8	Lanc. Mosq.
	Lisieux (Railway centre)	104	101	1	396.0	3, 8	Lanc. Mosq.
	Condé sur Noireau (Railway centre)	122	115	-	385.3	6, 8	Hal. Lanc. Mosq.
	Coutances (Railway centre)	139	132	-	469.7		
	Chateaudun (Railway centre)	112	105	1	395.4	4, 8	Hal. Lanc. Mosq.
	Paris (Acheres) (Railway centre)	104	53	1	189.5	1, 8	Lanc. Mosq.
	Vire	112	109	3	414.5	1, 8	Lanc. Mosq.
	Ludwigshafen	32	32	-	49.6	8	Mosq.
	Argentan	128	126	-	423.8	5, 8	Lanc. Mosq.
	St. Lo	115	110	-	384.3	4, 8	Hal. Lanc. Mosq.
	Minelaying	19	17	-	87 mines	3, 5, 4	Lanc. Stir. Hal.
	R.C.M.	18	18	-	-	100	Mosq.
	S.O.E.	26	-	-	-	3	Various
7	Met. Recce	2	2	-	-	8	Mosq.
7/8	Foret de Cerisy (troop cong.)	212	208	1	795.7	1, 5, 8	Lanc. Mosq.
	Versailles/Matelots (Railway centre)	83	81	6	292.3	1, 4, 6, 8	Hal. Lanc. Mosq.
	Massy/Palaiseau (Railway centre)	75	70	13	263.1	3, 8	Lanc. Mosq.
	Paris (Acheres) (Railway centre)	108	96	4	352.3	6, 8	Lanc. Hal. Mosq.
	Juvisy (Railway centre)	71	65	5	234.3	4, 8	Hal. Lanc. Mosq.
	Cologne	32	31	-	50.0	8	Mosq.
	Minelaying	25	23	-	94 mines	3, 4, 6	Hal. Stir.
	R.C.M. and Intruders	36	28	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	34	-	-	-	3, 100	Various
8	Met. Recce.	2	2	-	-	8	Mosq.
8/9	Saumur (Tunnel)	32	31	-	128.8	5	Lanc. Mosq.
	Fourgeres (Railway centre)	114	111	-	421.0	3, 8	Lanc. Mosq.
	Mayenne ( " " )	93	92	-	307.1	6, 8	Lanc. Mosq.
	Pontaubault (Railway centre)	58	55	-	197.8	5	Lanc. Mosq.
	Alencon ( " " )	112	110	-	362.5	4, 8	Hal. Lanc. Mosq.
	Rennes (Railway centre)	106	103	2	362.4	5, 8	Lanc. Mosq.
	Minelaying	34	26	-	109 mines	3, 4, 5, 6	Stir. Hal. Lanc.
	R.C.M.	17	15	-	-	100	Mosq.
	Intruders	19	13	-	-	100	Mosq.
9	Met. Recce.	2	2	-	-	8	Mosq.
9/10	Le Mans (Railway centre)	112	109	-	387.3	6, 8	Hal. Lanc. Mosq.
	Etampes ( " " )	117	114	-	422.4	5, 8	Lanc. Mosq.
	Rennes ( " " )	71	67	-	253.2	8	Lanc. Mosq.
	Laval ( " " )	111	89	2	312.4	4, 8	Hal. Lanc. Mosq.
	Berlin	36	36	-	56.9	8	Mosq.
	Flers (Railway centre)	107	102	-	384.7	1	Lanc. Mosq.
	Minelaying	28	28	-	105 mines	3, 4, 6	Stir. Hal.
	R.C.M.	2	2	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	Special Patrols	13	-	-	-	100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>June</u>							
10	Met. Recce	2	2	-	-	8	Mosq.
10/11	Paris (Acheres, Railway centre)	106	91	7	377.2	1, 8	Lanc. Mosq.
	Berlin	32	32	2	52.7	8	Mosq.
	Orleans (railway centre)	112	107	1	388.2	5	Lanc. Mosq.
	Versailles/Matelots (railway centre)	112	103	4	360.1	6, 8	Hal. Lanc. Mosq.
	Dreux (railway centre)	102	98	6	378.3	3, 8	Lanc. Mosq.
	Minelaying	30	29	-	125 mines	3, 4, 6	Stir. Hal. Lanc.
	R.C.M.	7	6	-	-	100	Mosq.
	Intruders	18	12	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	Special Patrols	13	-	-	-	100	Various
11	Met. Recce	2	2	-	-	8	Mosq.
11/12	Massy/Palaiseau (railway centre)	99	69	1	226.9	4, 8	Hal. Lanc. Mosq.
	Nantes	63	58	1	206.7	3, 8	Lanc. Mosq.
	Evreux	106	102	1	558.8	1, 8	Lanc. Mosq.
	Tours	61	57	1	203.9	8	Lanc. Mosq.
	Berlin	33	32	2	52.8	8	Mosq.
	Minelaying	13	13	-	50 mines	4, 6	Hal.
	R.C.M.	30	22	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
12	Met. Recce	1	1	-	-	8	Mosq.
12/13	Gelsenkirchen (Nordstern) (Oil)	294	276	17	1444.3	1, 3, 8	Lanc. Mosq.
	Amiens (Longueau) (railway centre)	113	108	4	369.4	4, 8	Hal. Lanc. Mosq.
	Amiens (St. Roch) (railway centre)	112	106	4	371.9	6, 8	Hal. Lanc. Mosq.
	Caen	118	77	-	399.3	5, 8	Lanc. Mosq.
	Poitiers	116	116	-	475.2	5	Lanc. Mosq.
	Arras	107	100	6	326.0	6, 8	Hal. Lanc. Mosq.
	Cambrai	105	98	9	344.0	6, 8	Hal. Lanc. Mosq.
	Cologne	27	27	-	40.2	8	Mosq.
	Minelaying	14	12	-	56 mines	3, 4, 6	Stir. Hal.
	R.C.M.	42	38	-	-	100	Mosq. Fort.
	Intruders	13	9	-	-	100	Various
	Met. Recce	1	1	-	-	8	Mosq.
13/14	Munchen Gladbach	8	8	-	12.5	8	Mosq.
	Duren	3	3	-	5.4	8	Mosq.
	Minelaying	12	11	-	57 mines	3	Lanc. Stir.
	R.C.M.	15	13	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	2	-	-	-	3	Hal.
14	Le Havre (shipping)	234	228	-	1231.1	1, 5, 8	Lanc. Mosq.
14/15	Annay (railway centre)	224	219	-	1168.6	5, 8	Lanc. Hal. Mosq.
	Cambrai (railway centre)	107	105	2	347.6	6, 8	Hal. Lanc. Mosq.
	Le Havre (shipping)	119	118	1	584.7	3, 8	Lanc. Mosq.
	Dorai (railway centre)	112	108	2	377.3	4, 8	Hal. Lanc. Mosq.
	Evrecy (railway centre)	113	108	-	446.1	4, 8	Hal. Lanc. Mosq.
	St. Pol (railway centre)	111	105	-	360.2	6	Lanc. Hal.
	Gelsenkirchen (oil)	35	35	-	49.3	8	Mosq.
	Minelaying	12	12	-	57 mines	3	Stir.
	R.C.M.	37	33	-	-	100	Mosq.
	S.O.E.	18	-	-	-	3, 100	Various
15	Boulogne (shipping)	297	274	-	1315.0	1, 5, 8	Lanc. Mosq.
15/16	Fouillard (railway centre)	113	112	-	376.1	4, 8	Hal. Lanc. Mosq.
	Chattellerant (railway centre)	114	114	1	418.0	5	Lanc. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>June</u>							
15/16	Valenciennes (railway centre)	113	110	5	410.2	3, 8	Lanc. Mosq.
	Lens (railway centre)	111	107	6	428.2	3, 8	Stir. Mosq. Lanc.
	Gelsenkirchen (oil)	31	29	1	43.8	8	Mosq.
	Minelaying	11	9	-	46 mines	3, 4	Stir. Hal.
	R.C.M.	34	29	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
16	Met. Recce	1	1	-	-	8	Mosq.
	Ranger Patrol	2	2	-	-	8	Mosq.
16/17	Sterkrade (oil)	321	301	31	1274.7	1, 4, 8, 6	Hal. Lanc. Mosq.
	Crossbow Targets N. France	405	391	-	1423.3	1, 4, 5, 6, 8	Hal. Lanc. Mosq.
	Berlin	26	26	-	40.3	8	Mosq.
	Minelaying	12	11	-	52 mines	3, 4	Stir. Hal.
	R.C.M.	54	48	1	-	100	Various
	S.O.E.	21	-	-	-	3, 100	Hal. Various
17	Met. Recce	1	1	-	-	8	Mosq.
17/18	Crossbow Targets N. France	209	201	-	701.8	4, 6, 8	Hal. Lanc. Mosq.
	Aulnoye (railway centre)	112	14	-	31.0	1, 8	Lanc. Mosq.
	Montdidier (railway centre)	110	12	1	34.2	3, 8	Lanc. Stir. Mosq.
	Berlin	30	29	-	45.1	8	Mosq.
	Gelsenkirchen (Buer)	4	4	-	7.1	8	Mosq.
	Minelaying	12	12	-	55 mines	3, 6	Hal. Stir.
	R.C.M.	54	43	-	-	100	Various
	Met. Recce	2	2	-	-	8	Mosq.
	S.O.E.	22	-	-	-	3, 100	Various, Hal.
18	Met. Recce	5	5	-	-	8	Mosq.
18/19	Crossbow Targets N. France	10	9	-	16.1	8	Mosq.
	Minelaying	7	7	-	30 mines	3, 6	Stir. Hal.
19	Met. Recce	5	5	-	-	8	Mosq.
	Crossbow Targets N. France	30	26	-	91.3	5, 8	Lanc. Mosq.
19/20	Crossbow Targets N. France	243	-	-	-	1, 4, 5, 8	Lanc. Hal Mosq.
20	Crossbow Target N. France	20	-	-	-	5	Lanc. Mosq.
21	Crossbow Targets N. France	322	125	-	424.8	3, 6, 8	Lanc. Mosq.
	Intruder Patrols	3	3	-	-	100	Mosq.
	Met. Recce	4	4	-	-	8	Mosq.
21/22	Wesseling (oil)	133	124	37	578.4	1, 5	Lanc. Mosq.
	Gelsenkirchen (Buer) (oil)	132	125	8	570.1	1, 5, 8	Lanc. Mosq.
	Berlin	32	30	-	45.7	8	Mosq.
	Minelaying	13	13	-	65 mines	3	Stir.
	R.C.M.	41	34	-	-	100	Various
	S.O.E.	10	-	-	-	3	Hal.
22	Crossbow Targets N. France	232	197	-	723.2	1, 4, 5, 8	Hal. Lanc. Mosq.
	Intruder Patrol	2	2	-	-	100	Mosq.
	Met. Recce	2	2	-	-	8	Mosq.
22/23	Rheims (railway centre)	107	101	4	383.6	1, 8	Lanc. Mosq.
	Laon ( " " )	114	110	4	351.3	4, 8	Hal. Lanc. Mosq.
	Hamburg	29	28	-	43.7	8	Mosq.
	Le Grand Verdiet (Rouen)	8	5	-	4.5	8	Mosq.
	Minelaying	10	9	-	42 mines	3, 4	Hal. Stir.
	R.C.M.	50	49	-	-	100	Various
	S.O.E.	10	-	-	-	3	Hal.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>June</u>							
23	Intruder Patrols Met. Recce.	2 1	1 1	- -	- -	100 8	Mosq. Mosq.
23/24	Crossbow Targets N. France	415	407	2	1792.4	3, 4, 68	Lanc. Hal. Mosq.
	Saintes (railway centre)	106	105	2	492.9	1	Lanc.
	Limoges ( " " )	101	100	-	362.0	5	Lanc. Mosq.
	Bremen	32	31	-	50.9	8	Mosq.
	Boves	10	10	3	6.7	8	Mosq.
	Minelaying	12	11	1	49 mines	3, 6	Stir. Hal.
	R.C.M.	27	25	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrols	14	-	-	-	100	Various
24	Crossbow Targets N. France	339	330	1	1153.2	1, 4, 5, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
24/25	Crossbow Targets N. France	739	723	22	2675.7	All Groups	Hal. Lanc. Stir. Mosq.
	Berlin	27	27	1	42.1	8	Mosq.
	Minelaying	13	13	-	50 mines	3, 6, 8	Stir. Hal. Mosq.
	R.C.M.	34	32	-	-	100	Mosq.
	S.O.E.	20	-	-	-	3, 100	Hal. Various
25	Crossbow Targets N. France	333	316	2	1166.8	1, 4, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
25/26	Homburg	42	39	-	44.0	8	Mosq.
	R.C.M.	3	2	-	-	100	Mosq.
	Intruders	13	13	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrols	8	-	-	-	100	Mosq.
26	Met. Recce. Intruder Patrols	4 2	4 2	- -	- -	8 100	Mosq. Mosq.
26/27	Gottingen	35	32	-	1	8	Mosq.
	Minelaying	8	8	-	24 mines	6	Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
27	Met. Recce Crossbow Target N. France	2 111	2 103	- -	- 444.6	8 4, 8	Mosq. Hal. Lanc. Mosq.
27/28	Crossbow Targets N. France	721	701	2	3121.5	1, 4, 5, 6, 8	Hal. Lanc. Mosq.
	Vitry (railway centre)	116	79	2	305.3	1, 5	Hal. Lanc. Mosq.
	Vaires ( " " )	107	99	2	391.3	1, 8	Lanc. Mosq.
	Minelaying	14	13	-	35 mines	4, 6	Hal.
	R.C.M.	61	55	2	-	100	Various
	S.O.E.	36	-	-	-	3, 100	Hal. Various
28	Crossbow Target N. France	110	103	-	437.6	4, 8	Hal. Lanc. Mosq.
	Intruder Patrols	2	-	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
28/29	Metz (railway centre)	114	107	8	364.8	6, 8	Hal. Lanc.
	Blainville (railway centre)	116	110	12	360.4	4, 8	Hal. Lanc.
	Gelsenkirchen (Buer) (oil)	10	7	-	9.8	8	Mosq.
	Saarbrucken	33	11	-	18.6	8	Mosq.
	Minelaying	12	11	-	39 mines	3, 6	Stir. Hal.
	R.C.M.	46	40	-	-	100	Various
	Met. Recce	1	1	-	-	8	Mosq.
	Special Patrols	10	-	-	-	100	Mosq.
29	Crossbow Targets N. France	305	295	5	1616.0	1, 5, 8	Lanc. Mosq.
	Intruder Patrols	2	-	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<b>June</b>							
29/30	Minelaying	8	5	-	15 mines	3	Stir.
	R.C.M.	14	12	-	-	100	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	18	-	-	-	3, 100	Fort. Various
30	Villers Bocage	266	258	2	1176.2	1, 3, 4, 8	Hal. Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Fighter Support	6	4	-	-	100	Mosq.
	Crossbow Target N. France	107	105	-	555.8	1, 8	Lanc. Mosq.
30/31	Vierzon (railway centre)	118	115	14	634.5	1	Lanc.
	Homburg (Meerbeck) (oil)	40	37	1	52.2	8	Mosq.
	Minelaying	6	6	-	36 mines	3	Stir.
	R.C.M.	23	20	-	-	100	Mosq.
	Intruders	6	6	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Special Patrols	6	-	-	-	100	Mosq.
<b>July</b>							
1	Crossbow Targets N. France	328	323	1	1102.6	4, 6, 8	Lanc. Hal. Mosq.
	Fighter Patrols	2	2	-	-	100	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
1/2	Homburg (Meerbeck) (oil)	4	4	-	4.0	8	Mosq.
	Scholven (Buer) (oil)	10	10	-	5.4	8	Mosq.
	Minelaying	6	6	-	36 mines	3	Lanc.
	Flying Bomb Patrol	2	-	-	-	100	Mosq.
2	Crossbow Targets N. France	389	383	-	2122.2	1, 3, 8	Lanc. Mosq.
	Fighter Patrols	4	1	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
2/3	Flying Bomb Patrol	16	15	-	-	100	Mosq.
3	Met. Recce.	3	3	-	-	8	Mosq.
3/4	Scholven (Buer) (oil)	6	4	-	4.2	8	Mosq.
	Homburg (Meerbeck)	4	4	-	9	8	Mosq.
	Minelaying	4	3	-	15 mines	3	Stir.
	Flying Bomb Patrol	11	10	-	-	100	Mosq.
	S.O.E.	24	-	-	-	3	Various
4	Crossbow Targets N. France	328	323	-	1101.9	4, 8	Lanc. Hal. Mosq.
	Intruder Patrols	4	2	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
4/5	Orleans (railway centre)	156	148	3	571.6	1	Lanc.
	Villeneuve (railway centre)	131	125	11	559.8	1, 6, 8	Hal. Lanc. Mosq.
	Crossbow Target N. France	246	224	13	1162.0	5, 8	Lanc. Mosq.
	Scholven (Buer) (oil)	36	3	-	3.1	8	Mosq.
	Minelaying	11	11	-	50 mines	3, 4	Stir. Hal.
	R.C.M.	46	46	-	-	100	Various
	Flying Bomb Patrol	15	14	-	-	100	Mosq.
	Leaflets N. France	30	27	-	-	92, 93	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	41	-	-	-	3, 100	Various
5	Met. Recce.	3	3	-	-	8	Mosq.
5/6	Dijon (railway centre)	154	152	-	625.0	1	Lanc.
	Crossbow Targets N. France	388	382	4	1660.0	3, 4, 6, 8	Lanc. Mosq.
	Scholven (Buer) (oil)	35	32	1	40.7	8	Mosq.
	Duren	10	8	-	14.3	8	Mosq.
	Minelaying	6	6	-	20 mines	6	Hal.
	R.C.M.	34	32	1	-	100	Various
	Flying Bomb Patrols	16	16	-	-	100	Mosq.
	Leaflets	3	3	-	-	93	Well.
	Met. Recce.	3	3	-	-	8	Mosq.
	S.O.E.	38	-	-	-	3, 100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>July</u>							
6	Crossbow Targets N. France	541	538	1	2346.0	1, 4, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
6/7	Scholven (Buer) (oil)	33	30	-	48.4	8	Mosq.
	Epone Meziers	3	1	-	-	8	Mosq.
	Minelaying	4	4	-	24 mines	3	Stir.
	Intruders	6	4	-	-	100	Mosq.
	Flying Bomb Patrol	16	16	-	-	100	Mosq.
7	Caen	467	457	2	2363.1	1, 4, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
7/8	Crossbow Target N. France	221	217	31	1127.6	5, 8	Lanc. Mosq.
	Vaires (railway centre)	128	118	-	564.2	1, 3, 8	Lanc. Mosq.
	Berlin	32	28	2	44.0	8	Mosq.
	Scholven (Buer)	9	9	-	11.6	8	Mosq.
	Spoof Target	7	7	-	-	5	Mosq.
	R.C.M.	67	60	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	Flying Bomb Patrol	16	16	-	-	100	Mosq.
	Diversiory Sweep	106	-	-	-	1, 3, 5, 93	Hal. Lanc. Stir. Well.
	S.O.E.	48	-	-	-	3, 100	Various
8	Met. Recce.	1	1	-	-	8	Mosq.
8/9	Scholven (Buer) (oil)	10	9	-	-	8	Mosq.
	Minelaying	12	12	-	44 mines	3, 6	Stir. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
	Flying Bomb Patrol	8	8	-	-	100	Mosq.
	S.O.E.	7	-	-	-	3	Various
9	Crossbow Targets N. France	347	327	2	1247.6	3, 4, 6, 8	Lanc. Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
9/10	Scholven Buer (oil)	8	8	-	9.4	8	Mosq.
	Minelaying	12	10	-	43 mines	3, 4	Stir. Hal.
	R.C.M.	23	22	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
	Leaflets	4	4	-	-	92	Well.
	S.O.E.	19	-	-	-	3	Various
10	Intruder Patrols	6	6	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
10/11	Berlin	35	33	1	52.5	8	Mosq.
	Minelaying	14	9	-	39 mines	5, 6	Hal. Lanc.
	Leaflets N. France	4	4	-	-	92	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	23	-	-	-	3	Various
11	Crossbow Targets N. France	32	31	-	110.0	8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
11/12	Homburg (Meerbeck) (oil)	8	6	-	5.4	8	Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
	Met. Recce.	2	1	-	-	8	Mosq.
	S.O.E.	21	-	-	-	3	Various
12	Vaires (railway centre)	159	14	-	46.0	1, 3, 5, 8	Lanc. Mosq.
	Crossbow Targets N. France	245	238	-	1046.7	4, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
12/13	Tours (railway centre)	117	115	-	615.7	1, 8	Lanc. Mosq.
	Revigny sur Ornain (railway centre)	107	57	10	209.8	1	Land.
	Culmont Chalindrey (railway centre)	161	157	2	646.7	5	Lanc. Mosq.
	Crossbow Targets N. France	232	223	-	731.7	4, 6, 8	Lanc. Hal. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>July</u>							
12/13	Homburg (Meerbeck)	8	6	-	8.0	8	Mosq.
	Leaflets	14	13	-	-	93	Well.
	Minelaying	12	12	-	48 mines	4	Hal.
	R.C.M.	92	79	-	-	100	Various
	Diversionsary Sweeps	168	-	-	-	1, 3, 4,	Hal. Stir.
	Special Patrols	12	-	-	-	6, 92, 93	Lanc. Well.
						100	Various
13	Crossbow Target N. France	13	-	-	-	8	Lanc.
	Intruder Patrols	2	2	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
13/14	Scholven (Bier) (oil)	4	4	-	4.9	8	Mosq.
	Homburg (Meerbeck)	4	4	-	3.8	8	Mosq.
	Minelaying	6	5	-	24 mines	3	Stir.
	Intruders	4	4	-	-	100	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	3	-	-	-	3	Hal.
14	Crossbow Target N. France	24	23	-	78.8	8	Lanc. Mosq.
	Intruder Patrols	4	4	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
14/15	Revigny sur Ormain R (railway centre)	125	13	7	45.1	1, 8	Lanc.
	Crossbow Targets N. France	115	112	-	361.8	4, 6, 8	Hal. Lanc.
	Villeneuve St. George	128	125	-	431.6	1, 5, 8	Lanc. Mosq.
	Hannover	42	42	-	64.5	8	Mosq.
	Minelaying	8	8	-	16 mines	3	Stir.
	R.C.M.	81	77	-	-	100	Various
	Diversionsary Sweeps	132	-	-	-	1, 3, 4,	Hal. Stir.
	Special Patrols	9	-	-	-	5, 92, 93	Lanc. Well.
						100	Various
15	Crossbow Target N. France	53	42	-	173.7	8	Lanc. Mosq.
	Photo Recce	2	2	-	-	8	Mosq.
	Met. Recce	2	2	-	-	8	Mosq.
15/16	Crossbow Targets N. France	234	224	1	1014.7	1, 4, 3,	Lanc. Hal.
	Nevers (railway centre)	108	107	2	464.6	6, 8	Mosq.
	Chalons sur Marne (railway centre)	121	107	1	413.6	5	Lanc. Mosq.
	Berlin	36	34	-	52.9	3, 8	Lanc. Mosq.
	Minelaying	6	6	-	30 mines	8	Mosq.
	Diversionsary Sweeps	162	-	-	-	5	Lanc.
	R.C.M.	58	53	-	-	3, 4, 5, 6	Stir. Lanc.
	Met. Recce.	1	1	-	-	91, 92, 93	Hal. Whit. Well.
	S.O.E.	23	-	-	-	100	Various
						8	Mosq.
16	Crossbow Target N. France	33	33	-	52.9	8	Lanc. Mosq.
	Photo. Recce.	2	2	-	-	8	Mosq.
16/17	Homburg	38	35	-	56.2	8	Mosq.
	Minelaying	4	4	-	12 mines	3	Stir.
	Leaflets N. France	5	5	-	-	91	Well.
	Flying Bomb Patrol	8	6	-	-	100	Mosq.
17	Met. Recce.	2	2	-	-	8	Mosq.
	Crossbow Targets N. France	132	130	-	510.2	3, 4, 5	Lanc. Hal.
17/18	Berlin	31	30	-	40.6	8	Mosq.
	Minelaying	8	8	-	32 mines	6	Hal.
	R.C.M.	49	46	-	-	100	Various
	Diversionsary Sweep	34	31	-	-	1, 5	Hal. Stir.
	Met. Recce.	1	1	-	-	100	Mosq.
	Flying Bomb Patrol	12	12	-	-	100	Mosq.
	S.O.E.	17	-	-	-	3, 100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>July</u>							
18	Military Targets S. of Caen (Operation Goodwood)	1056	1030	6	5008.3	All Groups	Hal. Lanc. Mosq.
	Vaires (railway centre) Met. Recce	110 1	106 1	2 -	371.1 -	4, 6, 8 8	Hal. Lanc. Mosq.
18/19	Wesseling (oil)	194	183	1	710.6	1, 6, 8	Hal. Lanc. Mosq.
	Scholven Buer (oil)	170	155	4	787.3	1, 8	Lanc. Mosq.
	Aulnoye (railway centre)	148	138	2	529.2	1, 3, 8	
	Revigny sur Ormain (railway centre)	115	107	24	516.5	5	Lanc. Mosq.
	Berlin	22	22	1	30.6	8	Mosq.
	Cologne (Spoof)	6	5	-	14.0	8	Mosq.
	Crossbow Target N. France	62	59	2	203.4	4, 8	Hal. Lanc. Mosq.
	Minelaying	8	8	-	32 mines	4	Hal.
	R.C.M.	86	82	-	-	100	Various
	Diversiory sweep	139	131	-	-	1, 3, 4, 6, 91, 92	Stir. Lanc. Hal. Well.
	Flying Bomb Patrol	10	10	-	-	100	Mosq.
	Met Recce S.O.E.	1 23	1 -	- -	- -	8 3, 100	Mosq. Various
19	Crossbow Targets N. France	144	133	-	605.6	5, 8	Lanc. Mosq.
	Met. Recce	1	1	-	-	8,	Mosq.
19/20	Bremen	36	36	-	55.1	8	Mosq.
	Minelaying	6	6	-	23 mines	6	Hal.
	Leaflets N. France	8	8	-	-	92	Well.
	R.C.M.	27	27	-	-	100	Various
	Flying Bomb Patrol	11	10	-	-	100	Mosq.
20	Crossbow Targets N. France	425	394	1	1555.3	1, 4, 6, 8	Hal. Lanc. Mosq.
	Fighter Support	8	8	-	-	100	Mosq.
	Met. Recce	3	3	-	-	100	Mosq.
20/21	Courtrai (railway centre)	317	306	9	1646.4	1, 5, 8	Lanc. Mosq.
	Alost (Spoof Target)	11	11	-	4.9	5	Lanc. Mosq.
	Crossbow Targets N. France	87	23	1	59.1	4, 5, 8	Hal. Lanc. Mosq.
	Homburg (Meerbeck) (oil)	158	147	20	750.5	1, 3, 8	Lanc. Mosq.
	Bottrop (Welheim) (oil)	166	154	8	536.6	4, 8	Lanc. Hal. Mosq.
	Hamburg	26	24	1	33.4	8	Mosq.
	Diversiory Sweep	111	100	-	-	1-5, 91, 92, 93	Hal. Stir. Lanc. Well.
	Met. Recce.	2	2	-	-	5, 8	Mosq.
	S.O.E.	21	-	-	-	3, 100	Various
	22	Crossbow Targets N. France	60	40	-	134.3	8
Intruder Patrols		2	2	-	-	8	Mosq.
Met. Recce		4	4	-	-	8	Mosq.
22/23	Minelaying	6	6	-	30 mines	3	Lanc.
	Leaflets N. France	5	5	-	-	91	Well.
	S.O.E.	10	-	-	-	3	Various
23	Crossbow Targets N. France	60	60	-	202.7	3, 8	Lanc. Mosq.
	Met. Recce	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>July</u>							
23/24	Crossbow Targets N. France	116	112	1	368.9	4, 8	Hal. Lanc. Mosq.
	Kiel	629	612	4	2916.3	All Groups	Hal. Lanc. Mosq.
	Berlin	27	26	-	38.4	8	Mosq.
	Donges (oil storage)	119	116	-	570.2	6, 8	Hal. Lanc. Mosq.
	Duren	5	4	-	4.9	8	Mosq.
	Minelaying	8	6	-	40 mines	3, 5	Stir. Lanc.
	R.C.M.	72	67	-	-	100	Various
	Leaflets	8	8	-	-	91, 93	Well.
	Flying Bomb Patrol	1	1	-	-	100	Mosq.
	Diversionsary Sweeps	180	157	-	-	1-6, 91-93	Stir. Lanc. Hal. Well
	Special Patrols	17	-	-	-	100	Various
24	Crossbow Targets N. France	36	22	-	69.6	3, 8	Lanc. Mosq.
	Intruder Patrols	3	2	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
24/25	Stuttgart	614	575	21	1750.4	All Groups	Lanc. Hal.
	Aachen	5	4	-	2.9	8	Mosq.
	Frankfurt	8	8	-	11.8	8	Mosq.
	Berlin	27	27	-	42.6	8	Mosq.
	Crossbow Targets N. France	114	105	1	230.9	6, 8	Hal. Lanc. Mosq.
	Donges (oil storage)	113	111	3	570.2	5, 8	Lanc. Mosq.
	Minelaying	4	4	-	14 mines	6	Hal.
	Leaflets N. France	4	4	-	-	92	Well.
	R.C.M.	73	71	-	-	100	Various
	Diversionsary Sweep	154	143	-	-	1-6, 91-93	Hal. Stir. Lanc. Well.
	S.O.E.	21	-	-	-	3, 100	Various
25	Crossbow Targets N. France	93	86	-	444.8	1, 5, 8	Lanc. Mosq.
	St. Cyr (A/F)	100	97	1	464.2	5, 8	Lanc. Mosq.
	Met. Recce.	5	5	-	-	8	Mosq.
25/26	Stuttgart	550	481	12	1443.6	1, 3, 5, 6, 8	Lanc. Hal.
	Wanne Eickel	135	116	-	420.4	1, 4, 8	Lanc. Mosq.
	Mannheim	15	15	-	17.6	8	Mosq.
	Berlin	21	16	-	26.2	8	Mosq.
	Crossbow Targets N. France	114	105	-	361.5	1, 4, 8	Lanc. Hal. Mosq.
	Scmain (railway centre)	6	6	-	4.7	8	Mosq.
	Minelaying	4	4	-	14 mines	6	Hal.
	Flying Bomb patrols	2	2	-	-	100	Mosq.
	S.O.E.	5	-	-	-	3	Hal.
26	Met. Recce.	1	1	-	-	8	Mosq.
26/27	Givors (railway centre)	187	166	6	605.7	5	Lanc. Mosq.
	Scmain "	11	10	-	10.2	8	Mosq.
	Hamburg	30	30	-	43.7	8	Mosq.
	Saarbrucken	2	1	-	.7	8	Mosq.
	Minelaying	6	4	-	24 mines	1	Lanc.
	R.C.M.	22	21	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Flying Bomb Patrol	1	1	-	-	100	Mosq.
	S.O.E.	12	-	-	-	3, 100	Various
27	Crossbow Targets N. France	72	57	-	246.3	3, 8	Lanc. Stir. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Stuttgart	30	27	-	38.4	8	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	12	-	-	-	3	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>July</u>							
28	Crossbow Targets N. France	199	192	1	657.8	3, 4, 8	Hal. Stir. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
28/29	Stuttgart	496	461	39	1613.3	1, 3, 5, 8	Lanc. Mosq.
	Hamburg	307	298	23	1153.1	1, 6, 8	Hal. Lanc. Mosq.
	Frankfurt	13	13	-	15.8	8	Mosq.
	Crossbow Target N. France	119	117	-	391.5	1, 4, 8	Hal. Lanc. Mosq.
	Minelaying	5	4	-	16 mines	6	Hal.
	R.C.M.	79	68	-	-	100	Various
	Flying Bomb Patrol	1	1	-	-	100	Mosq.
	Diversionsary Sweep	122	-	-	-	1-6, 91-93	Hal. Lanc.
	Special Patrols	11	-	-	-	91-93 100	Stir. Well. Various
29	Crossbow Target N. France	76	73	-	251.3	3, 4, 8	Stir. Hal. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
29/30	Frankfurt	30	27	-	41.2	8	Mosq.
	Coulommiers A/F	4	3	-	4.0	8	Mosq.
	St. Trond "	9	3	-	3.8	8	Mosq.
	R.C.M.	19	18	-	-	100	Various
	Leaflets N. France	9	8	-	-	93	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
30	Normandy Battle area	692	380	4	1380.5	All Groups	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
	Ranger Patrol	2	2	-	-	100	Mosq.
30/31	Leaflets	6	6	-	-	91	Well.
	Met. Recce.	2	1	-	-	8	Mosq.
	S.O.E.	20	-	-	-	3	Various
31	Crossbow Target N. France	102	89	2	495.5	5, 8	Lanc. Mosq.
	Joigny (La Roche) (railway centre)	121	91	1	597.1	1, 5,	Lanc. Mosq.
	Le Havre	57	57	1	298.2	1, 8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
31/1	Crossbow Targets N. France	202	195	2	584.4	2	Hal. Lanc. Mosq.
	Minelaying	4	4	-	16 mines	4	Hal.
	R.C.M.	4	4	-	-	100	Mosq.
<u>Aug.</u>							
1	Crossbow Targets N. France	776	59	-	158.8	All Groups	Hal. Lanc. Mosq.
	Fighter Support	4	4	-	-	100	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
2	Crossbow Targets N. France	393	354	2	1634.9	1, 5, 3, 4, 8	Hal. Lanc. Mosq.
	Le Havre	59	55	-	312.9	1, 8	Lanc. Mosq.
3	Crossbow Targets N. France	1114	1086	-	5094.2	All Groups	Hal. Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Mosq.
3/4	R.C.M.	1	1	-	-	100	Mosq.
4	Crossbow Targets N. France	294	290	4	2028.3	6, 8	Hal. Lanc. Mosq.
	Etaples (railway br.)	28	28	-	149.6	5	Lanc. Mosq.
	Paulliac (Fuel depot)	181	178	-	823.3	1, 8	Lanc.
	Bec d'Ambes (Fuel depot)	107	101	-	407.0	3, 8	Lanc.
	Bomber Support	27	25	-	-	100	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Aug.</u>							
4	Photo Recce.	2	2	-	-	8	Mosq.
4/5	Leaflets N. France	11	11	-	-	92	Well.
	S.O.E.	29	-	2	-	3	Various
	Minelaying	12	11	-	-	4	Hal.
5	Crossbow Targets N. France	778	723	1	3214.5	4, 5, 6,	Lanc. Hal.
	Brest	18	16	1	75.0	8	Mosq.
	Etaples (railway bridge)	14	13	-	74.6	5	Lanc. Mosq.
	Blaye (P.O.L.)	96	94	-	429.5	5	Lanc.
	Paulliac (P.O.L.)	96	94	1	431.1	1, 8	Lanc.
	Bassens (P.O.L.)	114	111	-	445.6	1, 8	Lanc.
	Fighter Support	30	24	-	-	3, 8	Lanc.
	Met. Recce	2	2	-	-	100	Mosq.
	Photo. Recce	1	1	-	-	8	Mosq.
5/6	Wanne-Eickel (oil)	35	34	-	27.2	8	Mosq.
	Minelaying	3	3	-	12 mines	6	Hal.
	S.O.E.	8	-	-	-	3, 100	Various.
	Leaflets	5	5	-	-	93	Well.
6	Crossbow Targets N. France	223	179	3	664.8	4, 5, 8	Lanc. Hal.
	Lorient	30	30	-	145.7	5	Mosq.
	Hazebrouck (railway centre)	62	58	1	204.0	4, 8	Lanc. Mosq.
	Special Patrol	1	1	-	-	100	Hal. Lanc.
	Met. Recce	3	3	-	-	8	Mosq.
	Photo. Recce	1	1	-	-	8	Mosq.
6/7	Castrop Rauxel (Oil)	40	38	1	53.1	8	Well.
	Cologne	7	6	-	4.7	8	Mosq.
	Crossbow Target N. France	4	3	-	4.0	8	Mosq.
	Minelaying	12	11	-	46 mines	3	Stir.
	Leaflets	7	7	-	-	91	Well.
	R.C.M.	24	24	-	-	100	Various
	Special Operations	10	10	-	-	8	Lanc.
	S.O.E.	22	-	-	-	3	Various
7	Lorient	26	-	-	-	5	Lanc. Mosq.
	Special Patrol	1	-	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
7/8	Normandy Battlefield (Operation Totalise)	1019	642	10	3461.2	All Groups	Hal. Lanc.
	Coulommiers	4	4	-	4.9	8	Mosq.
	Minelaying	29	26	-	83 mines	3, 4, 6	Stir. Hal.
	R.C.M.	58	55	-	-	100	Various
	Flying Bomb Patrol	1	1	-	-	100	Mosq.
	Met. Recce	1	1	-	-	8	Mosq.
	S.O.E.	6	-	-	-	3	Various
8	Foret de Chantilly (P.O.L.)	202	199	1	730.0	6, 8	Hal. Lanc.
	Crossbow Targets N. France	78	68	1	260.5	4, 8	Mosq.
	Special Operations	4	4	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Well. Mosq.
8/9	Crossbow Target N. France	180	174	1	752.2	1, 3, 8	Mosq.
	Cologne	34	34	-	48.2	8	Mosq.
	Minelaying	24	24	-	87 mines	-	Stir. Lanc.
	R.C.M.	25	23	-	-	100	Hal.
	Met. Recce	1	1	-	-	8	Various
	S.O.E.	23	-	-	-	3, 100	Mosq.
							Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Aug.							
9	Crossbow Targets N. France	172	169	3	575.2	4, 6, 8	Hal. Lanc. Mosq.
	Foret de Mormal (P.O.L.)	160	156	-	710.5	4, 8	Hal. Lanc. Mosq.
	La Pallice (U-boat pen)	30	30	-	145.9	5	Lanc. Mosq.
	Special Operations	4	-	-	-	100	Various
	Met. Recce.	3	3	-	-	8	Mosq.
9/10	Foret d'Englos (P.O.L. Dump)	124	121	-	675.0	1, 3, 8	Lanc. Mosq.
	Foret de Chatteraut (P.O.L. Dump)	190	178	2	865.7	1, 5,	Lanc. Mosq.
	Crossbow Targets N. France	208	202	-	832.2	1, 6, 8	Lanc. Hal. Mosq.
	Osnabruck Spoof	3	-	-	-	100	Mosq.
	Minelaying	26	21	-	67 mines	1, 3, 8	Lanc. Mosq.
	R.C.M.	62	60	-	-	100	Various
	Leaflets N. France	15	15	-	-	93	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	20	-	-	-	3	Various
10	Paris (Dugny) (Fuel Tanks)	103	99	612.1	612.1	1, 8	Lanc. Mosq.
	Crossbow Targets N. France	80	30	-	82.5	1, 8	Lanc. Mosq.
	Special Operations	4	3	-	-	100	Various
	Met. Recce.	3	3	-	-	8	Mosq.
10/11	Dijon (railway centre)	124	121	2	408.7	1, 4, 8	Lanc. Hal.
	Bordeaux (oil storage)	67	65	-	261.6	5	Lanc. Mosq.
	La Pallice " "	99	95	-	529.0	6	Lanc. Hal.
	Berlin	32	30	-	41.5	8	Mosq.
	Breman	3	3	-	13.4	8	Mosq.
	Minelaying	12	12	-	68 mines	1, 5	Lanc.
	S.O.E.	15	-	-	-	3, 100	Various
11	Bordeaux (Sub. pens)	41	36	-	177.2	5	Lanc. Mosq.
	La Pallice (Sub. pens)	14	14	-	68.8	5	Lanc. Mosq.
	Boual (railway centre)	135	124	-	751.4	1, 8	Lanc. Mosq.
	Lens " "	133	131	-	728.8	3, 8	Lanc. Mosq.
	Somain " "	142	140	-	645.4	4, 8	Lanc. Mosq.
	Crossbow Targets N. France	60	57	-	202.3	4, 8	Hal. Lanc. Mosq.
	Etaples (railway bridge)	49	48	-	210.8	4, 8	Hal. Lanc. Mosq.
	Fighter Support	6	6	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
11/12	Givors (railway centre)	189	183	-	684.6	1, 5	Lanc. Mosq.
	Berlin	33	32	1	44.6	8	Mosq.
	Crossbow Target N. France	2	1	-	.9	8	Mosq.
	Minelaying	14	14	-	60 mines	1, 3	Lanc. Stirs
	R.C.M.	36	35	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	15	-	-	-	3, 100	Various
12	Foret de Montrichard (Ammo. Dump)	117	108	-	366.7	6, 8	Hal. Lanc. Mosq.
	Brest (Sub. pen)	11	10	-	42.9	5	Lanc. Mosq.
	La Pallice (Sub. pen)	24	23	-	117.0	1, 8	Lanc. Mosq.
	Bordeaux " "	34	32	-	165.2	1, 8	Lanc.
	Fighter support	8	8	-	-	100	Mosq.
	Special Patrol	1	1	-	-	100	Well.
	Met. Recce.	3	3	-	-	8	Mosq.
12/13	Brunswick	379	351	27	1286.1	1, 3, 4, 5,	Lanc. Hal.
	Russelsheim	297	280	20	970.9	1, 3, 4, 5,	Lanc. Hal. Mosq.
	Frankfurt	10	10	1	8.4	8	Mosq.
	Kiel (Spoof)	21	20	-	31.1	8	Mosq.
	Juvincourt (A/F)	3	1	-	.9	8	Mosq.
	Coulommiers (A/F)	3	2	-	1.8	8	Mosq.
	Palaise	144	139	-	661.5	1, 3, 5,	Lanc. Stirs
	Crossbow Targets N. France	52	48	-	142.5	6, 8	Hal. Mosq.
	Minelaying	14	14	-	73 mines	3, 5, 6	Lanc. Hal.
	Diversiory Sweep	160	153	-	-	All Groups	Lanc. Hal. Stirs. Well.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Aug.							
12/13	R.C.M. Met. Recce. Leaflets N. France Special Patrols	58 2 21 17	54 2 19 -	1 - - -	- - - -	100 8 95 100	Various Mosq. Well. Various
13	Brest (Sub. pen) Bordeaux (oil) Fighter Support R.C.M. Photo. Recce.	28 15 8 1 1	27 14 6 1 1	1 1 - - -	148.2 73.2 - - -	5 5 100 100 8	Lanc. Mosq. Lanc. Mosq. Well. Mosq.
13/14	Hannover Minelaying R.C.M. Intruders Met. Recce. Leaflets S.O.E.	30 15 23 5 2 9 8	28 14 23 5 2 9 -	- - - - - - -	40.7 64 mines - - - - -	8 5, 6 100 100 8 91, 92 3, 100	Mosq. Lanc. Hal. Various Mosq. Mosq. Well. Hal. Various
14	Potigny (Troop conc.)  Brest (Blockships) R.C.M. Met. Recce.	811  156 1 1	779  147 1 1	2  2 - -	3669.0  803.3 - -	1, 4, 5, 6, 8 5 100 8	Lanc. Hal. Mosq. Lanc. Mosq. Well. Mosq.
14/15	Berlin Sterkrade (Holten) (oil) St. Trond (A/F) Minelaying Leaflets Met. Recce. S.O.E.	32 2 2 14 7 1 5	31 1 1 13 7 1 -	- - - - - - -	42.6 .9 .9 63 mines - - -	8 8 8 1, 4 92 8 3, 100	Mosq. Mosq. Mosq. Lanc. Hal. Well. Well. Mosq. Various
15	Airfields, Belgium, Holland  R.C.M. Met. Recce.	1002  1 1	977  1 1	3  - -	5298.7  - -	All Groups  100 8	Lanc. Hal. Mosq. Well. Mosq.
15/16	Berlin Venlo (A/F) Sterkrade (Holten) (oil) Dortmund (oil) Kamen Minelaying R.C.M. Met. Recce. Special Patrol	32 8 3 3 3 6 7 1 1	32 6 3 2 2 6 6 1 -	- - - - - - - - -	45.0 5.4 2.7 1.8 2.7 24 mines - - -	8 8 8 8 8 6 100 8 100	Mosq. Mosq. Mosq. Mosq. Mosq. Hal. Mosq. Mosq. Mosq.
16	La Pallice (Sub-pens) Met. Recce. R.C.M.	26 2 1	3 2 1	- - -	16.1 - -	5 8 100	Lanc. Mosq. Mosq. Well.
16/17	Kiel  Stettin  Berlin Deelen (A/F) Sterkrade (oil) Dortmund (oil) Kamen (oil) Minelaying  R.C.M. Leaflets N. France Diversitary Sweep  Special Patrol	348  461  23 5 3 3 3 93  69 24 145  11	336  439  20 3 2 2 2 81  65 22 138  -	5  5  - - - - - 5  - 1 - - -	902.8  1388.0  29.0 2.4 1.8 1.8 1.8 327 mines  - - - - -	1, 4, 6, 8 1, 3, 5, 6, 8 8 8 8 8 1, 3, 4, 5, 6 100 92, 93 1-6, 91-93 100	Hal. Lanc. Mosq. Lanc.  Mosq. Mosq. Mosq. Mosq. Mosq. Lanc. Hal.  Various Well. Hal. Lanc. Stir. Well. Various
17	Brest (Shipping) Met. Recce.	79 5	50 5	- -	238.8 -	4 8	Hal. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Aug.</u>							
17/18	Mannheim	37	37	--	50.4	8	Mosq.
	Sterkrade Holten (oil)	3	2	--	1.8	8	Mosq.
	Dortmund (oil)	3	1	--	.9	8	Mosq.
	Kamen (oil)	3	2	--	1.8	8	Mosq.
	Minelaying	12	12	--	48 mines	4, 6	Hal.
	R.C.M.	14	13	--	--	100	Various
	Leaflets	2	2	--	--	93	Well.
	Diversicnary Sweep	69	68	--	--	91, 92, 93, 100	Well. Various.
	S.O.E.	4	--	--	--	3	Various.
18	Crossbow Targets N. France	201	197	4	191.4	1, 5, 6, 8	Lanc. Hal. Mosq.
	Rieme - Ertvelde (oil)	43	42	--	210.7	1, 8	Lanc. Mosq.
	La Pallice	24	22	--	117.9	5	Lanc. Mosq.
	Bordeaux (oil)	26	24	1	126.4	5	Lanc.
	Met. Recce.	1	1	--	--	8	Mosq.
18/19	Bremen-Holten	289	274	1	1126.0	1, 3, 6, 8	Lanc. Hal. Mosq.
	Sterkrade (oil)	234	217	2	770.0	1, 4, 8	Lanc. Hal. Mosq.
	Rieme-Ertvelde (oil)	113	109	--	641.7	1, 8	Lanc. Mosq.
	Connantre (railway centre)	124	118	--	388.8	6, 8	Lanc. Hal. Mosq.
	Harburg (Switching str.)	3	2	1	10.8	8	Mosq.
	Wanne Eickel (oil)	2	1	--	.9	8	Mosq.
	Kamen (oil)	2	--	--	--	8	Mosq.
	Florennes (A/F)	5	2	--	10.8	8	Mosq.
	Cologne (Spooft)	7	7	--	5.0	8	Mosq.
	Berlin "	21	21	--	30.8	8	Mosq.
	Minelaying	11	11	--	44 mines	4, 6	Hal.
	R.C.M.	84	76	--	--	100	Various
	Diversicnary Sweep	141	132	--	--	1-6, 91-93	Hal. Lanc. Stir. Well.
	Met. Recce.	1	1	--	--	8	Mosq.
	S.O.E.	16	--	--	--	3, 100	Various
19	La Pallice (oil storage)	52	43	--	218.8	5	Lanc.
	R.C.M.	1	1	--	--	100	Well.
	Met. Recce.	1	1	--	--	8	Mosq.
20	Intruder Patrols	3	2	--	--	100	Mosq.
	R.C.M.	1	1	--	--	100	Well.
	Met. Recce.	1	1	--	--	8	Mosq.
20/21	Minelaying	7	5	--	28 mines	5	Lanc.
21	Met. Recce.	2	2	--	--	8	Mosq.
21/22	Met. Recce.	1	1	--	--	8	Mosq.
22	Met. Recce.	2	2	--	--	8	Mosq.
23/24	Cologne	46	42	--	54.0	8	Mosq.
	Homborg (Meerbeck) (oil)	4	3	--	2.7	8	Mosq.
	Castrop Rauxel "	2	2	--	1.8	8	Mosq.
	Venlo (A/F)	2	2	--	1.8	8	Mosq.
	Met. Recce	1	1	--	--	8	Mosq.
24	Brest (Shipping)	53	49	--	235.7	4	Hal.
	Ijmuiden	23	--	--	118.7	5	Lanc. Mosq.
	Met. Recce.	3	3	--	--	8	Mosq.
24/25	Minelaying	6	6	--	24 mines	6	Hal.
25	Crossbow Targets N. France	161	150	--	296.9	3, 4, 8	Lanc. Hal.
	Met. Recce.	3	3	--	--	8	Mosq. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Aug.							
25/25	Russelsheim (A.F.V. Works)	412	397	15	1554.4	1, 3, 6, 8	Lanc.
	Darmstadt	196	159	7	554.0	5	Lanc. Mosq.
	Berlin	36	33	"	45.9	8	Mosq.
	Frankfurt	7	4	"	3.1	8	Mosq.
	Homburg (Meerbeek) (oil)	4	3	"	2.7	8	Mosq.
	Castrop Rauxel (oil)	2	2	"	1.8	8	Mosq.
	Brest (Gun posns.)	334	274	24	1202.3	4, 6, 8	Hal. Lanc. Mosq.
	Venlo (A/F)	5	4	"	3.3	8	Mosq.
	Deelen "	4	3	"	2.7	8	Mosq.
	Minelaying	6	5	"	20 mines	4	Hal.
	R.Co.M.	92	85	"	"	100	Various
	Special Patrols	15	12	"	"	100	Various
	Target Recce.	2	2	"	"	8	Mosq.
	Diversionsary Sweep	172	155	"	"	1-6, 91-93	Hal. Lanc. Stir. Well.
	S.O.E.	6	"	"	"	3	Various
26	Met. Recce.	2	2	"	"	8	Mosq.
26/27	Kiel	382	368	17	1750.1	1, 3, 8	Lanc. Mosq.
	Konigsberg	174	167	4	459.4	5	Lanc.
	Berlin	21	21	"	28.5	8	Mosq.
	Hamburg	13	13	"	11.4	8	Mosq.
	Deelen (A/F)	3	2	"	1.8	8	Mosq.
	Venlo "	5	5	"	4.5	8	Mosq.
	Le Culot "	2	2	"	1.8	8	Mosq.
	Wanne Eickel	1	"	"	"	8	Mosq.
	Dortmund	1	1	"	.7	8	Mosq.
	Minelaying	45	44	5	183 mines	1, 3, 4, 5, 6	Lanc. Hal.
	Diversionsary Sweep	107	102	"	"	1-5, 91-93	Hal. Stir. Well.
	R.Co.M.	77	72	1	"	100	Various
	S.O.E.	12	9	1	"	100	Various
27	Homburg (Meerbeek) (oil)	244	220	"	775.2	4, 5, 8	Hal. Lanc. Mosq.
	Crossbow Target N. France	226	221	"	812.4	6, 8	Hal. Lanc. Mosq.
	Brest (Shipping)	24	24	"	129.0	5	Lanc. Mosq.
	Met. Recce.	2	2	"	"	8	Mosq.
27/28	Mannheim	30	27	2	35.3	8	Mosq.
	R.Co.M.	44	38	1	"	100	Various
	Diversionsary Sweep	67	67	"	"	91-93, 100	Well. Fort. Various
	S.O.E.	7	"	"	"	3	Hal.
28	Ile de Decembre (Bty)	30	29	"	119.2	6, 8	Hal. Lanc. Mosq.
	Brest	24	24	"	129.0	6	Hal.
	Crossbow Targets N. France	145	129	1	487.8	1, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	2	2	"	"	8	Mosq.
28/29	Essen	35	32	"	43.7	8	Mosq.
	Cologne	2	2	"	1.8	8	Mosq.
	Leverkusen (Chem. works)	4	3	"	2.7	8	Mosq.
	Le Culot (A/F)	3	2	"	1.8	8	Mosq.
	Venlo "	3	2	"	1.8	8	Mosq.
	Minelaying	6	6	"	24 mines	6	Hal.
	R.Co.M.	13	13	"	"	100	Mosq.
	S.O.E.	19	"	"	"	3	Various
29	Met. Recce.	2	2	"	"	100	Mosq.
29/30	Stettin	403	385	23	1338.4	1, 3, 6, 8	Lanc. Mosq.
	Konigsberg	189	175	15	480.9	5	Lanc.
	Hamburg	17	16	"	21.6	8	Mosq.
	Berlin	21	19	"	23.0	8	Mosq.
	Leverkusen	4	2	"	1.8	8	Mosq.
	Cologne	2	2	"	1.8	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Aug.</u>							
29/30	Florennes (A/F)	4	4	-	3.6	8	Mosq.
	Le Culot "	5	3	-	2.5	8	Mosq.
	Minelaying	43	42	1	183 mines	1, 3, 4, 5	Hal. Lanc.
	Diversiónary Sweep	133	125	2	-	1-6, 91-93	Hal. Lanc. Stir. Well.
	R.C.M.	75	65	-	-	100	Various
	Photo. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	17	-	-	-	3, 100	Various
30	Met. Recce.	2	2	-	-	8	Mosq.
30/31	Frankfurt	36	35	-	46.6	8	Mosq.
	Minelaying	4	3	-	11 mines	4	Hal.
	R.C.M.	6	6	-	-	100	Stir.
	Flying Bomb Patrol	6	6	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
31	Ile de Decembre (Bty)	170	169	-	802.0	5, 6, 8	Hal. Mosq.
	Crossbow Targets N. France	603	403	-	2401.7	1, 4, 5, 8	Hal. Lanc. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
31/1	Dusseldorf	42	41	-	54.2	8	Mosq.
	Leverkusen	6	5	1	4.5	8	Mosq.
	Cologne	6	5	1	5.4	8	Mosq.
	R.C.M.	15	15	-	-	100	Mosq.
	Flying Bomb Patrol	6	6	-	-	8	Mosq.
	Special Patrols	3	3	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	24	-	-	-	3	Various
<u>Sept.</u>							
1	Crossbow Targets N. France	121	113	-	498.2	4, 8	Lanc. Hal. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Well.
1/2	Bremen	35	34	-	48.4	8	Mosq.
	R.C.M.	34	34	-	-	100	Mosq.
	Flying Bomb Patrol	5	3	-	-	100	Mosq.
	Signals Patrol	4	3	-	-	100	Hal.
	S.O.E.	7	-	-	-	3	Various
2	Brest (Shipping)	68	64	-	364.7	5	Lanc. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
2/3	R.C.M.	4	4	-	-	100	Hal.
3	Airfields Belgium, Holland	675	631	1	3371.4	All Groups	Lanc. Hal. Mosq.
	Photo. Recce.	2	2	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	1	1	-	-	100	Hal.
3/4	Intruders	2	2	-	-	100	Mosq.
4	Ranger Patrol	5	5	2	-	100	Mosq.
4/5	Karlsruhe	43	42	-	57.6	8	Mosq.
	Steenwijk Haven (A/F)	14	9	-	8.0	8	Mosq.
	R.C.M.	6	3	-	-	100	Mosq.
5	Le Havre (Troop Conc.)	348	335	-	1880.9	1, 3, 8	Lanc. Stir. Mosq.
	Brest (Bty)	66	63	-	384.0	5	Lanc. Mosq.
	Target Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Sept,							
5/6	Hannover Steenwijk/Havelte (A/F) R.C.M. and Signals Patrol Met. Recce. S.O.E.	43 12 31 1 19	41 6 29 1 -	- - - - -	55.6 5.4 - - -	8 8 100 8 3	Mosq. Mosq. Various Mosq. Various
6	Le Havre (Strongpoints) Emden Met. Recce.	344 181 3	271 180 3	- 1 -	1504.3 581.3 -	1, 3, 8 6, 8 8	Lanc. Stir. Mosq. Hal. Lanc. Mosq.
6/7	Hamburg Emden Minelaying R.C.M. Special Patrols S.O.E.	32 6 8 46 4 6	29 6 7 42 3 -	- - - 1 - -	34.3 8.1 28 mines - - -	8 8 4 100 100 3	Mosq. Mosq. Hal. Various Various Stir.
7	Met. Recce.	1	1	-	-	8	Mosq.
7/8	Karlsruhe Steenwijk Emden Met. Recce S.O.E.	41 12 6 1 16	38 4 5 1 -	- - - - -	50.0 3.6 4.2 - -	8 8 8 8 3	Mosq. Mosq. Mosq. Mosq. Stir.
8	Le Havre (Strongpoints) Photo. Recce. Met. Recce. S.O.E.	333 1 1 2	109 1 1 2	2 - - -	535.3 - - -	1, 3, 8 5 8 3	Lanc. Stir. Mosq. Mosq. Mosq. Hudson
8/9	Nuremberg Emden Steenwijk/Havelte (A.F.) R.C.M. Special Patrols Met. Recce. S.O.E.	45 6 3 8 5 1 13	44 4 2 7 5 1 -	- - - - - - -	58.9 3.6 1.8 - - - -	8 8 8 100 100 8 3	Mosq. Mosq. Mosq. Stir. Various Mosq. Various
9	Le Havre (Strongpoints) S.O.E. R.C.M.	168 1 2	16 1 2	- - -	7.1 - -	4, 8 100 100	Hal. Mosq. Lanc. Hudson. Well.
9/10	Munchen Gladbach Brunswick Steenwijk/Havelte (A.F.) R.C.M. Met. Recce. Special Patrols	137 39 6 46 1 6	128 39 4 43 1 -	- - - - - -	615.0 55.1 3.6 - - -	5, 8 8 8 100 8 100	Lanc. Mosq. Mosq. Mosq. Various Mosq. Various
10	Le Havre (Strongpoints site) Le Havre (Coastal Bty) Photo. Recce. Target Recce. R.C.M. Special Patrols S.O.E.	932 61 1 2 3 5 23	900 60 1 2 3 5 23	- - - - - - -	4719.2 266.1 - - - - -	All Groups 4, 8 8 5 100 100 3	Lanc. Hal. Mosq. Lanc. Hal. Mosq. Mosq. Hal. Well. Fort. Mosq. Stir. Hud.
10/11	Berlin Minelaying R.C.M. Special Patrols	47 2 30 5	41 1 29 -	- - - -	52.6 6 mines - -	8 3 100 100	Mosq. Lanc. Various Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Sept.							
11	Le Havre (Strongpoints)	163	146	-	742.3	4, 5, 8	Lanc. Hal. Mosq.
	Castrop Raukel (oil)	29	18	1	84.6	8	Lanc. Mosq.
	Gelsenkirchen Nordstern (oil)	129	114	7	398.2	4, 8	Hal. Lanc. Mosq.
	Kamen (oil)	116	116	1	586.4	3, 5, 8	Lanc.
	Target Recce.	1	1	-	-	8	Lanc.
	Met. Recce.	2	1	-	-	8	Mosq.
	R.C.M.	5	5	-	-	100	Hal. Well. Fort.
	S.O.E.	19	-	-	-	3	Hud. Stir.
11/12	Darmstadt	240	234	12	872.5	1, 5	Lanc. Mosq.
	Berlin	47	42	-	55.1	8	Mosq.
	Steenwijk A.F.	7	3	-	2.7	8	Mosq.
	Minelaying	76	69	-	317 mines	3	Lanc. Hal.
	R.C.M.	57	56	-	-	100	Various
	Signals Patrol	13	-	-	-	100	Various
12	Gelsenkirchen (Buer) (oil)	167	141	3	514.0	4, 8	Hal. Lanc. Mosq.
	Wanne Eickel (oil)	33	19	3	79.8	8	Lanc. Mosq.
	Dortmund (oil)	13	8	-	18.8	5, 8	Lanc. Mosq.
	Munster	124	121	2	350.0	4, 8	Hal. Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	16	9	-	-	100	Hal. Well. Fort. Mosq.
	S.O.E.	1	1	-	-	3	Hud.
12/13	Frankfurt	387	367	17	1546.7	1, 3, 8	Lanc. Mosq.
	Stuttgart	217	208	4	881.3	1, 5	Lanc. Mosq.
	Berlin	29	28	-	39.8	8	Mosq.
	Steenwijk Havelte (A/F)	6	5	-	4.5	8	Mosq.
	Minelaying	12	-	-	-	6	Mosq.
	R.C.M.	103	97	2	-	100	Various
	Special Patrols	9	9	-	-	100	Various
	Diversiory Sweep	138	104	1	-	1, 6, 91-93	Hal. Stir. Lanc. Well.
13	Gelsenkirchen Nordstern (oil)	140	100	2	366.2	4, 8	Lanc.
	Osnabruck	20	19	-	68.4	8	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	13	13	-	-	100	Hal. Fort. Mosq. Well.
13/14	Berlin	36	36	2	48.5	8	Mosq.
	Karlsruhe	3	3	-	1.5	8	Mosq.
	R.C.M.	63	46	-	-	100	Various
	Special Patrols	7	5	-	-	100	Various
14	Wilhelmshaven	184	-	-	-	3, 8	Lanc. Mosq.
	Wassenaar (Ammo, dump)	45	37	-	189.5	3, 8	Lanc. Mosq.
	Photo. Recce.	1	-	-	-	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	12	9	-	-	100	Various
15	Tirpitz (Kaa Fjord)	27	21	-	93.2	5	Lanc.
	Photo. Recce.	1	1	-	-	5	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	9	9	-	-	100	Various
	S.O.E.	1	1	-	-	3	Hud.
15/16	Kiel	490	405	6	1451.5	1, 4, 6,	Lanc. Hal. Mosq.
	Berlin	27	24	1	31.7	8	Mosq.
	Lubeck	9	7	-	6.1	8	Mosq.
	Rheine (railway centre)	8	6	-	6.2	8	Mosq.
	Minelaying	68	64	-	287 mines	1, 3, 4, 6	Lanc. Hal.
	R.C.M.	90	72	-	-	100	Various
	Diversiory Sweep	164	145	-	-	1-6, 91-93	Hal. Lanc. Stir. Well.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<b>Sept.</b>							
16	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	9	8	-	-	100	Various
	S.O.E.	18	-	-	-	3	Stir. Hud.
16/17	Airfields Holland, N.W. Germany	233	206	-	874.4	1, 8	Mosq. Lanc.
	Moerdijk (railway bridge)	59	57	2	295.3	3, 8	Lanc. Mosq.
	Brunswick (oil)	29	22	1	30.4	8	Mosq.
	Dortmund (oil)	4	3	-	2.7	8	Mosq.
	R.C.M.	43	35	-	-	100	Various
	Met. Recce	1	1	-	-	8	Mosq.
17	Boulogne (Strongpoint area)	762	688	2	3391.3	3, 4, 5, 8	Lanc. Hal. Mosq.
	Coastal Battery (Walcheren)	100	96	-	432.1	1, 8	Lanc. Mosq.
	Eikenhorst (Supply Depot)	32	30	-	170.9	1, 8	Lanc. Mosq.
	Target Recce	7	7	-	-	8	Mosq. Lanc.
	R.C.M.	9	9	-	-	100	Fort. Hal.
	Intruders	6	6	-	-	100	Mosq.
	S.O.E.	11	-	-	-	3	Hud. Stir.
17/18	Bremen	42	42	-	57.3	8	Mosq.
	Dortmund	6	6	-	5.4	8	Mosq.
	Diversionsary Sweep	201	195	-	-	1-6, 91-93	Lanc. Hal. Well. Stir.
	R.C.M.	48	45	-	-	100	Various
	Special Patrols	10	10	-	-	100	Various
18	Domberg (Coastal Bty.)	74	8	-	3.6	6, 8	Hal. Lanc. Mosq.
	R.C.M.	7	7	-	-	100	Fort. Well. Hal.
	Met. Recce.	2	2	-	-	8	Mosq.
18/19	Bremerhaven	213	208	2	863.9	5	Lanc. Mosq.
	Berlin	33	22	-	34.4	8	Mosq.
	Rheine (railway centre)	6	6	-	5.4	8	Mosq.
	Mine laying	4	4	-	24 mines	5	Lanc.
	R.C.M.	67	63	-	-	100	Various, Mosq.
19	Domberg (Coastal Bty.)	55	-	-	-	6	Lanc. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	8	5	-	-	100	Various
	S.O.E.	10	-	-	-	3	Stir. Hud.
20	Calais	646	633	1	3372.1	1, 3, 4, 5, 6, 8	Lanc. Hal. Mosq.
19/20	Munchen Gladbach and Rheydt	237	233	-	652.0	1, 5	Lanc. Mosq.
	R.C.M.	32	27	-	-	100	Various
21	Met. Recce	1	1	-	-	8	Mosq.
	R.C.M.	4	3	-	-	100	Fort. Well.
	S.O.E.	12	-	-	-	3	Stir. Hud.
22	R.C.M.	7	6	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
22/23	Intruders	1	1	-	-	100	Nosq.
	Flying Bomb Patrol	4	4	-	-	100	Mosq.
	R.C.M.	3	2	-	-	100	Fort. Mosq.
23	Domberg (Coastal Bty.)	50	49	-	184.6	6, 8	Hal. Lanc. Mosq.
	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	6	5	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	5	-	-	-	3	Hud.
23/24	Neuss	549	491	7	2660.9	1, 3, 4, 8	Lanc. Hal. Mosq.
	Dortmund-Ems Canal	141	103	14	512.1	5	Lanc. Mosq.
	Handorf (A/F)	113	85	-	160.9	5	Lanc. Mosq. Light.
	Bochum	44	42	-	56.8	8	Mosq.
	Rheine (railway centre)	6	6	-	4.1	8	Mosq.
	R.C.M.	67	63	-	-	100	Various
	Special Patrols	9	9	-	-	100	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Sept.							
24	Calais (Defended areas)	188	126	7	570.3	All Groups	Lanc. Hal. Mosq.
	Target Recce.	1	1	1	3.6	8	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	2	-	-	-	100	Hud.
25	Calais (Defended areas)	872	303	-	1321.5	1,3,4,6,8	Lanc. Hal. Mosq.
	Target Recce.	1	-	-	-	8	Mosq.
	Photo. Recce.	2	2	-	-	8	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
	R.C.M.	4	4	-	-	100	Various
	Supply Carrying	70	70	-	-	4	Hal.
	S.O.E.	5	-	-	-	3	Hud.
25/26	Mannheim	48	47	-	50.7	8	Mosq.
	Farben Hoechst	4	1	-	2.7	8	Mosq.
	R.C.M.	29	24	-	-	100	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	Special Patrols	3	3	-	-	100	Various
	Freelance Patrol	1	-	-	-	100	Mosq.
26	Cap Gris Nez	531	516	1	2845.2	1,3,4,8	Lanc. Hal. Mosq.
	Calais (Defended Area)	191	183	-	839.5	6, 8	Lanc. Hal. Mosq.
	Photo. Recce.	2	1	1	-	5	Lanc. Mosq.
	Ranger Patrol	2	2	-	-	100	Mosq.
	Supply Carrying	74	74	-	-	4	Hal.
	R.C.M.	5	5	-	-	100	Various
	S.O.E.	5	-	-	-	3	Hud.
26/27	Karlsruhe	237	225	2	950.0	1, 5	Lanc. Mosq.
	Frankfurt (petrol dump)	3	3	-	2.7	8	Mosq.
	Frankfurt	47	45	-	59.5	8	Mosq.
	Homburg (Meerbeck) oil	6	6	-	4.7	8	Mosq.
	R.C.M.	67	64	-	-	100	Various
	Special Patrol	9	9	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
27	Calais (Defended area)	341	323	1	1718.4	1,3,4,8	Hal. Lanc. Mosq.
	Bottrorp (Welheim) (oil)	175	132	-	490.2	6, 8	Lanc. Hal. Mosq.
	Sterkrade (Holtzen) (oil)	171	163	-	285.8	6, 8	Lanc. Hal. Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Supply Carrying	73	73	-	-	4	Hal.
	R.C.M.	6	4	-	-	100	Various
	S.O.E.	5	-	-	-	3	Hud.
27/28	Kaiserslautern	227	221	2	811.8	1, 5	Lanc. Mosq.
	Kassel	46	45	-	59.2	8	Mosq.
	Aschaffenburg (Railway centre)	6	4	-	3.6	8	Mosq.
	Heilbronn	6	5	-	5.4	8	Mosq.
	R.C.M.	33	27	-	-	100	Various
	Special Patrols	7	-	-	-	100	Various
28	Cap Gris Nez (Bty.)	301	198	-	855.5	8	Lanc. Mosq.
	Calais (Defended area)	193	68	-	260.7	1,3,8	Lanc. Mosq.
	Photo. Recce.	2	2	-	-	8	Mosq.
	Supply carrying	75	75	-	-	4	Hal.
	R.C.M.	4	3	-	-	100	Lib. Well.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	13	-	-	-	3	Hud. Lys.
28/29	Brunswick	44	43	-	57.1	8	Mosq.
	Heilbronn (Railway centre)	5	4	-	7.1	8	Mosq.
	Aschaffenburg (Railway centre)	4	1	-	1.8	8	Mosq.
	R.C.M.	74	70	-	-	100	Various
	Special Patrol	4	3	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	17	-	-	-	3	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Sept.</u>							
29	Supply Carrying	72	72	-	-	4	Hal.
	R.C.M.	4	4	-	-	100	Various
	S.O.E.	3			-	3	Lys.
29/30	Karlsruhe	40	39	-	53.9	8	Mosq.
	Mine laying	15	13	-	83 mines	3, 5	Lanc.
	R.C.M.	67	62	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
30	Bottrop (Welheim) (oil)	13	4	-	4.9	6, 8	Hal. Lanc.
	Sterkrade (Holten) (oil)	139	24	1	72.3	4, 8	Mosq. Lanc. Hal.
	Supply Carrying	74	74	-	-	4	Mosq.
	Met. Recce.	1	1	-	-	8	Hal.
	Ranger Patrol	2	-	2	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
	S.O.E.	6			-	3	Well. Lib. Hud.
30/1	Hamburg	46	45	-	58.5	8	Mosq.
<u>Oct.</u>	Aschaffenburg (Railway centre)	6	1	-	1.8	8	Mosq.
	Heilbronn (railway centre)	6	1	-	1.8	8	Mosq.
	Sterkrade (Holten) (oil)	5	2	-	1.8	8	Mosq.
	Ranger Patrols	20	16	-	1.8	100	Mosq.
	Special Patrol	1	1	-	-	100	Well.
	S.O.E.	14			-	3	Various
1	Supply Carrying	73	71	-	-	4	Hal.
	R.C.M.	3	3	-	-	100	Lib. Well.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	6			-	3	Hud.
1/2	Brunswick	48	46	-	59.3	8	Mosq.
	Krefeld	8	6	-	12.5	8	Mosq.
	Koblenz	6	5	-	8.9	8	Mosq.
	Dortmund (oil)	6	6	-	5.4	8	Mosq.
	Heilbronn (railway centre)	6	4	-	7.1	8	Mosq.
	R.C.M.	2	2	-	-	100	Well.
2	Supply carrying	71	71	-	-	4	Hal.
	R.C.M.	2	2	-	-	100	Mosq.
	S.O.E.	8			-	3	Hud.
2/3	Brunswick	34	23	-	59.3	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Pforzheim	7	3	-	5.4	8	Mosq.
	Dortmund (oil)	4	2	-	1.8	8	Mosq.
	Frankfurt	4	3	-	4.5	8	Mosq.
	R.C.M.	42	39	-	-	3	Various
	S.O.E.	1	-	-	-		
3	West Kapelle Dyke	259	247	-	1269.6	1, 3, 5, 8	Lanc. Mosq.
	Photo. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	6	6	-	-	100	Hal. Lib.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
3/4	Kassel	43	41	-	54.9	8	Mosq.
	Pforzheim	6	3	-	5.4	8	Mosq.
	Kamen (oil)	4	3	-	2.0	8	Mosq.
	Munster/Handorf (A.F.)	5	5	-	4.5	8	Mosq.
	R.C.M.	20	14	-	-	100	Mosq. Lib.
	Met. Recce.	1	1	-	-	8	Mosq.
4	Bergen (U-Boat pen)	136	118	-	602.7	6, 8	Hal. Lanc.
	Escort Patrol	12	12	-	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
4/5	Pforzheim	6	-	-	8.0	8	Mosq.
	Heilbronn	5	4	-	5.4	8	Mosq.
	Mine laying	78	74	3	370 mines	1, 3, 4, 5, 6	Lanc. Hal.
	R.C.M.	40	35	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	15	-	-	-	3	Various

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Oct.							
5	Wilhelmshaven	221	201	-	1081.6	5	Lanc. Mosq.
	R.G.M.	7	6	-	-	100	Various
	S.O.E.	5	-	-	-	3	Lys. Hud.
	Met. Recce.	2	2	-	-	8	Mosq.
5/6	Saarbrücken	361	349	-	1499.8	1,3,8	Lanc. Mosq.
	Saarbrücken (railway centre)	190	81	3	412.4	1,3,8	Lanc. Mosq.
	Berlin	20	20	-	26.0	8	Mosq.
	Krefeld	7	4	-	8.9	8	Mosq.
	Frankfurt	6	5	-	3.1	8	Mosq.
	Berlin	20	20	-	26.0	8	Mosq.
	Handorf (A.F.)	5	4	-	3.6	8	Mosq.
	Dortmund (oil)	3	3	-	2.7	8	Mosq.
	Brunsbüttel Koog (Port)	5	4	-	3.0	8	Mosq.
	Mine laying	19	19	-	49 mines	6,8	Hal. Mosq.
	R.C.M.	83	68	-	-	100	Various
6	Sterkrade (Holten) (oil)	159	149	3	517.1	4,8	Lanc. Hal.
	Gelsenkirchen (Buer) (oil)	161	147	6	522.2	4,8	Mosq.
	Met. Recce.	1	1	-	-	8	Lanc. Hal.
	R.C.M.	3	3	-	-	100	Mosq.
							Well. Lib.
6/7	Dortmund	523	484	5	1658.6	3,6,8	Hal. Lanc.
	Bremen	253	246	5	998.8	1,5	Mosq.
	Ludwigshafen	11	10	-	7.2	8	Lanc. Mosq.
	Berlin	22	20	-	23.0	8	Mosq.
	Saarbrücken	2	2	-	3.6	8	Mosq.
	Mine laying	19	19	-	94 mines	1,4,5	Mosq.
	R.C.M.	111	108	-	-	100	Lanc. Hal.
	Met. Recce.	2	2	-	-	8	Various
	S.O.E.	6	-	-	-	3	Mosq.
							Various
7	Cleve	351	339	2	1707.1	3,4,8	Hal. Lanc.
	Emmerich	350	341	3	1909.1	1,3,8	Mosq.
	Kembs Dam	13	12	2	64.3	5	Lanc. Mosq.
	East Flushing (Dyke)	64	64	-	383.9	5	Lanc.
	West Flushing	59	58	-	348.2	5	Lanc. Mosq.
	R.C.M.	5	5	-	-	100	Lanc.
	Ranger Patrol	2	-	-	-	100	Well. Lib.
	Met. Recce.	3	3	-	-	8	Mosq.
	Photo. Recce.	4	4	1	-	5,8	Mosq.
	S.O.E.	2	-	-	-	3	Hud.
7/8	R.C.M.	32	32	-	-	100	Various
	Intruders	14	12	-	-	100	Mosq.
8	Ranger Patrols	2	2	-	-	100	Mosq.
	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
9	R.C.M.	4	3	-	-	100	Well. Lib.
	Met. Recce.	2	2	-	-	8	Mosq.
9/10	Bochum	435	405	6	1454.1	1,4,6,8	Hal. Lanc.
	Wilhelmshafen	47	46	-	59.5	8	Mosq.
	Saarbrücken	4	3	-	7.1	8	Mosq.
	Krefeld	5	1	-	5.4	8	Mosq.
	Düsseldorf	3	1	-	5.4	8	Mosq.
	R.C.M.	83	78	-	-	100	Various
	Special Patrols	8	8	-	-	100	Hal. Mosq.
10	Ranger Patrols	2	2	-	-	100	Mosq.
	R.C.M.	3	2	-	-	100	Well. Lib.
	S.O.E.	7	-	-	-	3	Stir. Hud.
	Met. Recce.	3	3	-	-	8	Mosq.
10/11	Cologne	49	47	-	59.6	8	Mosq.
	Duisburg	5	5	-	8.9	8	Mosq.
	Düsseldorf (A.F.)	2	2	-	2.7	8	Mosq.
	Aschaffenburg	6	5	-	8.9	8	Mosq.
	Pforzheim	6	6	-	10.7	8	Mosq.
	R.C.M.	1	1	-	-	100	Lib.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Oct.							
11	Fort Frederik Hendrik	90	7	-	13.4	1,8	Lanc. Mosq.
	Veere (Sea wall)	63	62	-	374.1	5	Lanc. Mosq.
	Flushing	115	105	-	600.2	5	Lanc.
	Ranger Patrol	1	1	-	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Well. Lib.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	2		-	-	3	Hud.
11/12	Berlin	46	38	-	44.9	8	Mosq.
	Wiesbaden (Chem. Wks)	8	8	-	13.4	8	Mosq.
	Heilbronn	4	4	-	7.1	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
12	Wanne-Eickel (oil)	147	130	1	568.7	6,8	Lanc. Hal.
	Fort Frederik Hendrik	96	92	-	541.5	1,8	Mosq.
	Met. Recce.	3	3	-	-	8	Lanc. Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
	S.O.E.	1		-	-	100	Well. Lib.
							Hud.
12/13	Hamburg	52	46	1	58.5	8	Mosq.
	Wiesbaden (Chem. Wks)	6	5	-	8.9	8	Mosq.
	Dusseldorf (A.F.)	6	4	-	7.1	8	Mosq.
	Koblenz	4	3	-	7.2	8	Mosq.
	Schweinfurt	2	2	-	1.6	8	Mosq.
13	R.C.M.	3	2	-	-	100	Well. Lib.
	Met. Recce.	1	1	-	-	8	Mosq.
13/14	Cologne	56	53	-	68.0	8	Mosq.
	Stuttgart	4	3	-	5.4	8	Mosq.
14	Duisburg	1013	963	15	4490.2	1,3,4,6,	Lanc. Hal.
	Duisburg (Hamborn) Blast	50	44	-	292.1	8	Mosq.
	Furnaces and Rolling Mills					1	Lanc.
	Target Recce.	1	1	-	-	5	Mosq.
	Late Recce.	1	1	-	-	8	Mosq.
	R.C.M.	3	2	-	-	100	Well. Lib.
	Met. Recce.	1	1	-	-	8	Mosq.
14/15	Duisburg	1008	938	6	4547.2	1,3,4,6,	Hal. Lanc.
	Brunswick	240	234	1	847.1	8	Mosq.
	Hamburg	20	20	-	24.6	5	Lanc. Mosq.
	Berlin	16	16	1	19.9	8	Mosq.
	Mannheim (Railway centre)	8	6	-	4.6	8	Mosq.
	Dusseldorf (A.F.)	2	2	-	3.6	8	Mosq.
	R.C.M.	120	110	-	-	100	Various
	Diversiory Sweep	141	135	-	-	1-6,91-	Hal. Well.
	Signals Patrols	12	11	-	-	93	Stir. Lanc.
	Met. Recce.	1	1	-	-	100	Various
	S.O.E.	8		-	-	8	Mosq.
						3	Various
15	Sorpe Dam	18	16	-	85.7	5	Lanc.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	3	2	-	-	100	Lib. Well.
	S.O.E.	4		-	-	3	Hud.
15/16	Wilhelmshaven	506	492	7	2134.7	1,3,4,6,	Hal. Lanc.
	Hamburg	44	43	-	52.9	8	Mosq.
	Saarbrucken	6	5	-	8.9	8	Mosq.
	Kassel	2	2	-	1.8	8	Mosq.
	Dusseldorf (A.F.)	2	2	-	3.6	8	Mosq.
	Mine laying	37	30	4	141 mines	1,3,4,5,	Lanc. Hal.
	R.C.M.	75	70	-	-	6	Various
	S.O.E.	2		-	-	3	Various
16	Ranger Patrol	5	5	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Anti-Mine Sweeper Patrol	4	4	-	-	100	Mosq.

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Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Oct.</u>							
16/17	Cologne West Kapelle (Dyke)	39 49	38 49	- -	41.6 289.7	8 5	Mosq. Lanc. Mosq.
17	Target Recce. Ranger Patrol R.C.M. Met. Recce. S.O.E.	1 445 5 1 1	1 1 5 1 -	- - - - -	- - - - -	5 100 100 8 3	Mosq. Mosq. Various Mosq. Hud.
17/18	Met. Recce. Anti-Flying Bomb Patrol	1 12	1 11	- -	- -	8 100	Mosq. Mosq.
18	Bonn R.C.M. Met. Recce. S.O.E.	128 5 1 1	127 4 1 1	1 - - -	621.0 - - -	3 100 8 3	Lanc. Various Mosq. Hud.
18/19	Hannover Mannheim Pforzheim Wiesbaden (Chem. Wks) Dusseldorf (A.F.)	19 18 5 4 8	19 18 2 3 5	- - 1 - -	24.3 24.4 4.5 5.4 8.0	8 8 8 8 8	Mosq. Mosq. Mosq. Mosq. Mosq.
19	R.C.M. S.O.E.	5 2	5 -	- -	- -	100 3	Various Hud.
19/20	Stuttgart Nuremberg Wiesbaden Dusseldorf R.C.M.	583 270 48 6 131	564 257 44 5 123	6 - - - -	2445.9 874.9 52.1 8.9 -	1,3,6,8 5 8 8 100	Lanc. Mosq. Lanc. Mosq. Mosq. Mosq. Various
20	Met. Recce.	1	1	-	-	8	Mosq.
20/21	Met. Recce.	2	2	-	-	8	Mosq.
21	Flushing (Bty) R.C.M. Met. Recce.	75 2 2	75 2 2	- - -	459.8 - -	3 100 8	Lanc. Well. Mosq.
21/22	Hannover Pforzheim Harburg Cologne  Dusseldorf Minelaying	263 4 3 2  2 7	- 3 - -  2 -	- - - -  - -	- 7.2 - 1.8  (Alt. area) 3.6 -	4,6,8 8 8 8  8 3,4,6	Hal. Lanc. Mosq. Mosq. Mosq.  Mosq. Lanc. Hal.
22	Neuss R.C.M. Met. Recce. S.O.E.	100 3 2 1	97 2 2 -	- - - -	522.9 - - -	3 100 8 3	Lanc. Well. Lib. Mosq. Hud.
22/23	Hamburg Wiesbaden Dusseldorf Cologne Minelaying R.C.M. S.O.E.	45 4 3 2 39 6 6	44 4 2 2 38 5 -	- - - - - - -	56.4 7.1 3.6 3.6 190 mines - -	8 8 8 8 1,3,4,6, 100 3	Mosq. Mosq. Mosq. Mosq. Lanc. Hal. Mosq. Stir.
23	Flushing (Bty) Intruders R.C.M. Met. Recce.	112 6 4 4	92 6 4 3	4 - - -	563.4 - - -	5 100 100 8	Lanc. Mosq. Well. Mosq.
23/24	Essen Berlin	1055 38	955 32	8 -	4538.0 37.4	1,3,4,6, 8 8	Lanc. Hal. Mosq. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Oct.							
23/24	Wiesbaden Aschaffenburg (railway centre) R.C.M. S.O.E.	10 2 91 1	10 - 77 -	- - - -	10.7 - - -	8 8 100 3	Mosq. Mosq. Various Hud.
24	Met. Recce. R.C.M.	2 3	2 3	- -	- -	8 100	Mosq. Well Lib.
24/25	Hannover Oberhausen Aschaffenburg Minelaying R.C.M. S.O.E.	57 4 6 34 14 1	54 4 2 33 13 -	- - - - - -	68.7 7.1 3.6 181 mines - -	8 8 8 5 5 3	Mosq. Mosq. Mosq. Lanc. Lanc. Various
25	Essen Homburg (Meerbeck) (oil) R.C.M. S.O.E.	771 243 6 1	740 228 6 -	4 - - -	3683.7 971.9 - -	1, 3, 4, 6, 8 6, 8 100 3	Lanc. Hal. Mosq. Lanc. Hal. Mosq. Hal. Well. Hud.
26	Leverkusen (Chem. wks) R.C.M. S.O.E.	105 4 1	102 4 -	- - -	514.3 - -	3 100 3	Lanc. Hal. Well. Hud.
26/27	Minelaying R.C.M.	10 68	9 61	1 -	54 mines -	1 100	Lanc. Various, Mosq.
27	Met. Recce.	2	2	-	-	8	Mosq.
27/28	Berlin Pforzheim Dusseldorf Essen Schweinfurt Rheine (railway centre) Aschaffenburg (railway centre) Met. Recce.	60 6 2 2 2 3 6 1	58 3 1 2 1 3 3 1	- - - - - - - -	67.8 5.4 1.8 3.6 .9 5.4 5.4 -	8 8 8 8 8 8 8 8	Mosq. Mosq. Mosq. Mosq. Mosq. Mosq. Mosq. Mosq.
28	Cologne Flushing (Bty) Walcheren (Btys) R.C.M. Photo. Recce. Met. Recce. S.O.E.	733 50 277 4 1 3 1	623 49 212 4 1 3 -	5 1 - - - - -	2715.8 266.7 923.0 - - - -	1, 3, 4, 6, 8 3 3, 4, 8 100 5 8 3	Hal. Lanc. Mosq. Lanc. Lanc. Hal. Mosq. Well. Hal. Mosq. Mosq. Hud.
28/29	Bergen Cologne Karlsruhe Rheine (railway centre) Minelaying R.C.M.	244 30 4 3 14 13	51 30 2 3 10 13	3 - - - - -	189.2 45.9 3.6 3.6 54 mines -	5 8 8 8 5, 6 100	Lanc. Mosq. Mosq. Mosq. Mosq. Lanc. Various
29	Walcheren (Btys) Tirpitz (Tromso Fjord) Ranger Patrols S.O.E. Met. Recce. Photo. Recce.	358 39 4 1 1 1	327 33 4 - 1 1	- 1 - - - -	1597.5 176.8 - - - -	1, 3, 4, 8 5 100 3 8 5	Lanc. Hal. Mosq. Lanc. Mosq. Hud. Mosq. Mosq.
29/30	Cologne Mannheim/Ludwigshafen Intruders Met. Recce.	59 6 55 1	56 6 46 1	- - - -	71.0 4.7 - -	8 8 8 8	Mosq. Mosq. Mosq. Mosq.
30	Wesseling (oil) Walcheren (Btys) R.C.M. S.O.E. Met. Recce.	102 110 7 1 3	102 96 - - 3	- 1 - - -	527.0 561.6 - - -	3 5 100 3 8	Lanc. Lanc. Mosq. Hal. Well. Hud. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Oct.</u>							
30/31	Cologne	905	867	-	4040.3	1, 3, 4, 6, 8	Lanc. Hal. Mosq.
	Berlin	62	58	-	70.7	8	Mosq.
	Oberhausen	3	2	-	2.2	8	Mosq.
	Heilbronn	3	2	-	.4	8	Mosq.
	R.C.M.	99	95	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
31	Bottrop (Welheim) (oil)	101	101	1	531.2	3	Lanc.
	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	100	Hud.
31/1	Cologne	493	477	1	2402.4	1, 3, 4, 8	Lanc. Hal. Mosq.
<u>Nov.</u>	Cologne (Spooft)	15	15	-	-	8	Mosq.
	Hamburg	49	48	1	62.2	8	Mosq.
	Saarbrücken	4	4	-	7.1	8	Mosq.
	Schweinfurt	2	1	-	3.6	8	Mosq.
	R.C.M.	95	86	-	-	100	Various
1	Homburg (Meerbeck) (oil)	242	167	1	955.0	5, 8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	2	2	-	-	100	Well.
	S.O.E.	1	-	-	-	3	Hud.
1/2	Oberhausen	288	280	-	1185.9	6, 8	Hal. Lanc. Mosq.
	Berlin	49	47	-	63.8	8	Mosq.
	Cologne (Spooft)	12	10	-	11.4	8	Mosq.
	Karlsruhe	4	4	-	5.4	8	Mosq.
	Mülheim	4	3	-	5.4	8	Mosq.
	R.C.M.	74	70	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	25	-	-	-	3	Various
2	Homburg (Meerbeck) (oil)	184	183	4	952.3	3	Lanc.
	R.C.M.	2	2	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
2/3	Düsseldorf	992	946	24	4484.1	1, 4, 5, 6, 8	Hal. Lanc. Mosq.
	Osnabrück	42	41	-	49.8	8	Mosq.
	Hallendorf (Steel wks)	9	1	-	1.8	8	Mosq.
	R.C.M.	88	81	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
3	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
3/4	Berlin	55	54	-	71.8	8	Mosq.
	Herford	9	3	-	13.2	8	Mosq.
4	Solingen	176	-	4	945.8	3	Lanc.
	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
4/5	Bochum	748	705	29	3332.1	1, 4, 6, 8	Lanc. Hal. Mosq.
	Dortmund-Ems Canal	176	172	3	930.4	5	Lanc. Mosq.
	Hannover	43	41	-	56.5	8	Mosq.
	Herford	6	2	-	7.2	8	Mosq.
	R.C.M.	107	95	-	-	100	Various
5	Solingen	173	170	1	881.7	3	Lanc.
	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
5/6	Stuttgart	65	63	-	79.0	8	Mosq.
	Aschaffenburg (railway centre)	6	5	-	10.7	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
6	Gelsenkirchen	738	693	5	3288.6	1, 4, 6 8	Hal. Lanc. Mosq.
	R.C.M.	2	2	-	-	100	Well.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Nov.							
6/7	Koblenz	128	122	-	518.2	3	Lanc.
	Gravenhorst (Canal bank)	235	31	10	66.7	5	Lanc. Mosq.
	Gelsenkirchen	48	44	1	50.9	8	Mosq.
	Hannover	18	17	-	18.7	8	Mosq.
	Herford	8	6	-	14.3	8	Mosq.
	Rheine (railway centre)	11	11	-	49.1	8	Mosq.
	Minelaying	12	12	-	69 mines	1	Lanc.
	R.C.M.	114	102	-	-	100	Various
7	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
7/8	S.O.E.	9	-	-	-	3	Stir.
	Met. Recce.	1	1	-	-	8	Mosq.
8	Homburg (Meerbeck) (oil)	136	134	-	731.5	3	Lanc.
	R.C.M.	1	1	-	-	100	Well.
8/9	Hannover	50	45	-	57.3	8	Mosq.
	Herford	9	8	-	14.3	8	Mosq.
	R.C.M.	4	4	-	-	100	Mosq.
	S.O.E.	24	-	-	-	3	Various
9	Wanne-Eickel (oil)	277	6	-	3.1	1, 8	Lanc. Mosq.
	Wanne-Eickel	1	1	-	1280.1	1, 8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
9/10	Gotha	6	5	-	8.9	8	Mosq.
	Pforzheim	6	3	-	10.8	8	Mosq.
	Kassel	3	2	-	2.5	8	Mosq.
	Schwelm (A.F.)	4	-	-	-	8	Mosq.
	R.C.M. & Intruders	24	15	-	-	100	Various
	S.O.E.	3	-	-	-	3	Stir.
10	Ranger Patrols	2	2	-	-	100	Mosq.
	R.C.M.	2	2	-	-	100	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
10/11	Hannover	59	58	-	73.8	8	Mosq.
	Gotha	4	3	-	5.4	8	Mosq.
	Erfurt	4	-	-	-	8	Mosq.
	R.C.M. & Intruders	70	62	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
11	Castrop Rauxel (oil)	122	114	-	593.3	3	Lanc.
	R.C.M.	2	2	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
11/12	Dortmund (oil)	228	206	-	1127.1	1, 8	Lanc. Mosq.
	Hamburg (oil)	245	233	7	1099.0	5	Mosq. Lanc.
	Kamen (oil)	41	17	-	25.9	8	Mosq.
	Osnabruck	12	12	-	10.5	8	Mosq.
	Wiesbaden	9	7	-	5.8	8	Mosq.
	Gotha	6	2	-	3.6	8	Mosq.
	Erfurt	3	1	-	1.8	8	Mosq.
	Minelaying	50	46	-	228 mines	1, 3, 4, 5, 6	Lanc. Hal.
	R.C.M. & Intruders	95	91	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
12	Tirpitz (Battleship)	32	29	1	155.3	5	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	2	2	-	-	100	Well. Hal.
13	R.C.M.	1	1	-	-	100	Well.
14	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
15	Dortmund	177	174	2	902.0	3	Lanc.
	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	5	4	-	-	100	Hal. Well.
	Met. Recce.	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Nov.</u>							
15/16	Berlin	36	34	1	41.6	8	Mosq.
	Gotha	6	5	-	8.9	8	Mosq.
	Karlsruhe	5	4	-	7.1	8	Mosq.
	Wanne-Eickel (oil)	6	6	-	8.5	8	Mosq.
	Gelsenkirchen (oil)	4	4	-	7.5	8	Mosq.
	R.C.M.	59	52	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
16	Duren	498	480	3	2713.2	1, 5, 8	Lanc. Mosq.
	Julich	508	469	-	1945.6	4, 6, 8	Lanc. Hal.
	Heinsburg	182	181	1	1030.1	3	Mosq.
	Met. Recce.	1	1	-	-	8	Lanc.
16/17	Met. Recce.	1	1	-	-	8	Mosq.
18	Munster	479	444	-	1693.3	4, 6, 8	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	4	3	-	-	100	Hal.
18/19	Wanne-Eickel (oil)	309	295	1	1515.5	1, 8	Lanc. Mosq.
	Wiesbaden	31	31	-	40.3	8	Mosq.
	Hannover	21	18	-	23.3	8	Mosq.
	Erfurt	6	3	-	4.5	8	Mosq.
	R.C.M. & Intruders	73	65	-	-	100	Various
19	Met. Recce	1	1	-	-	8	Hud.
	S.O.E.	1	-	-	-	3	Hud.
20	Homburg (Meerbeck) (oil)	183	168	5	868.9	5	Lanc.
	Ranger Patrol	2	2	-	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Hal. Well.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	3	-	-	-	3	Hud.
20/21	Hannover	63	57	-	66.3	8	Mosq.
	Koblenz	43	42	-	225.1	8	Mosq.
	Homburg (Meerbeck) (oil)	14	11	-	9.6	8	Mosq.
	Castrop Rauxel (oil)	14	12	-	11.8	8	Mosq.
	Eisenach (A.F. V.Wks)	9	7	-	12.5	8	Mosq.
	R.C.M. & Intruders	34	25	-	-	100	Various
21	Homburg (Meerbeck) (oil)	160	154	2	306.0	3	Lanc.
	R.C.M.	2	2	-	-	100	Well.
	Met. Recce.	1	1	-	-	8	Mosq.
21/22	Aschaffenburg	283	274	2	1362.4	1, 8	Lanc. Mosq.
	(railway centre)						
	Castrop Rauxel (oil)	273	260	4	960.4	1, 6, 8	Lanc. Hal.
	Sterkrade (oil)	270	247	2	868.9	4, 8	Mosq.
	Dortmund-Ems Canal	128	127	-	629.2	5	Lanc. Mosq.
	Mittelland Canal	143	136	2	613.3	5	Lanc. Mosq.
	Hannover	26	24	-	34.8	8	Mosq.
	Stuttgart	29	25	-	29.1	8	Mosq.
	Worms	19	17	-	47.5	8	Mosq.
	Wesel (railway sidings)	4	2	-	21.4	8	Mosq.
	Minelaying	42	41	-	191 mines	1, 3, 4,	Lanc. Hal.
	Photo. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	118	103	-	-	100	Various
	S.O.E.	9	-	-	-	3	Stir.
22	R.C.M.	1	1	-	-	100	Well.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
22/23	Trondheim (Port)	178	18	1	3.8	5	Lanc. Mosq.
	Minelaying	17	16	-	96 mines	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
23	Gelsenkirchen (Nordstern)	168	163	1	865.8	3	Lanc.
	(oil)						
	Ranger Patrol	4	2	-	-	100	Mosq.
	Met Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Nov.							
23/24	Hannover Hagen Eisenach R.C.M. & Intruders	61 6 9 43	61 4 9 40	1 - - -	79.8 5.4 16.1 -	8 8 8 100	Mosq. Mosq. Mosq. Various
24	R.C.M. Met. Recce. S.O.E.	1 2 1	1 2 -	- - -	- - -	100 8 3	Well. Mosq. Hud.
24/25	Berlin Gottingen Minelaying	58 6 14	57 6 10	- - -	76.2 8.9 40 mines	8 8 6	Mosq. Mosq. Hal.
25	Met. Recce.	2	2	-	-	8	Mosq.
25/26	Nuremburg Hagen Erfurt Stuttgart R.C.M. & Intruders Met. Recce.	68 10 9 9 74 1	63 7 7 7 59 1	- - - - - -	78.3 9.8 14.3 11.6 - -	8 8 8 8 100 100	Mosq. Mosq. Mosq. Mosq. Various Mosq.
26	Fulda (railway centre) Met. Recce. S.O.E.	75 2 1	71 2 -	- - -	328.3 - -	3 8 3	Lanc. Mosq. Hud.
26/27	Munich Erfurt Karlsruhe R.C.M. & Intruders S.O.E.	277 7 6 40 31	256 7 6 30 -	- - - 2 2	730.8 12.5 5.5 - -	5 8 8 100 3	Lanc. Mosq. Mosq. Mosq. Various Various
27	Cologne (Kalk Nord) (railway centre) Met. Recce.	169 1	167 1	1 -	860.4 -	3 8	Lanc. Mosq.
27/28	Freiburg Neuss  Berlin Ludwigshafen Nuremburg Hallendorf Minelaying R.C.M. & Intruders Met. Recce.	351 290  67 7 5 7 30 96 1	345 277  60 7 4 4 26 88 1	1 1  - - - - - -	1696.0 1194.2  77.0 4.4 7.1 7.1 126 mines - -	1, 8 1, 6, 8  8 8 8 8 1, 4, 6 100 8	Lanc. Mosq. Lanc. Hal. Mosq. Mosq. Mosq. Mosq. Hal. Lanc. Various Mosq.
28	Met. Recce.	2	2	-	-	8	Mosq.
28/29	Essen  Neuss Nuremburg Hallendorf R.C.M. & Intruders Met. Recce.	316  153 75 9 70 2	308  148 72 5 65 2	3 - 1 - - -	1193.6  731.8 85.0 12.5 - -	1, 4, 8  1, 3 8 8 100 8	Lanc. Hal. Mosq. Lanc. Mosq. Mosq. Various Mosq.
29	Dortmund Duisburg (oil) Photo. Recce. S.O.E.	310 30 2 1	291 29 2 -	6 - - -	1583.8 42.8 - -	1, 8 8 8 3	Lanc. Mosq. Mosq. Mosq. Hud.
29/30	Hannover Bielefeld Minelaying R.C.M. & Intruders S.O.E.	60 7 6 65 19	60 4 - 63 -	- - - - -	82.0 1.8 - - -	8 8 8 100 3	Mosq. Mosq. Mosq. Various Various
30	Bottrop (Welheim) (oil) Osterfeld (oil) Duisberg (oil) Met. Recce.	60 60 38 1	60 60 36 1	- 2 - -	311.6 312.3 50.7 -	3 3 8 8	Lanc. Lanc. Mosq. Mosq.

Date	Target or purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Nov.</u>							
30/1	Duisburg	575	553	-	2111.4	1, 4, 6, 8	Lanc. Hal. Mosq.
<u>Dec.</u>	Hamburg	53	51	-	63.4	8	Mosq.
	Hallendorf Steel Wks	7	6	-	11.6	8	Mosq.
	R.C.M. & Intruders	88	75	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	9	-	-	-	3	Various
1	Met. Recce.	1	1	-	-	8	Mosq.
1/2	Karlsruhe	71	69	-	82.2	8	Mosq.
	Hallendorf	6	6	-	10.7	8	Mosq.
	Duisburg (oil)	4	4	-	7.1	8	Mosq.
	R.C.M. & Intruders	46	46	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
2	Dortmund (oil)	93	92	-	485.0	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
2/3	Hagen	504	465	1	1817.3	1, 4, 6, 8	Hal. Lanc. Mosq.
	Giessen	570	525	-	70.3	8	Mosq.
	R.C.M. & Intruders	106	97	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	10	-	-	-	3	Stir.
3	Heimbach (Roer Dams)	207	4	-	1.8	1, 8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
3/4	Hallendorf (Steel wks)	11	11	-	17.9	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
4	Oberhausen	160	156	1	838.5	3	Lanc.
	Urft Dam	30	28	-	136.2	8	Lanc. Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
4/5	Karlsruhe	535	516	-	2308.5	1, 6, 8	Lanc. Hal. Mosq.
	Heilbronn	292	265	12	1266.9	5	Lanc. Mosq.
	Hagen	54	48	-	64.6	8	Mosq.
	Hamm & Bielefeld	12	10	-	5.4	8	Mosq.
	R.C.M. & Intruders	107	96	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
5	Schwammerauel Dam (Roer)	56	2	-	11.6	3	Lanc.
	Hamm	94	91	-	454.6	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
5/6	Soest (railway centre)	497	474	2	1850.1	1, 4, 6, 8	Lanc. Hal. Mosq.
	Nuremberg	32	28	-	23.4	8	Mosq.
	Ludwigshafen	53	51	-	77.3	8	Mosq.
	Duisburg (Hamborn) (oil)	4	2	-	2.7	8	Mosq.
	R.C.M. & Signals	72	63	-	-	100	Various
	Photo. Recce.	1	1	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Stir.
6	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	1	-	-	3	Stir.

Date	Target or purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Dec.							
6/7	Merseburg (Leuna) (oil)	497	465	5	1847.4	1, 3, 8	Lanc. Mosq.
	Osnabruck	453	416	8	1370.4	1, 4, 6, 8	Lanc. Hal. Mosq.
	Giessen (railway centre)	265	255	7	1207.0	5	Lanc. Mosq.
	Schwerte	10	8	-	7.1	8	Mosq.
	Berlin	42	40	1	47.6	8	Mosq.
	Hanau	2	1	-	3.6	8	Mosq.
	Schwerte (railway centre)	10	8	-	7.1	8	Mosq.
	R.C.M. & Intruders	84	63	-	-	100	Various
	Photo. Recce.	1	1	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
7	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
7/8	Cologne	53	51	-	62.3	8	Mosq.
	Hanau	7	6	-	10.7	8	Mosq.
	R. C.M. & Intruders	4	3	-	-	100	Various
8	Duisburg (railway centre)	163	159	-	900.4	3	Lanc.
	Duisburg (Meiderich) (oil)	30	28	-	32.1	8	Mosq.
	Urft Dam (Roer)	205	129	1	785.3	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	1	-	-	8	Mosq.
8/9	Met. Recce.	1	1	-	-	8	Mosq.
9	Met. Recce.	1	-	-	-	8	Mosq.
9/10	Berlin	60	56	2	72.6	8	Mosq.
	Koblenz	8	7	-	5.5	8	Mosq.
	Duisburg (Meiderich) (oil)	4	4	-	3.6	8	Mosq.
	R.C.M. & Intruders	64	53	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	Urft Dam	230	-	-	-	5, 8	Lanc. Mosq.
10	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
10/11	Met. Recce.	2	2	-	-	8	Mosq.
11	Osterfeld (railway centre)	98	96	-	502.2	3	Lanc.
	Osterfeld (oil)	52	52	1	284.2	3	Lanc.
	Duisburg Bruckhausen (oil)	48	46	-	60.7	8	Mosq.
	Duisburg (Meiderich) (oil)	32	31	-	40.4	8	Mosq.
	Urft Dam	238	180	1	1073.6	5	Lanc. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	-	-	-	8	Mosq.
11/12	Hannover	38	38	-	48.7	8	Mosq.
	Schwerte (railway centre)	9	8	-	7.1	8	Mosq.
	Hamburg	28	25	1	25.0	8	Mosq.
	Bielefeld	8	8	-	7.1	8	Mosq.
	Duisburg (Bruckhausen) (oil)	6	4	-	3.6	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
12	Witten (Steel works)	140	137	8	636.5	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
12/13	Essen	550	529	6	2377.5	1, 8	Lanc. Hal.
	Osnabruck	49	49	-	64.3	8	Mosq.
	R.C.M. & Intruders	86	78	-	-	100	Various
13	Met. Recce.	1	1	-	-	8	Mosq.
13/14	Horten (shipping)	59	46	-	118.3	5	Lanc. Mosq.
	Minelaying	19	18	-	91 mines	1, 4	Lanc. Hal.
14	Met. Recce.	3	3	-	-	8	Mosq.
14/15	Minelaying	39	37	-	200 mines	1, 3, 4, 5	Lanc. Hal.
15	Siegen (railway centre)	108	-	-	-	3	Lanc.
	Ijmuiden (E/R Boats)	17	14	-	75.0	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Dec.							
15/16	Ludwigshafen (Chem. Wks)	334	320	1	1554.4	1, 6, 8	Lanc. Mosq.
	Hannover	62	57	-	75.4	8	Mosq.
	Osnabruck	11	11	-	9.8	8	Mosq.
	Duisburg (Bruckhausen) (oil)	3	3	-	2.3	8	Mosq.
	Minelaying	23	19	1	82 mines	4, 5	Lanc. Hal.
	R.C.M. & Intruders	69	65	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
16	Siegen	108	92	1	471.0	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
16/17	R.C.M.	2	1	-	-	100	Well.
17	Met. Recce.	2	2	-	-	8	Mosq.
17/18	Ulm	330	318	3	1294.3	1, 8	Lanc. Mosq.
	Munich	288	266	7	956.9	5	Lanc. Mosq.
	Hanau (Spoof)	44	40	-	52.1	8	Mosq.
	Duisburg	523	486	8	1808.4	4, 6, 8	Lanc. Hal. Mosq.
	Munster	26	24	-	25.8	8	Mosq.
	Hallendorf (oil)	5	3	-	5.4	8	Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	R.C.M. & Intruders	94	73	-	-	100	Various
	Met. Recce.	2	2	-	-	8	Mosq.
18	Met. Recce.	1	1	-	-	8	Mosq.
18/19	Nuremberg	40	39	-	46.0	8	Mosq.
	Munster	16	14	-	19.4	8	Mosq.
	Gdynia (Shipping)	236	227	-	817.5	5	Lanc.
	Minelaying	14	10	-	66 mines	5	Lanc.
	R. C.M. & Intruders	45	42	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
19	Trier	32	30	-	135.6	3	Lanc.
19/20	Minelaying	12	12	-	54 mines	3	Lanc.
21	Trier	113	94	-	441.2	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
21/22	Bonn	114	107	-	552.0	1, 8	Lanc. Mosq.
	Cologne/Nippes (railway centre)	136	126	9	500.3	4, 6, 8	Lanc. Hal. Mosq.
	Politz	207	184	3	694.2	5	Lanc. Mosq.
	Schneidemuhl	4	4	-	6.5	5	Lanc.
	Minelaying	53	48	-	237 mines	1, 4, 5,	Lanc. Hal.
	R.C.M. & Intruders	27	24	-	-	100	Various
22	Met. Recce.	1	1	-	-	8	Mosq.
22/23	Koblenz (Mosel) (railway centre)	168	162	-	914.5	4, 8	Lanc. Hal. Mosq.
	Bingen (railway centre)	106	93	3	325.6	4, 8	Lanc. Hal. Mosq.
	R.C.M. & Intruders	44	37	-	-	100	Various
23	Trier	153	152	1	705.1	3	Lanc.
	Cologne (Gremberg) (railway centre)	39	26	6	116.5	8	Lanc. Mosq.
23/24	Siegburg (railway centre)	40	38	-	50.9	8	Mosq.
	Limburg ( " " )	52	50	-	64.1	8	Mosq.
	Town Centres N. Germany	7	7	-	6.3	8	Mosq.
	R. C.M. & Intruders	62	57	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	6	-	-	-	3	Stir.
24	Essen (A/F)	168	160	3	537.2	4, 8	Lanc. Hal. Mosq.
	Dusseldorf (A/F)	170	164	3	797.0	6, 8	Lanc. Hal. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Dec.</u>							
24/25	Bonn (Hangelar) (A. F.)	101	100	1	495.5	1, 8	Lanc.
	Cologne/Nippes (railway centre)	102	94	6	554.0	1, 8	Lanc. Mosq.
	Munster	2	1	-	.8	8	Mosq.
	Minelaying	12	12	-	48 mines	6	Hal.
	R.C.M. & Intruders	85	82	-	-	100	Various
	S.O.E.	8	-	-	-	3	Stir.
26	St. Vith (Troop Conc.)	294	278	2	1138.5	All Groups	Lanc. Hal. Mosq.
	R.C.M.	1	1	-	-	100	Hal.
27	Rheydt	211	191	1	957.6	1, 3, 5, 8	Lanc. Mosq.
27/28	Opladen (railway workshops)	328	313	2	1169.7	4, 6, 8	Lanc. Hal. Mosq.
	Town Centres N. Germany	7	7	-	6.3	8	Mosq.
	" " Cent. Germany	7	6	-	5.2	8	Mosq.
	R. C.M. & Intruders	69	64	-	-	100	Various
28	Cologne (Gremberg) (railway centre)	167	164	-	756.1	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
28/29	Bonn (railway centre)	178	171	1	914.9	1, 8	Lanc. Mosq.
	Munchen Gladbach (railway centre)	186	167	-	766.8	1, 4, 8	Lanc. Hal. Mosq.
	Frankfurt (railway centre)	8	4	1	5.4	8	Mosq.
	Frankfurt	79	79	2	111.4	8	Mosq.
	Oslo Fjord (Horten) (Shipping)	68	65	3	350.5	5	Lanc. Mosq.
	Met. Recce.	3	2	-	-	8	Mosq.
	Minelaying	27	25	1	125 mines	5, 6	Lanc. Hal.
	R.C.M. & Intruders	80	73	-	-	100	Various
	S.O.E.	12	-	-	-	3	Stir.
29	Koblenz (Lutzell) (railway centre)	85	82	-	403.0	3	Lanc.
	Koblenz (Mosel) (railway centre)	192	180	-	505.5	4, 8	Lanc. Hal. Mosq.
	Rotterdam (E/Boat Pens)	16	16	-	85.7	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
29/30	Gelsenkirchen (oil)	337	324	4	1624.6	1, 6, 8	Lanc. Mosq.
	Troisdorf (railway centre)	187	176	-	608.1	6, 8	Lanc. Hal. Mosq.
	Minelaying	24	20	-	92 mines	5, 6	Lanc. Hal.
	R.C.M. & Intruders	56	51	-	-	100	Mosq. Various
30	IJmuiden (port area)	13	-	-	-	5	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
30/31	Cologne (Kalk) (railway centre)	470	457	2	1757.0	4, 6, 8	Lanc. Hal. Mosq.
	Duisburg	8	8	-	6.4	8	Mosq.
	Hannover	68	68	-	81.2	8	Mosq.
	Bochum	9	8	-	16.1	8	Mosq.
	Houffalize	166	97	1	529.6	5, 8	Lanc. Mosq.
	Minelaying	11	11	-	56 mines	3	Lanc.
	R.C.M. & Intruders	68	64	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	21	-	-	-	3	Stir.
31	Vöhrkel (railway centre)	155	153	2	762.6	3	Lanc.
	Olso (Gestapo H.Q.)	12	8	-	7.1	5	Mosq.
<u>Jan.</u>							
31/1	Osterfeld (railway centre)	166	155	3	810.5	1, 8	Lanc. Mosq.
	Oslo Fjord (Shipping)	28	26	1	81.7	5	Lanc.
	Berlin	73	67	-	82.8	8	Mosq.
	Ludwigshafen (Chem. wks)	12	12	1	21.4	8	Mosq.
	Minelaying	26	24	1	112 mines	5, 6	Lanc. Hal.
	R.C.M. & Intruders	66	65	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	21	-	-	-	3	Stir.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
1945 Jan.							
1	Rly. tunnels in area Koblenz/Kaiserslautern/ Trier/St. Vith/Euskirchen Dortmund-Ems Canal	17 104	12 94	1 2	28.6 558.6	8 5	Mosq. Lanc. Mosq.
1/2	Dortmund (oil)	139	115	-	375.0	4, 8	Hal. Lanc. Mosq.
	Gravenhorst (Canal)	157	152	1	715.7	5	Lanc. Mosq.
	Vohwinkel (railway centre)	146	142	4	684.6	3	Lanc.
	Hanau	28	24	-	29.6	8	Mosq.
	Hannover	27	26	-	33.7	8	Mosq.
	Bomber Support (inc. 59 Intruders)	100	94	-	-	100	Various
	R.C.M.	1	1	-	-	100	
2	Met. Recce.	1	-	-	-	8	Mosq.
	S.O.E.	2	-	-	-	3	Hud.
2/3	Nuremburg	521	508	6	2083.0	1, 3, 6, 8	Lanc. Mosq.
	Ludwigshafen (Chem. Plant)	386	368	-	1220.9	4, 6, 8	Hal. Lanc. Mosq.
	Berlin	53	49	1	55.4	8	Mosq.
	Hanau	7	6	-	4.4	8	Mosq.
	Castrop Rauxel (oil)	9	8	1	13.4	8	Mosq.
	Bomber Support (inc. 41 Intruders)	84	75	-	-	100	Various
	R.C.M.	6	5	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
3	Castrop Rauxel (oil)	49	44	-	213.6	3	Lanc.
	Dortmund (Hansa) (oil)	50	49	1	234.9	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
3/4	Ludwigshafen (railway centre)	3	3	-	2.3	8	Mosq.
	Neuss (railway centre)	3	2	-	3.6	8	Mosq.
4	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
4/5	Berlin	66	60	-	76.4	8	Mosq.
	Neuss (railway centre)	7	5	-	10.7	8	Mosq.
	Royan	354	350	6	1589.9	1, 5, 8	Lanc. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
	R.C.M.	2	2	-	-	100	Various
5	Ludwigshafen (railway centre)	160	152	2	665.1	3	Lanc.
5/6	Hannover	664	639	30	2359.7	1, 4, 6, 8	Hal. Lanc. Mosq.
	Berlin	69	59	1	69.7	8	Mosq.
	Castrop Rauxel (oil)	6	6	-	4.7	8	Mosq.
	Neuss (railway centre)	8	8	-	14.3	8	Mosq.
	Houffalize (Troop Conc.)	140	99	2	482.5	5, 8	Lanc. Mosq.
	Bomber Support (inc. 55 Intruders)	103	95	1	-	100	Various
	R.C.M.	10	9	-	-	100	Various
6	Met. Recce.	3	3	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Hud.
6/7	Hanau	433	425	6	1411.7	4, 6, 8	Hal. Lanc. Mosq.
	Hanau (railway centre)	53	51	-	246.5	1, 8	Lanc. Mosq.
	Neuss ( " " )	147	140	1	682.8	1, 3	Lanc.
	Kassel	20	12	-	12.5	8	Mosq.
	Castrop Rauxel (oil)	6	4	-	3.1	8	Mosq.
	Mine laying	49	46	2	234 mines	1, 3, 5	Lanc.
	Bomber Support (inc. 32 Intruders)	77	68	2	-	100	Various
	R.C.M.	7	6	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
7	Met. Recce.	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Jan.							
7/8	Munich	654	597	15	2185.0	1, 3, 5, 6, 8	Lanc. Mosq.
	Hanau (railway centre)	12	12	-	13.8	8	Mosq.
	Nuremburg	18	18	-	19.8	8	Mosq.
	Hannover	54	53	1	66.9	8	Mosq.
	Bomber Support (inc. 45 Intruders)	81	63	1	-	100	Various
	R.C.M.	3	2	-	-	100	Hal. Well.
	Met. Recce.	1	1	-	-	8	Mosq.
8	Met. Recce.	1	1	-	-	8	Mosq.
8/9	Met. Recce.	1	1	-	-	8	Mosq.
10	Met. Recce.	1	1	-	-	8	Mosq.
10/11	Hannover	50	50	-	70.5	8	Mosq.
	Cologne/Koblenz/Wiesbaden/Mannheim	3	2	-	2.6	8	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
11	Krefeld-Uerdingen (railway centre)	152	146	-	674.2	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Stir.
11/12	Met. Recce.	1	1	-	-	8	Mosq.
12	Bergen (U-boat Pens & Port)	33	25	3	128.6	5	Lanc. Mosq.
	Met. Recce.	4	2	-	-	8	Mosq.
	Fighter Support & A.S.R. duty	2	2	-	-	100	Mosq.
	S.O.E.	2	-	-	-	3	Stir.
12/13	Fortsetzung (oil)	9	8	-	11.6	8	Mosq.
	Carolinengluck (oil)	11	10	-	17.0	8	Mosq.
	Minelaying	32	24	4	98 mines	8	Mosq.
13	Saarbrucken (railway centre)	158	151	-	650.6	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Huds.
13/14	Saarbrucken (railway centre)	276	264	1	761.9	4, 6, 8	Hal. Lanc. Mosq.
	Politz (oil)	225	215	2	812.7	5	Lanc. Mosq.
	Minelaying	10	10	-	47 mines	5	Lanc.
	Bomber Support (inc. 21 Intruders)	36	34	1	-	100	Various
	R.C.M.	5	5	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
14	Saarbrucken (railway centre)	134	121	-	351.9	4, 8	Hal. Lanc. Mosq.
14/15	Merseburg (Leuna) (oil)	587	561	6	2212.6	1, 5, 6, 8	Lanc. Mosq.
	Grevenbroich (railway centre)	151	142	-	365.6	6, 8	Hal. Lanc. Mosq.
	Berlin	83	69	2	88.3	8	Mosq.
	Mannheim	9	9	-	9.6	8	Mosq.
	Dulmen (Fuel)	115	105	1	303.5	4, 8	Hal. Lanc. Mosq.
	Minelaying	31	29	-	136 mines	1, 4, 6	Lanc. Hal.
	"Sweepstake" Diversion	126	110	1	-	7, 91, 92, 93	Lanc. Hal. Stir. Well.
	Bomber Support (inc. 52 Intruders)	107	100	1	-	100	Various
	R.C.M.	5	5	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
15	Langendreer (oil)	63	61	-	282.0	3	Lanc.
	Fortsetzung (oil)	82	79	-	375.7	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	1	-	-	-	3	Huds.
15/16	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Jan.</u>							
16/17	Magdeburg	371	348	17	1066.3	4, 6, 8	Hal., Lanc. Mosq.
	Zeitz (oil)	328	320	10	1328.8	1, 6, 8	Lanc.
	Brux (oil)	237	222	1	856.8	1, 5	Lanc. Mosq.
	Mannheim	17	17	-	13.1	8	Mosq.
	Hamburg	9	8	-	7.4	8	Mosq.
	Wanne-Eickel (oil)	138	128	1	572.4	3	Lanc.
	MineLaying	31	27	-	123 mines	1, 4, 6	Lanc. Hal.
	Bomber Support (inc. 52 Intruders)	100	95	1	-	100	Various
	R.C.M.	7	6	-	-	100	Mosq. Hal.
17	S.O.E.	1	-	-	-	3	Huds.
17/18	Ruthen (oil)	8	8	-	9.4	8	Mosq.
	Magdeburg	73	69	-	79.3	8	Mosq.
	Cologne/Koblenz/Frankfurt/ Mannheim	3	3	-	2.8	8	Mosq.
	Bomber Support (inc. 13 Intruders)	45	41	-	-	100	Various
	R.C.M.	1	1	-	-	100	Mosq.
18	Met. Recce.	1	1	-	-	8	Mosq.
18/19	Ruthen (oil)	7	6	-	8.0	8	Mosq.
	Sterkrade (oil)	56	50	1	62.9	8	Mosq.
	Dusseldorf/Kassel/Koblenz	12	17	-	9.8	8	Mosq.
19	Met. Recce.	1	1	-	-	8	Mosq.
20	Met. Recce.	1	1	-	-	8	Mosq.
21	Met. Recce.	1	1	-	-	8	Mosq.
21/22	Mainz	4	4	-	3.3	8	Mosq.
	Kassel	76	71	1	79.4	8	Mosq.
	Bomber Support (inc. 9 Intruders)	31	28	-	-	100	Various
	R.C.M.	2	1	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
22	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Hal.
22/23	Bruckhausen (oil)	302	287	2	1297.4	1, 3, 8	Lanc. Mosq.
	Gelsenkirchen (oil)	152	139	-	434.0	4, 5, 8	Hal., Lanc. Mosq.
	Hannover	48	47	-	54.6	8	Mosq.
	Dortmund	6	5	-	3.9	8	Mosq.
	Bomber Support (inc. 40 Intruders)	86	76	-	-	100	Various
	R.C.M.	4	4	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
23/24	Met. Recce.	1	1	-	-	-	
26/27	Castropauxel (oil)	8	8	-	14.3	8	Mosq.
27	Met. Recce.	1	1	-	-	5	Mosq.
27/28	Berlin	12	8	-	7.1	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
28	Cologne (Gremberg) (railway centre)	153	144	3	769.3	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
28/29	Stuttgart (Kornwestheim) (railway centre)	226	186	2	610.6	4, 6, 8	Hal., Lanc. Mosq.
	Stuttgart (Suffenhausen)	376	353	9	1272.5	1, 4, 6,	Hal., Lanc. Mosq.
	Mainz	8	7	-	6.5	8	Mosq.
	Berlin	67	63	-	78.0	8	Mosq.
	MineLaying	6	6	-	30 mines	8	Lanc.
	Bomber Support (inc. 34 Intruders)	81	68	-	-	100	Various
	R.C.M.	6	6	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Jan.							
29	Krefeld-Uerdingen (Railway centre)	148	142	-	648.0	3	Lanc.
29/30	Berlin	59	52	-	62.9	8	Mosq.
31/1	Dortmund (Hansa) (oil)	8	8	-	10.5	8	Mosq.
	Bruckhausen (oil)	6	6	1	8.0	8	Mosq.
Feb.							
1	Munchen/Gladbach	160	157	-	714.0	8	Lanc.
	R.C.M.	1	1	-	-	100	Hal.
	Met. Recce.	2	2	-	-	8	Mosq.
1/2	Ludwigshafen	396	382	8	1677.2	1, 6, 8	Lanc. Mosq.
	Mainz	340	321	-	1028.3	4, 6, 8	Hal. Lanc. Mosq.
	Siegen	282	279	5	1306.7	5	Lanc.
	Bruckhausen (oil)	8	8	-	6.2	8	Mosq.
	Berlin	122	116	2	135.6	8	Mosq.
	Mannheim/Stuttgart	4	4	-	5.9	8	Mosq.
	Nuremberg	4	4	-	3.6	8	Mosq.
	Hannover	6	6	-	10.7	8	Mosq.
	Bomber Support (inc. 47 Intruders)	106	99	-	-	100	Various
	R.C.M.	5	4	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	14	-	-	-	3	Various
2	Met. Recce.	1	1	-	-	8	Mosq.
	Ranger Patrol	2	-	-	-	100	Mosq.
2/3	Karlsruhe	261	244	14	1183.2	5	Lanc. Mosq.
	Wanne-Eickel (oil)	323	295	4	872.3	4, 6, 8	Hal. Lanc. Mosq.
	Wiesbaden	497	465	12	2047.5	1, 3, 6, 8	Lanc. Mosq.
	Magdeburg (oil)	43	42	-	43.3	8	Mosq.
	Mannheim (Feint)	20	18	-	17.2	8	Mosq.
	Bomber Support (inc. 44 Intruders)	92	87	-	-	100	Various
	R.C.M.	6	6	-	-	100	Various
3	Poortershaven (U-boat Pens)	19	19	-	96.4	5	Lanc. Mosq.
	Ijmuiden (U- and E-boat Pens)	18	17	-	91.1	5	Lanc.
	R.C.M.	1	1	-	-	100	Hal.
	Photo. Recce.	1	-	-	-	-	-
3/4	Bottrop (oil)	210	198	8	1006.9	1, 8	Lanc. Mosq.
	Dortmund (oil)	149	133	4	591.1	3	Lanc.
	Osnabruck	20	19	-	19.4	8	Mosq.
	Wiesbaden	42	41	-	52.5	8	Mosq.
	Mine laying	19	17	-	68 mines	4	Hal.
	Bomber Support (inc. 28 Intruders)	67	65	-	-	100	Various
	R.C.M.	3	3	-	-	100	Hal. Mosq.
4	Met. Recce.	2	2	-	-	8	Mosq.
4/5	Bonn	238	218	3	851.7	4, 6, 8	Hal. Lanc. Mosq.
	Gelsenkirchen Nordstern (oil)	120	107	-	343.4	4, 8	Hal. Lanc. Mosq.
	Osterfeld (oil)	123	113	-	320.9	6, 8	Hal. Lanc. Mosq.
	Dortmund	12	11	-	11.4	8	Mosq.
	Wurzburg	3	2	1	5.4	8	Mosq.
	Hannover	50	46	1	56.9	8	Mosq.
	Magdeburg	4	4	-	7.1	8	Mosq.
	Mine laying	27	27	-	137 mines	1, 6	Lanc. Hal.
	Bomber Support (inc. 45 Intruders)	95	89	-	-	100	Various
	R.C.M.	6	5	-	-	100	Mosq. Hal.
5	Met. Recce.	3	3	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Hal.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Feb.</u>							
5/6	Berlin	63	55	1	59.1	8	Mosq.
	Wurzburg	6	4	-	8.9	8	Mosq.
	Magdeburg	7	7	-	10.7	8	Mosq.
	R.C.M.	1	1	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
6	Bielefeld (railway Viaduct)	17	-	-	-	5	Lanc.
	Altenbecken (railway Viaduct)	18	-	-	-	5	Lanc.
6/7	Met. Recce.	1	1	-	-	8	Mosq.
7	Wanne-Eickel (oil)	100	77	1	340.4	3	Lanc.
7/8	Kleve	305	286	1	1396.5	1, 8	Lanc. Mosq.
	Goch	464	155	6	474.5	4, 6, 8	Hal. Lanc.
	Magdeburg	38	37	-	40.4	8	Mosq.
	Bonn	6	6	-	4.0	8	Mosq.
	Koblenz	6	6	-	10.7	8	Mosq.
	Kassel	10	10	-	17.9	8	Mosq.
	Mainz	16	16	1	24.1	8	Mosq.
	Duisburg	8	8	-	6.9	8	Mosq.
	Dusseldorf	8	8	-	7.1	8	Mosq.
	Ladbergen Canal	188	174	5	812.4	5, 8	Lanc. Mosq.
	Hannover	9	9	-	11.8	8	Mosq.
	Minelaying	30	29	-	143 mines	4, 5	Hal. Lanc.
	Bomber Support (inc. 45 Intruders)	99	92	7	-	100	Various
	R.C.M.	9	8	-	-	100	Hal. Mosq.
	S.O.E.	5	-	-	-	3	Various
8	Ijmuiden	15	15	-	80.4	5	Lanc.
	R.C.M.	1	1	-	-	100	Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
8/9	Poltitz (oil)	475	452	11	1659.4	8, 1, 5	Lanc. Mosq.
	Neu Brandenburg (Feint)	9	9	-	16.3	5	Lanc.
	Wanne-Eickel (oil)	228	210	-	653.9	4, 6, 8	Hal. Lanc.
	Hohenbudberg	151	142	1	633.0	3	Lanc.
	Berlin	47	45	-	46.9	8	Mosq.
	Nuremberg	4	3	-	2.7	8	Mosq.
	Minelaying	10	9	-	40 mines	5	Lanc.
	Bomber Support (inc. 35 Intruders)	82	74	1	-	100	Various
	R.C.M.	7	7	-	-	100	Hal. Mosq.
9	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Hal.
9/10	S.O.E.	7	-	1	-	3	Various
	R.C.M.	1	1	-	-	100	Mosq.
10	Met. Recce.	2	2	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Hal.
10/11	Hannover	82	78	-	93.4	8	Mosq.
	Essen	11	11	-	15.0	8	Mosq.
	Bomber Support (inc. 22 Intruders)	43	33	-	-	100	Various
	R.C.M.	3	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
11	Met. Recce.	1	1	-	-	8	Mosq.
12	Met. Recce.	1	1	-	-	8	Mosq.
12/13	Stuttgart	72	68	-	84.8	8	Mosq.
	Wurzburg	4	4	-	7.1	8	Mosq.
	Misburg (oil)	11	11	-	19.6	8	Mosq.
	Cologne/Koblenz/Wiesbaden/ Frankfurt	3	2	-	2.6	8	Mosq.
	R.C.M.	1	1	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
Feb.							
13	Met. Recce.	3	3	-	-	8	Mosq.
13/14	Bohlen (oil)	368	335	1	788.8	4, 6, 8	Hal. Lanc. Mosq.
	Dresden	805	772	5	2659.3	1, 3, 5, 6, 8	Lanc. Mosq.
	Magdeburg	71	70	-	84.2	8	Mosq.
	Nuremburg	8	7	-	6.0	8	Mosq.
	Dortmund	6	5	-	3.9	8	Mosq.
	Bonn	16	16	-	17.2	8	Mosq.
	Misburg (oil)	8	7	-	12.5	8	Mosq.
	Bomber Support (inc. 66 Intruders)	117	107	-	-	100	Various
	R.C.M.	7	5	-	-	100	Mosq. Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
14	Bielefeld (Railway Viaduct)	20	-	-	-	5	Lanc. Mosq.
	Altenbeken (Railway Viaduct)	17	-	1	-	5	Lanc.
	Met. Recce.	3	3	-	-	8	Mosq.
14/15	Rositz (oil)	232	217	3	831.1	5	Lanc. Mosq.
	Chemnitz	717	671	15	2079.4	1, 3, 4, 6, 8	Hal. Lanc.
	Duisburg	12	10	-	7.6	8	Mosq.
	Mainz	19	19	-	23.2	8	Mosq.
	Berlin	46	43	-	53.6	8	Mosq.
	Frankfurt	8	8	-	9.7	8	Mosq.
	Nuremburg	11	11	-	16.3	8	Mosq.
	Dessau	14	13	-	13.7	8	Mosq.
	Minelaying	54	45	6	231 mines	1, 4, 6	Lanc. Hal.
	Diversicary Sweep	95	91	-	-	3, 7	Lanc. Hal. Str.
	Bomber Support (inc. 54 Intruders)	101	96	-	-	100	Various
	R.C.M.	7	6	-	-	100	Hal. Mosq.
15	Met. Recce.	1	1	-	-	8	Mosq.
	R.C.M.	1	1	-	-	100	Hal.
15/16	Minelaying	55	52	-	272 mines	1, 3, 4, 5, 6	Lanc. Hal.
	Bomber Support (inc. 6 Intruders)	6	6	-	-	100	Mosq.
	R.C.M.	2	2	-	-	100	Mosq.
16	Wesel	100	96	-	422.3	3	Lanc.
	Photo. Recce.	1	1	-	8	8	Mosq.
17	Wesel	298	21	-	47.8	4, 6, 8	Hal. Lanc. Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.
17/18	Bremen (Shipbuilding Yards)	6	6	-	10.7	8	Mosq.
18	Wesel	160	155	-	690.5	3	Lanc.
	Photo. Recce.	1	1	-	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
18/19	Mannheim	32	32	-	50.0	8	Mosq.
	Berlin	6	5	-	4.5	8	Mosq.
	Bremen (Shipbuilding Yards)	6	6	-	10.7	8	Mosq.
	Eisenach/Gotha/Erfurt/ Weimar	3	2	-	1.4	8	Mosq.
	Minelaying	25	23	2	130 mines	1, 6	Lanc. Hal.
	Bomber Support (inc. 18 Intruders)	45	44	-	-	100	Various
	R.C.M.	7	7	-	-	100	Hal. Mosq.
19	Wesel	169	168	1	723.9	3, 8	Lanc. Mosq.
	R.C.M.	1	1	-	-	100	Hal.
19/20	Bohlen (oil)	260	239	1	967.6	5	Lanc. Mosq.
	Erfurt	82	79	-	99.8	8	Mosq.
	Wurzburg	6	6	-	10.7	8	Mosq.
	Bremen (Shipbuilding Yards)	6	5	-	8.9	8	Mosq.
	Hannover/Brunswick/Osnabruck/ Munster	12	12	-	12.1	8	Mosq.
	Bomber Support (inc. 27 Intruders)	32	31	-	-	100	Mosq. Fort.
	R.C.M.	6	6	-	-	100	Hal. Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Feb.</u>							
20	R.Co.Mo	1	1	-	-	100	Hal.
	Met. Recce.	3	3	-	-	8	Mosq.
20/21	Dortmund	528	513	14	2248.6	1, 3, 6, 8	Lanc. Mosq.
	Gravenhorst (Canal)	165	21	-	2.8	5	Lanc. Mosq.
	Reisholz (oil)	173	157	6	373.1	4, 8	Hal. Lanc. Mosq.
	Monheim (oil)	128	120	2	305.8	6, 8	Hal. Lanc. Mosq.
	Mannheim	16	16	-	12.4	8	Mosq.
	Berlin	66	62	-	72.9	8	Mosq.
	Diversitary Sweep	91	87	-	-	7	Lanc. Hal. Stir.
	Bomber Support (inc. 45 Intruders)	104	103	1	-	100	Various
	R.Co.Mo	6	6	-	-	100	Hal. Mosq.
	S.O.E.	6	-	-	-	3	Various
21	Met. Recce.	1	1	-	-	8	Mosq.
	R.Co.M.	1	1	-	-	100	Hal.
21/22	Gravenhorst (Canal)	177	167	13	816.0	5	Lanc. Mosq.
	Worms	349	340	18	942.8	4, 6, 8	Hal. Lanc. Mosq.
	Berlin	77	70	1	86.7	8	Mosq.
	Bremen	5	3	-	10.8	8	Mosq.
	Duisburg	373	364	10	1631.8	1, 6, 8	Lanc. Mosq.
	Bomber Support (inc. 41 Intruders)	95	91	-	-	100	Various
	R.Co.M.	6	5	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	28	-	-	-	3	Huds. Stir.
22	Gelsenkirchen/Scholven (oil)	88	84	1	374.6	3, 5, 8	Lanc. Mosq.
	Osterfeld (oil)	82	75	-	353.1	3	Lanc.
	Bielefeld (Railway Viaduct)	18	18	-	96.4	5	Lanc.
	Altenbeken (Railway Viaduct)	18	17	-	85.7	5	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
22/23	Berlin	73	72	-	80.1	8	Mosq.
	Erfurt	4	3	1	7.1	8	Mosq.
	Bremen (Shipbuilding yards)	6	6	-	10.7	8	Mosq.
	Osnabruck/Paderborn/Kassel/Gottingen	3	3	-	4.5	8	Mosq.
	Bomber Support (inc. 39 Intruders)	67	61	-	-	100	Various
	R.Co.Mo	4	4	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	19	-	-	-	3	Stir. Huds.
23	Gelsenkirchen (oil)	133	130	-	579.8	3	Lanc.
	Essen	342	324	1	1172.6	4, 6, 8	Hal. Lanc. Mosq.
	Photo. Recce.	2	2	-	-	8	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
23/24	Pforzheim	375	369	12	1551.7	1, 5, 6, 8	Lanc. Mosq.
	Berlin	70	70	1	92.4	8	Mosq.
	Worms (Feint)	6	6	-	4.7	8	Mosq.
	Darmstadt	4	4	-	2.5	8	Mosq.
	Frankfurt	4	4	-	3.6	8	Mosq.
	Essen	4	3	-	4.9	8	Mosq.
	Horten (U-boats and shipping)	83	83	1	221.4	5	Lanc. Mosq.
	Minelaying	22	21	-	126 mines	5, 6	Lanc.
	Bomber Support (inc. 25 Intruders)	70	68	-	-	100	Various
	R.Co.Mo	9	7	2	-	100	Hal. Mosq.
	S.O.E.	13	-	1	-	3	Various
24	Kamen (oil)	340	317	1	1035.4	4, 6, 8	Hal. Lanc. Mosq.
	Dortmund-Ems Canal	171	-	-	-	5	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	Photo. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>Feb.</u>							
24/25	Berlin	63	63	-	79.9	8	Mosq.
	Neuss	18	15	-	19.2	8	Mosq.
	Dessau/Halle/Weimar/ Erfurt	3	1	-	.8	8	Mosq.
	Minelaying	35	32	-	108 mines	1, 3, 5, 6	Lanc.
	Bomber Support (inc. 23 Intruders)	58	55	5	-	100	Various
	R.C.M.	2	2	-	-	100	Mosq.
	Diversionsary Sweep	75	74	-	-	1, 7, 91,	Lanc. Hal.
	Met. Recce.	2	2	-	-	92	Well.
						8	Mosq.
25	Kamen (oil)	153	140	1	650.9	3	Lanc.
25/26	Erfurt	63	59	-	72.8	8	Mosq.
	Berlin	10	8	-	7.1	8	Mosq.
	Mainz	10	9	-	12.1	8	Mosq.
	Bremen (Shipyards)	6	6	-	10.7	8	Mosq.
	Minelaying	10	9	1	36 mines	6	Hal.
	Bomber Support (inc. 23 Intruders)	31	27	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	20	-	-	-	3	Various
26	Dortmund (oil)	149	148	-	651.6	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
26/27	Berlin	38	36	-	28.8	8	Mosq.
	Nuremburg	38	35	-	55.5	8	Mosq.
	Emden/Oldenburg/Bremen Osnabruck	3	3	-	2.7	8	Mosq.
	Bomber Support (Intruders)	6	6	-	-	100	Mosq.
	R.C.M.	1	1	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	18	-	-	-	3	Various
27	Gelsenkirchen (oil)	149	146	1	641.1	3	Lanc.
	Mainz	458	435	1	1548.0	4, 6, 8	Hal. Lanc.
	Photo. Recce.	2	1	1	-	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
27/28	Bremen (Shipyards)	6	6	-	8.4	8	Mosq.
	Berlin	96	96	-	112.4	8	Mosq.
	Bomber Support (inc. 32 Intruders)	81	78	-	-	100	Various
	Diversionsary Sweep	85	81	-	-	1, 7, 100	Various
	R.C.M.	10	9	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
28	Gelsenkirchen (oil)	156	154	-	696.9	3	Lanc.
	Neuss	307	-	-	-	1, 6	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
28/1	Berlin	74	73	1	95.1	8	Mosq.
	Nuremburg	8	7	-	12.5	8	Mosq.
	Munich	4	4	-	3.1	8	Mosq.
	Minelaying	5	1	-	2 mines	5	Mosq.
	Bomber Support (inc. 31 Intruders)	70	68	-	-	100	Various
	Diversionsary Sweep	98	95	-	-	5, 7,	Lanc. Hal.
						91, 92	Well.
	R.C.M.	5	4	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
	S.O.E.	20	-	-	-	3	Stir. Huds.
<u>March</u>							
1	Mannheim	478	466	3	1986.3	1, 6, 8	Lanc. Hal.
	Kamen (oil)	151	146	-	659.7	3	Mosq.
	Photo. and Met. Recce.	1	1	-	-	8	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft	
<b>March</b>								
1/2	Berlin	55	50	1	40.9	8	Mosq.	
	Erfurt	40	39	1	65.4	8	Mosq.	
	Oldenburg/Bremen/Hamburg/ Lubeck	3	3	-	2.6	8	Mosq.	
	Bomber Support (inc. 13 Intruders)	41	41	-	-	100	Various	
	R.C.M. Met. Recce.	4 2	4 2	- -	- -	100 8	Hal. Mosq. Mosq.	
2	Cologne	858	636	10	2898.6	1, 3, 4, 5, 6, 8	Hal. Lanc. Mosq.	
	Photo. Recce.	2	2	-	-	8	Mosq.	
2/3	Kassel	67	66	-	78.2	8	Mosq.	
	Berlin	22	22	-	16.3	8	Mosq.	
	Wiesbaden/Darmstadt/Mannheim/ Stuttgart	3	3	-	2.7	8	Mosq.	
	Minelaying	16	15	-	50 mines	5, 6	Hal. Lanc. Mosq.	
	Bomber Support (inc. 31 Intruders)	73	69	-	-	100	Various	
	R.C.M.	6	6	-	-	100	Hal. Mosq.	
	Diversionsary Sweep	69	68	-	-	7	Hal. Lanc.	
	Met. Recce.	1	1	-	-	8	Mosq.	
	S.O.E.	21	-	-	-	3	Various	
	3	Met. Recce.	2	2	-	-	8	Mosq.
3/4	Kamen (oil)	234	221	-	737.4	4, 8	Hal. Lanc. Mosq.	
	Berlin	64	58	-	60.2	8	Mosq.	
	Wurzburg	32	31	-	47.1	8	Mosq.	
	Ladbergen (canal)	221	213	7	1028.6	5	Lanc. Mosq.	
	Minelaying	31	29	1	175 mines	1, 5	Lanc.	
	Diversionsary Sweep	95	83	-	-	7, 91, 92	Hal. Lanc. Well.	
	Bomber Support (inc. 82 Intruders)	82	78	1	-	100	Various	
	R.C.M.	8	7	-	-	100	Hal. Mosq.	
	Met. Recce.	1	1	-	-	8	Mosq.	
	S.O.E.	17	-	-	-	3	Various	
4	Wanne-Eickel (railway centre)	128	125	-	617.0	3	Lanc.	
	Met. Recce.	2	2	-	-	8	Mosq.	
4/5	Bremen (Shipyard)	4	3	-	5.4	8	Mosq.	
	Berlin	31	30	-	22.2	8	Mosq.	
	Essen	24	23	-	26.7	8	Mosq.	
	Kiel/Lubeck/Hamburg/ Wilhelmshaven	6	3	-	5.4	8	Mosq.	
	Minelaying	12	12	-	48 mines	4	Hal.	
	Bomber Support (Intruders)	6	5	-	-	100	Mosq.	
	Met. Recce.	1	1	-	-	8	Mosq.	
	S.O.E.	16	-	2	-	3	Various	
5	Gelsenkirchen (oil)	170	163	2	793.1	3	Lanc.	
	Met. Recce.	2	2	-	-	8	Mosq.	
5/6	Chemnitz	720	686	23	1972.3	1, 4, 6, 8	Hal. Lanc. Mosq.	
	Bohlen (oil)	258	238	5	872.1	5	Lanc. Mosq.	
	Berlin	75	75	1	88.4	8	Mosq.	
	Gelsenkirchen	15	14	-	13.3	8	Mosq.	
	Mannheim	8	8	-	4.1	8	Mosq.	
	Hallendorf (Steel works)	8	6	1	10.7	8	Mosq.	
	Kiel/Lubeck/Hamburg/ Hannover	5	3	-	4.6	8	Mosq.	
	Bomber Support (inc. 27 Intruders)	71	66	1	-	100	Various	
	R.C.M.	8	5	1	-	100	Hal. Mosq.	
	Met. Recce.	2	2	-	-	8	Mosq.	
	6	Salzbergen (oil)	119	118	1	548.2	3	Lanc.
		Wesel	48	39	1	41.3	8	Mosq.
		Met. Recce.	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<b>March</b>							
6/7	Sassnitz (Naval Installations)	198	186	1	679.7	5	Lanc. Mosq.
	Berlin	42	38	1	37.4	8	Mosq.
	Wesel	138	129	-	460.5	3, 8	Lanc. Mosq.
	Minelaying	15	15	-	83 mines	5	Lanc.
	Bomber Support	6	6	-	-	100	Various
	R.C.M.	1	1	-	-	100	Hal.
7	Met. Recce.	2	2	-	-	8	Mosq.
7/8	Dessau	526	519	19	1713.5	1, 3, 6, 8	Lanc. Mosq.
	Harburg (oil)	241	222	13	1039.4	5	Lanc. Mosq.
	Hemmingstedt (Heide) (oil)	281	278	5	730.4	4, 6, 8	Hal. Lanc.
	Berlin	75	64	1	71.9	8	Mosq.
	Frankfurt	10	10	-	10.1	8	Mosq.
	Munster	9	9	-	6.6	8	Mosq.
	Hannover/Berlin/Dessau	5	4	-	4.5	8	Mosq.
	Minelaying	20	20	-	86 mines	3, 4	Lanc. Hal.
	Photo. Recce.	3	3	-	-	5, 8	Mosq.
	Bomber Support	92	86	2	-	100	Various
	R.C.M.	7	5	1	-	100	Hal. Mosq.
8	Met. Recce.	2	-	-	-	-	-
8/9	Kassel	276	268	2	1142.3	1, 8	Lanc. Mosq.
	Hamburg (U-boat building yard)	312	304	1	843.6	4, 6, 8	Hal. Lanc.
	Berlin	39	38	1	30.2	8	Mosq.
	Hannover	28	28	-	39.0	8	Mosq.
	Hagen	7	7	-	5.5	8	Mosq.
	Osnabruck/Hannover/Bremen	5	4	-	4.4	8	Mosq.
	Minelaying	37	36	-	165 mines	4, 6	Hal. Lanc.
	Bomber Support (inc. 36 Intruders)	79	73	1	-	100	Various
	R.C.M.	7	7	-	-	100	Hal. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
	S.O.E.	5	-	-	-	3	Various
9	Datteln (oil)	159	157	1	781.9	3	Lanc.
	Bielefeld (Railway Viaduct)	21	-	-	-	5	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
9/10	Berlin	92	88	-	104.3	8	Mosq.
	Wilhelmshaven/Bremen/Hannover/ Osnabruck	4	3	-	5.4	8	Mosq.
	Minelaying	21	20	-	80 mines	4, 6	Hal.
	Bomber Support (inc. 12 Intruders)	38	35	-	-	100	Various
	R.C.M.	3	3	-	-	100	Various
10	Scholven-Buar (oil)	155	153	-	755.1	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
10/11	Berlin	60	57	-	70.3	8	Mosq.
	Gotha	4	4	-	7.1	8	Mosq.
	Weimar	4	4	-	7.1	8	Mosq.
	Jena	4	3	-	2.7	8	Mosq.
	Bomber Support (inc. 10 Intruders)	40	38	-	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
11	Essen	1079	1055	4	4661.8	1, 3, 4, 5, 6, 8	Lanc. Hal. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
11/12	Berlin	90	89	-	105.6	8	Mosq.
	Hannover/Brunswick	6	4	-	4.4	8	Mosq.
	Magdeburg	22	21	-	125 mines	1, 5	Lanc.
	Minelaying	4	4	-	-	100	Mosq.
	Bomber Support (Intruders)	4	4	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
March							
12	Dortmund	1107	1079	2	4851.2	1, 3, 4, 5, 6, 8	Lanc. Hal. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
12/13	Berlin	81	80	-	98.6	8	Mosq.
	Stendal/Magdeburg/Halle	3	3	-	2.1	-	-
	MineLaying	19	14	3	79 mines	1, 6	Lanc. Hal.
	R.C.M.	2	2	-	-	100	Hal. Lanc.
13	Barmen	354	334	-	1153.2	4, 6, 8	Hal. Lanc. Mosq.
	Arnsberg (Railway Viaduct)	18	1	-	5.4	5	Lanc.
	Bielefeld (Railway Viaduct)	20	-	-	-	5	Lanc.
	Photo. Recce.	1	-	-	-	5	Mosq.
	Met. Recce.	4	4	-	-	8	Mosq.
13/14	Herne (oil)	112	98	-	464.1	1, 8	Lanc. Mosq.
	Gelsenkirchen (oil)	115	105	1	449.9	1, 8	Lanc. Mosq.
	Berlin	50	48	1	55.4	8	Mosq.
	Bremen	26	25	-	33.3	8	Mosq.
	Frankfurt	6	6	-	2.7	8	Mosq.
	Bomber Support (inc. 37 Intruders)	89	87	2	-	100	Various
	R.C.M.	6	6	-	-	100	Hal. Mosq.
14	Hattingen (oil)	89	86	1	381.4	3	Lanc.
	Datteln (oil)	80	77	1	349.1	3	Lanc.
	Bielefeld (Railway Viaduct)	20	16	-	79.9	5, 8	Lanc. Mosq.
	Arnsberg (Railway Viaduct)	21	15	-	80.4	5, 8	Lanc. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
14/15	Lutzkendorf (oil)	255	245	8	935.7	5	Lanc. Mosq.
	Zweibrucken	230	221	-	818.7	6, 8	Hal. Lanc. Mosq.
	Homburg	161	152	2	470.0	4, 8	Hal. Lanc. Mosq.
	Berlin	69	66	-	82.3	8	Mosq.
	Bremen/Brunswick/Berlin	6	2	-	4.8	8	Mosq.
	Bomber Support (inc. 27 Intruders)	70	67	3	-	100	Various
	R.C.M.	9	9	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
15	Castrop Rauxel (oil)	89	81	-	266.0	6, 8	Hal. Lanc. Mosq.
	Bottrop (oil)	99	90	-	278.9	4, 8	Hal. Lanc. Mosq.
	Arnsberg (Railway Viaduct)	16	7	1	42.0	5	Lanc.
	Photo. Recce.	2	1	-	-	5	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
15/16	Misburg (oil)	265	254	4	1033.7	1, 8	Lanc. Mosq.
	Hagen	277	267	10	969.5	4, 6, 8	Hal. Lanc. Mosq.
	Berlin	54	52	-	57.7	8	Mosq.
	Erfurt	22	19	-	26.5	8	Mosq.
	Mannheim	16	16	-	18.8	8	Mosq.
	Erfurt/Weimar/Jena	5	3	-	3.0	8	Mosq.
	Bomber Support	85	77	1	-	100	Various
	R.C.M.	15	15	-	-	100	Hal.
	Met. Recce.	3	3	-	-	8	Mosq.
16	Met. Recce.	2	2	-	-	8	Mosq.
16/17	Nuremburg	293	283	26	1124.2	1, 8	Lanc. Mosq.
	Wurzburg	236	230	7	927.0	5	Lanc. Mosq.
	Berlin	50	45	-	54.2	8	Mosq.
	Hanau	24	20	-	18.1	8	Mosq.
	Osnabruck/Berlin/Brunswick	6	-	-	6.5	8	Mosq.
	MineLaying	24	23	-	114 mines	4, 6	Hal. Lanc.
	Bomber Support (inc. 40 Intruders)	76	74	-	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
17	Dortmund (oil)	77	75	-	367.6	3	Lanc.
	Huls (oil)	90	86	-	428.6	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
17/18	Berlin	38	37	-	40.4	8	Mosq.
	Nuremburg	39	37	-	43.1	8	Mosq.
	Mannheim/Stuttgart	2	2	-	1.3	8	Mosq.
	Bomber Support (Intruders)	15	15	1	-	100	Mosq.
	R.Co.M.	2	2	-	-	100	Hal. Mosq.
	Diversionsary Sweep	99	90	-	-	7, 100	Various
18	Langendreer (oil)	50	50	-	250.7	3	Lanc.
	Hattingen (oil)	50	50	-	260.7	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
18/19	Hanau	285	280	2	1198.8	1, 8	Lanc. Mosq.
	Witten	324	311	9	964.5	4, 6, 8	Hal. Lanc.
	Berlin	30	30	-	37.5	8	Mosq.
	Kassel	24	23	-	20.5	8	Mosq.
	Nuremburg	18	18	-	19.5	8	Mosq.
	Bomber Support	85	81	1	-	100	Various
	R.Co.M.	8	8	-	-	100	Hal. Mosq.
	Diversionsary Sweep	70	68	-	-	5, 6, 7	Various
	Met. Recce.	2	2	-	-	8	Mosq.
19	Gelsenkirchen (oil)	79	77	3	369.6	3	Lanc.
	Arnsberg (Railway Viaduct)	19	18	-	123.2	5	Lanc.
	Vlotho (Railway Bridge)	18	15	-	80.4	5	Lanc.
	Photo. Recce.	1	1	-	-	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
19/20	Berlin	34	32	-	24.5	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
20	Hamm (Railway centre)	99	97	-	462.1	3	Lanc.
	Recklinghausen	153	121	1	370.4	4, 8	Hal. Lanc.
	(Railway centre)						Mosq.
	Neinburg (railway bridge)	14	13	-	69.6	5	Lanc.
	Met. Recce.	3	3	-	-	8	Mosq.
20/21	Bohlen (oil)	235	225	9	945.2	5	Lanc. Mosq.
	Halle	12	12	1	56.2	5	Lanc.
	Hemmingstedt (oil)	166	166	1	710.6	1, 6, 8	Lanc.
	Kassel	16	12	-	6.6	8	Mosq.
	Berlin	38	35	-	39.6	8	Mosq.
	Bremen	27	27	-	26.4	8	Mosq.
	Minelaying	9	9	-	53 mines	1	Lanc.
	Bomber Support (inc. 47						
	Intruders)	96	95	2	-	100	Various
	R.Co.M.	6	5	-	-	100	Hal. Mosq.
	Diversionsary Sweep	70	64	-	-	7	Lanc. Hal.
	Met. Recce.	3	3	-	-	8	Mosq.
21	Bremen (oil)	139	132	1	642.6	1, 8	Lanc. Mosq.
	Bremen (Arbergen railway						
	bridge)	20	20	1	116.1	5	Lanc.
	Munster (Railway centre)	104	102	1	505.1	3	Lanc.
	Munster (Railway viaduct)	55	52	3	254.5	3	Lanc.
	Rhine	178	160	1	510.3	4, 6, 8	Hal. Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
21/22	Hamburg (oil)	159	149	4	670.5	5	Lanc. Mosq.
	Bochum (Langendreer) (oil)	143	137	1	621.9	1, 8	Lanc. Mosq.
	Berlin	142	135	2	168.4	8	Mosq.
	Bremen	3	2	-	.7	8	Mosq.
	Minelaying	7	5	-	-	5	Mosq.
	Bomber Support (inc. 50						
	Intruders)	75	74	1	-	100	Various
	R.Co.M.	7	7	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
22	Bocholt	100	98	-	482.4	3	Lanc.
	Dorsten	161	110	-	383.0	6, 8	Hal. Lanc. Mosq.
	Dulmen	130	122	-	392.0	4, 8	Hal. Lanc. Mosq.
	Hildesheim	235	224	4	1045.3	1, 6, 8	Lanc. Mosq.
	Nienburg (railway bridge)	20	17	-	113.4	5	Lanc.
	Bremen (railway bridge)	82	74	-	459.9	5	Lanc.
22/23	Berlin	56	54	-	58.6	8	Mosq.
	Paderborn	8	8	-	14.3	8	Mosq.
	Bochum	6	5	-	3.3	8	Mosq.
	Mine laying	29	28	-	137 mines	1, 5	Lanc. Mosq.
	Bomber Support (inc. 30 Intruders)	55	62	2	-	100	Various
	R.Co.M.	6	4	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
23	Bremen (railway bridge)	117	104	2	655.3	1, 5	Lanc.
	Bad Oeynhausen (railway bridge)	11	9	-	53.6	5	Lanc.
	Wesel (Operation Plunder)	30	77	-	435.5	3	Lanc.
	Photo. Recce.	1	1	-	-	5	Lanc.
23/24	Wesel (Operation Plunder)	218	201	1	1107.7	5, 8	Lanc. Mosq.
	Berlin	65	63	2	78.9	8	Mosq.
	Aschaffenburg	23	23	-	23.8	8	Mosq.
	Bomber Support (inc. 39 Intruders)	78	74	-	-	100	Various
	R.Co.M.	2	2	-	-	100	Hal. Mosq.
	Diversionsary Sweep	78	75	-	-	7	Lanc. Hal.
24	Gladbeck	175	166	1	551.9	4, 6, 8	Hal. Lanc. Mosq.
	Sterkrade (railway centre)	177	169	-	565.4	4, 8	Hal. Lanc. Mosq.
	Dortmund (oil)	95	92	4	425.5	6	Lanc. Mosq.
	Bottrop (oil)	90	85	1	425.5	6, 8	Lanc. Mosq.
	Photo. Recce.	1	1	-	-	5	Lanc.
24/25	Berlin	67	62	-	78.9	8	Mosq.
	Nordheim (railway centre)	8	7	-	5.5	8	Mosq.
	Magdeburg/Berlin	2	2	-	1.1	8	Mosq.
	Bomber Support (inc. 32 Intruders)	68	61	-	.4	100	Various
	R.Co.M.	3	3	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
25	Hannover	275	261	1	1188.3	1, 6, 8	Lanc. Mosq.
	Osnabruck	156	142	-	473.4	4, 8	Hal. Lanc. Mosq.
	Munster	175	161	3	527.5	4, 6, 8	Hal. Lanc. Mosq.
	Met. Recce.	1	-	-	-	8	Mosq.
25/26	Berlin	8	8	-	6.3	8	Mosq.
	Leaflets	1	1	-	-	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
26	Met. Recce.	1	1	-	-	8	Mosq.
26/27	Berlin	86	80	-	110.9	8	Mosq.
	Magdeburg/Berlin	2	1	-	.9	8	Mosq.
	Erfurt	2	2	-	3.6	8	Mosq.
	Paderborn	2	2	-	3.6	8	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
27	Hamm (Konigsborn) (oil)	76	75	-	389.5	3	Lanc.
	Hamm (Sachsen) (oil)	74	72	-	363.2	3	Lanc.
	Farge (oil storage and U-boat shelters)	115	109	-	693.8	5	Lanc.
	Paderborn	276	270	-	-	1, 8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	-	-

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>March</u>							
27/28	Berlin	82	79	3	101.0	8	Mosq.
	Erfurt	4	4	-	7.1	8	Mosq.
	Bremen	4	4	-	5.1	8	Mosq.
	Bremen/Hannover/Magdeburg	3	2	-	2.0	8	Mosq.
	Minelaying	8	7	1	12 mines	5	Mosq.
	Bomber Support (inc. 23 Intruders)	61	60	-	-	100	Various
	R.C.M.	8	7	-	-	100	Hal. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
28	Met. Recce.	1	1	-	-	8	Mosq.
28/29	Met. Recce.	2	2	-	-	8	Mosq.
29	Hallendorf (oil)	130	121	-	446.0	3	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
29/30	Berlin	48	46	-	59.1	8	Mosq.
	Harburg (Factory)	7	7	-	5.1	8	Mosq.
	Bremen/Hannover	3	3	-	1.3	8	Mosq.
30	Met. Recce.	2	2	-	-	8	Mosq.
30/31	Berlin	43	40	1	48.9	8	Mosq.
	Nordlingen	4	4	-	3.1	8	Mosq.
	Erfurt	43	43	-	57.9	8	Mosq.
	Hamburg/Kiel	3	2	-	1.9	8	Mosq.
	Minelaying	6	5	-	8 mines	5	Mosq.
	Bomber Support (inc. 31 Intruders)	63	62	-	-	100	Various
	R.C.M.	4	4	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
31	Hamburg (U-boat building yards)	468	454	11	2235.1	1,6,8	Lanc. Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
31/1	Met. Recce.	1	1	-	-	8	Mosq.
<u>April 1945</u>							
1/2	Intruders	4	4	-	-	100	Mosq.
2	Met. Recce.	2	2	-	-	8	Mosq.
2/3	Berlin	54	54	1	44.3	8	Mosq.
	Magdeburg	50	48	-	78.4	8	Mosq.
	Luneburg	8	7	-	6.3	8	Mosq.
	Hamburg/Lubeck	2	2	-	1.5	8	Mosq.
	Diversionsary Sweep	59	59	-	-	7	Hal. Lanc.
	Bobber Support (inc. 29 Intruders)	77	76	-	-	100	Various
	R.C.M.	7	7	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
3	Nordhausen (Barracks)	255	233	2	1168.5	1,8	Lanc. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
3/4	Berlin	94	90	-	114.5	8	Mosq.
	Plauen	8	8	-	7.1	8	Mosq.
	Magdeburg/Berlin	6	6	-	3.5	8	Mosq.
	Minelaying	9	-	-	N11 mines	1	Lanc.
	Bomber Support (Intruder)	16	14	-	-	100	Various
	Met. Recce.	1	1	-	-	8	Mosq.
4	Nordhausen	252	236	2	1217.4	5,8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
4/5	Hamburg (Harburg) (oil)	327	313	4	1028.0	4,6,8	Hal. Lanc.
	Nerseburg (oil)	341	327	2	991.2	3,6,8	Hal. Mosq.
	Berlin	35	35	-	43.3	8	Lanc. Mosq.
	Magdeburg	31	31	2	54.4	8	Mosq.
	Lutzendorf (oil)	272	265	6	957.5	1,8	Lanc. Mosq.
	Minelaying	30	26	3	156 mines	1,6	Lanc.
	Bomber Support (inc. 75 Intruders)	133	127	-	-	100	Various
	R.C.M.	12	12	-	-	100	Hal. Mosq.
	Met. Recce.	4	4	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
April							
5	Met. Recce.	2	2	-	-	8	Mosq.
5/6	Met. Recce.	1	1	-	-	8	Mosq.
6	Ijmuiden	55	-	-	-	5	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
7	Ijmuiden	17	17	-	80.4	5	Lanc. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
	Photo. Recce.	2	-	-	-	-	-
7/8	Molbis (oil)	186	148	-	505.2	5	Lanc. Mosq.
	Bomber Support (inc. 14 Intruders)	22	21	-	-	100	Various
	R.C.M.	6	5	-	-	100	Hal. Mosq.
8	Met. Recce.	3	3	-	-	8	Mosq.
8/9	Hamburg (U-boat Yards)	440	427	5	1503.2	4,6,8	Hal. Lanc. Mosq.
	Travemunde (Port Area)	22	20	-	58.0	4	Hal.
	Lutzkendorf (oil)	242	233	6	956.8	5	Lanc. Mosq.
	Berlin	28	27	-	30.0	8	Mosq.
	Dessau	71	60	-	71.7	8	Mosq.
	Munich	8	8	-	6.2	8	Mosq.
	Bomber Support (inc. 51 Intruders)	106	104	-	-	100	Various
	R.C.M.	9	9	-	-	100	Hal.
	Met. Recce.	1	1	-	-	8	Mosq.
9	Hamburg (oil and U-boat shelters)	57	55	2	334.8	5	Lanc.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
9/10	Kiel (Shipyards and shipping)	599	578	3	2638.1	1,3,8	Lanc. Mosq.
	Stade	22	21	1	78.6	4	Hal.
	Berlin	44	41	-	49.2	8	Mosq.
	Plauen	37	36	-	51.1	8	Mosq.
	Hamburg	24	24	-	12.9	8	Mosq.
	Minelaying	98	91	-	485 mines	1,3,4,6	Lanc. Hal.
	Bomber Support (inc. 47 Intruders)	87	84	-	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
10	Leipzig (Railway centre)	230	217	2	755.7	6,8	Hal. Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
10/11	Leipzig (Railway centre)	95	86	6	305.5	5,8	Lanc. Mosq.
	Plauen (Railway centre)	315	309	1	1141.6	1,8	Lanc. Mosq.
	Chemnitz	21	20	-	18.1	8	Mosq.
	Bayreuth	7	5	-	3.7	8	Mosq.
	Berlin	77	72	1	100.4	8	Mosq.
	Bomber Support (inc. 32 Intruders)	75	72	1	-	100	Various
	R.C.M.	10	10	-	-	100	Hal. Mosq.
	Met. Recce.	2	1	-	-	8	Mosq.
11	Bayreuth (Railway centre)	122	110	-	364.7	4,8	Hal. Lanc. Mosq.
	Nuremberg (Railway centre)	143	140	-	487.8	4,8	Hal. Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
11/12	Berlin	107	105	1	128.9	8	Mosq.
	Munich	8	8	-	5.4	8	Mosq.
	Target in Germany	5	-	-	-	5,6	Hal. Lanc.
12	Met. Recce.	3	3	-	-	8	Mosq.
12/13	Berlin	97	93	-	128.7	8	Mosq.
	Munich	10	10	-	8.9	8	Mosq.
	Intruders	13	13	-	-	8	Mosq.
13	Strinesunde	34	-	-	-	5	Lanc.
	Photo. Recce.	1	-	-	-	5	Mosq.
	Met. Recce.	4	3	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
April							
13/14	Kiel (Shipyards)	482	467	2	1906.2	3,6,8	Hal. Lanc. Mosq.
	Boizenburg	28	23	-	54.9	4,8	Hal. Mosq.
	Stralsund	20	20	-	23.2	8	Mosq.
	Reisa (oil)	12	12	-	10.7	8	Mosq.
	Hamburg	87	83	-	105.7	8	Mosq.
	Mine laying	109	100	-	535 mines	1,3,4,5, 6	Lanc. Hal.
	Bomber Support (inc. 58 Intruders)	108	102	1	-	100	Various
	R.C.M.	12	11	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
14	Met. Recce.	1	1	-	-	8	Mosq.
14/15	Potsdam	512	491	2	1751.9	1,3,8	Lanc. Mosq.
	Cuxhaven (Port Area)	28	23	-	113.4	1,8	Lanc. Mosq.
	Berlin	62	60	-	89.3	8	Mosq.
	Wismar	10	10	-	17.9	8	Mosq.
	Bomber Support (inc. 55 Intruders)	104	91	1	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
15	Swinemunde	21	-	-	-	5	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
15/16	Berlin	106	103	-	133.1	8	Mosq.
	Lechfield (Airfield)	4	1	-	.4	8	Mosq.
	Oranienburg (Airfield)	8	6	-	10.7	8	Mosq.
	Bomber Support (inc. 21 Intruders)	43	41	1	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
16	Swinemunde	19	16	1	80.4	5	Lanc. Mosq.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	2	1	-	-	8	Mosq.
16/17	Pilsen (Railway centre)	233	218	1	865.7	5	Lanc. Mosq.
	Schwandorf (Railway centre)	175	169	2	633.3	6,8	Lanc. Mosq.
	Gablingen (Airfield)	23	21	-	46.7	6,8	Hal. Mosq.
	Berlin	64	62	-	86.6	8	Mosq.
	Munich	23	18	-	18.3	8	Mosq.
	Bomber Support (inc. 46 Intruders)	98	89	3	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
17	Met. Recce.	3	3	-	-	8	Mosq.
17/18	Berlin	61	56	1	73.1	8	Mosq.
	Ingoldstadt (Airfield)	43	42	-	55.4	8	Mosq.
	Cham (Railway centre)	101	99	-	310.3	5	Lanc. Mosq.
	Bomber Support (inc. 40 Intruders)	64	57	-	-	100	Various
	R.C.M.	4	4	-	-	100	Hal. Mosq.
18	Heligoland (Main Island)	684	666	1	3436.3	1,3,4,5, 8,100	Lanc. Mosq. Hal.
	Heligoland (Naval Base)	160	158	-	968.6	1,8	Lanc.
	Heligoland (Dune Airfield)	125	121	2	566.3	5,6,8	Hal. Lanc. Mosq.
	Route Markers	10	10	-	-	8	Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
18/19	Komotau (Railway centre)	123	112	-	383.8	5	Lanc. Mosq.
	Berlin	57	54	-	75.1	8	Mosq.
	Schleissheim (Airfield)	36	36	-	30.5	8	Mosq.
	Bomber Support (inc. 39 Intruders)	64	52	1	-	100	Various
	R.C.M.	10	10	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
19	Pasing (Railway Transformer Station)	49	47	-	188.6	3	Lanc.
	Heligoland (Gun emplacements)	36	33	-	208.9	5	Lanc.
	Photo. Recce.	1	1	-	-	5	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>April</u>							
19/20	Berlin	79	73	-	100.1	8	Mosq.
	Wittstock (Airfield)	35	28	-	33.2	8	Mosq.
	Schleswig (Airfield)	8	7	-	8.2	8	Mosq.
	Bomber Support (inc. 43 Intruders)	71	70	-	-	100	Various
	R.C.M.	6	6	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
20	Regensburg (oil)	100	98	1	341.1	3	Lanc.
	Met Recce.	2	2	-	-	8	Mosq.
20/21	Berlin	76	64	-	75.7	8	Mosq.
	Scheissheim (Airfield)	36	36	-	41.1	8	Mosq.
	Bomber Support (Intruders)	3	3	-	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
21	Met. Recce.	1	1	-	-	8	Mosq.
21/22	Kiel	107	104	2	135.7	8	Mosq.
	Esgebek	16	13	-	11.4	8	Mosq.
	Mine laying	20	20	-	118 mines	6	Lanc.
	Bomber Support (Intruders)	16	16	-	-	100	Mosq.
	R.C.M.	3	3	-	-	100	Mosq.
22	Bremen (Military targets)	757	206	3	974.5	1,3,6,8	Hal. Lanc.
	Met. Recce.	3	3	-	-	8	Mosq.
22/23	Bremen (Barracks and hutted camp)	40	35	-	59.8	8	Mosq.
	Kiel	11	11	-	7.4	8	Mosq.
	Bomber Support (inc. 47 Intruders)	98	96	-	-	100	Various
	R.C.M.	5	5	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
23	Flensburg (Railway centre and Port Area)	149	-	-	-	5	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
	Photo. Recce.	1	-	-	-	5	Lanc.
23/24	Kiel	60	59	-	75.2	8	Mosq.
	Rendsburg (Railway centre)	38	37	-	62.4	8	Mosq.
	Travemunde (Port Area)	32	30	-	25.8	8	Mosq.
	Schleissheim (Airfield)	8	5	-	4.2	8	Mosq.
	Bomber Support (inc. 31 Intruders)	69	68	-	-	100	Various
	R.C.M.	8	7	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
24	Bad Oldesloe (Railway Centre)	110	104	-	506.0	3	Lanc.
	Met. Recce.	2	2	-	-	8	Mosq.
24/25	Kiel	17	17	-	15.2	8	Mosq.
	Schleissheim (Airfield)	40	38	1	65.1	8	Mosq.
	Pasing (Transformer and Switching Station)	38	36	-	44.0	8	Mosq.
	Supplies to P.O.W.s	7	6	-	-	8	Lanc. Mosq.
	Leaflets	30	20	-	-	8	Mosq.
	Bomber Support (inc. 20 Intruders)	44	43	-	-	100	Various
	R.C.M.	3	3	-	-	100	Hal. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
25	Berchtesgaden (Barracks, Chalet, Eagles Nest)	375	333	3	1235.8	1,5,8	Lanc. Mosq.
	Wangerooze (Coastal Guns)	482	468	7	2184.0	4,6,8,	Hal. Lanc.
	R.C.M.	1	1	-	-	100	Mosq.
	Photo. Recce.	1	1	-	-	100	Hal.
	Met. Recce.	2	2	-	-	5	Mosq.
					8	Mosq.	

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>April</u>							
25/26	Tonsberg (oil)	119	100	1	390.7	5	Lanc.
	Pasing (Transformer Station)	82	80	-	110.3	8	Mosq.
	Kiel	18	18	-	16.1	8	Mosq.
	Mine laying	14	12	-	72 mines	5	Lanc.
	Leaflets	12	11	-	-	8	Mosq.
	Bomber Support (inc. 43 Intruders)	45	45	-	-	100	Fort. Mosq.
	R.C.M.	7	7	-	-	100	Hal. Mosq.
26	Evacuation of ex-P.O.W.	42	42	-	-	5	Lanc.
	Met. Recce.	2	2	-	-	2	Mosq.
26/27	Grossenbrode (Airfield)	28	24	-	29.3	8	Mosq.
	Kiel	12	11	-	14.7	8	Mosq.
	Esgebek	28	26	-	33.0	8	Mosq.
	Husum	31	30	-	49.2	8	Mosq.
	Neumunster	12	8	-	14.3	8	Mosq.
	Bomber Support (Intruders)	8	8	-	-	100	Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
27	Evacuation of ex-P.O.W.	46	20	-	-	1	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
27/28	Met. Recce.	1	1	-	-	8	Mosq.
28	Evacuation of ex-P.O.W.	74	43	-	-	1	Lanc.
	Ranger Patrol	1	1	-	-	100	Mosq.
	Met. Recce.	3	3	-	-	8	Mosq.
28/29	Met. Recce.	1	-	-	-	8	Mosq.
29	Food Supplies to Holland	258	253	-	504.5	1,3,8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
29/30	Met. Recce.	1	1	-	-	8	Mosq.
30	Evacuation of ex-P.O.W.	2	2	-	-	5	Lanc.
	Food Supplies to Holland	500	497	-	974.2	1,3,8	Lanc. Mosq.
	Met. Recce.	4	4	-	-	8	Mosq.
30/1	Met. Recce.	1	1	-	-	8	Mosq.
<u>1945</u>							
<u>May</u>							
1	Evacuation of ex-P.O.W.	10	10	-	-	5	Lanc.
	Food for the Dutch at Leiden	50	49	-	103.0	1,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	247	243	-	502.3	1,8	Lanc. Mosq.
	Food for the Dutch at The Hague	111	111	-	440.2	3,8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
1/2	Met. Recce.	1	1	-	-	8	Mosq.
2	Evacuation of ex-P.O.W.	45	30	-	-	5	Lanc.
	Food for the Dutch at Leiden	46	45	-	93.5	1,8	Lanc. Mosq.
	Food for the Dutch at The Hague	209	205	-	430.6	3,8	Lanc. Mosq.
	Food for the Dutch at Gouda	16	15	-	26.7	1,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	236	233	-	478.3	1,8	Lanc. Mosq.
	Met. Recce.	1	1	-	-	8	Mosq.
2/3	Kiel	126	124	-	151.0	8	Mosq.
	Esgebek (Airfield)	8	8	-	14.3	8	Mosq.
	Husum (Airfield)	8	6	-	10.7	8	Mosq.
	Bomber Support (inc. 72 Intruders)	155	149	3	-	100	Various
	R.C.M.	6	6	-	-	100	Hal. Mosq.
3	Food for the Dutch at Leiden	26	26	-	48.7	1,8	Lanc. Mosq.
	Food for the Dutch at The Hague	123	123	-	269.4	3,8	Lanc. Mosq.
	Food for the Dutch at Gouda	14	14	-	21.8	1,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	240	240	-	487.8	1,8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.

Date	Target or Purpose	Despatched	Attacking	Missing	Tonnage	Groups	Aircraft
<u>May</u>							
3/4	Minelaying	46	-	-	-	3,6	Lanc.
4	Food for the Dutch at Leiden	15	15	-	24.6	1,8	Lanc.
	Food for the Dutch at Gouda	9	9	-	11.0	1,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	127	125	-	238.1	1,8	Lanc. Mosq.
	Food for the Dutch at The Hague	73	72	-	138.4	3,8	Lanc. Mosq.
	Evacuation of ex-P.O.W.	147	147	-	-	5	Lanc.
	Met. Recce.	3	3	-	-	8	Mosq.
4/5	Met. Recce.	1	1	-	-	8	Mosq.
5	Food for the Dutch at Leiden	14	14	-	22.4	1,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	126	120	-	234.6	1,8	Lanc. Mosq.
	Food for the Dutch at Gouda	9	9	-	11.2	1,8	Lanc. Mosq.
	Food for the Dutch at The Hague	70	69	-	129.7	3,8	Lanc. Mosq.
	Met. Recce.	2	2	-	-	8	Mosq.
5/6	Met. Recce.	1	1	-	-	8	Mosq.
6	Evacuation of ex-P.O.W.	66	66	-	-	5	Lanc.
6/7	Met. Recce.	1	1	-	-	8	Mosq.
7	Food for the Dutch at Rotterdam	320	318	-	663.0	1,8	Lanc. Mosq.
	Food for the Dutch at Leiden	58	58	-	118.4	8	Lanc. Mosq.
	Food for the Dutch at The Hague	159	158	-	330.2	3,8	Lanc. Mosq.
	Food for the Dutch at Gouda	28	27	-	54.6	3,8	Lanc. Mosq.
	Evacuation of ex-P.O.W.	36	36	-	-	5,8	Lanc.
	Met. Recce.	1	1	-	-	8	Mosq.
8	Food for the Dutch at The Hague	104	104	-	216.1	1,3,8	Lanc. Mosq.
	Food for the Dutch at Rotterdam	53	51	-	111.4	1,3,8	Lanc. Mosq.
	Evacuation of ex-P.O.W.	212	211	-	-	5,6,8	Lanc.

## VIIIth U.S. AIR FORCE

## DIARY OF OPERATIONS - MARCH 1944 TO MAY 1945(1)

Date	Target or Purpose	Despatched	Attacking	(Short) Tonnage	Losses
March 1944					
2	Frankfurt A/C Factory Chartres A/F	467 106	241 84	569.1 158.2	8 1
3	Wilhelmshaven Port area	239	51	125.0	3
4	Bonn Berlin	251 234	109 31	244.8 69.3	3 11
5	Bergerac A/F	216	60	129.7	2
6	Berlin Genshagen Berlin	259 214 237	187 51 110	436.8 133.4 260.7	18 7 22 + 22 lost on targets of oppor- tunity
8	Erkner	590	468	1061.4	36
9	Berlin	509	332	768.6	6
11	Munster Crossbow Target	124 51	121 34	235.4 131.2	1 -
12	Crossbow Target	52	52	202.5	-
13	Poix A/F	270	7	21.0	2
15	Brunswick A/C Factory	346	330	745.3	3
16	Augsburg A/C Factory Friedrichshafen A/C Factory	494 231	356 197	895.2 507.4	18 5
18	Oberpfaffenhefen A/C Factory Lechfeld A/C Factory Landsberg A/C Factory Friedrichshafen A/C Factory Munich A/C Factory	118 112 57 219 216	135 161 39 159 93	300.5 359.6 82.3 401.6 213.2	4 2 4 28 5

Note: Owing to the nature of Eighth Air Force tactics, a very large number of secondary targets, targets of opportunity and targets of last resort were bombed if bad visibility was encountered over primary targets. To keep this diary to a reasonable size, primary targets only are included except in important raids (e.g. on Berlin or on oil targets). Blind bombing attacks are also, for the main part, excluded. Leaflet dropping missions have been omitted. 'Despatched' is defined as being those aircraft which passed a point half way to the enemy coast. Figures in the despatched column are for aircraft despatched to the specific target. In a number of instances aircraft detailed for other missions, for various reasons, attacked this target. In such instances therefore a higher figure appears in the attacking column than in the despatched column. The U.S. 'short' ton (2000 lb.) has been used throughout. Source: VIIIth U.S.A.A.F. Monthly Summary of Operations.

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>March</u> <u>1944</u>					
19	Crossbow Targets	192	172	505.5	-
20	Frankfurt	437	51	105.8	4
21	Crossbow Target	65	56	217.0	-
22	Basdorf	205	32	80.1	-
	Berlin	464	621	1374.2	12
23	Beckum	299	26	72.6	-
	Handorf	14.1	68	188.1	2
	Osnabruck	92	87	234.7	3
	Brunswick	222	205	476.5	16
24	Schweinfurt	228	60	130.3	-
	Nancy A/F	102	33	95.4	-
	St. Dizier A/F	104	147	405.8	-
26	Crossbow Targets	570	490	1249.8	5
27	Tours A/F	111	110	313.7	-
	Chartres A/F	67	67	197.5	-
	St. Jean D'Angeley A/F	56	55	165.0	-
	La Rochelle A/F	63	59	154.6	1
	Pau A/F	71	66	167.1	1
	Mont de Marsan A/F	47	47	125.3	2
	Biarritz A/F	49	37	81.4	-
	Cazaux	118	118	273.1	-
	Merignac A/F	125	123	291.5	2
28	Dijon-Longvie	123	117	311.7	-
	Rheims-Champagne	58	59	175.3	-
	Chartres	62	61	150.0	-
	Chateaudun	129	126	298.0	2
29	Brunswick	234	193	392.0	9
	Crossbow Target	77	31	115.0	-
<u>April</u>					
1	Pforzheim	191	98	269.4	12
5	Crossbow Target	50	21	59.0	-
6	Crossbow Target	12	12	44.0	-
8	Oldenburg A/C Factory	59	59	151.6	-
	Brunswick " "	325	192	475.7	30
	Rheine A/F	127	41	77.2	2
	Quackenbruck A/F	63	83	156.2	-
	Achmer A/F	62	60	109.6	1
9	Marienburg	94	98	223.8	3
	Gdynia/Rahmel	48	40	97.5	3
	Warnemunde	84	86	199.0	1
	Rostock	20	18	43.3	1
	Posen	343	33	77.5	10
	Tutow	145	104	263.0	14

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>April</u> <u>1944</u>					
10	Brussels/Melsbroek A/F	54	52	95.6	1
	Brussels/Vilvorde "	59	39	90.0	-
	Brussels/Evere A/F	125	122	296.2	-
	Orleans/Bricy	52	25	83.0	1
	Bourges A/F	174	158	465.9	-
	Marquis "	15	9	29.6	-
	Courseilles	124	21	44.1	-
	Beaumont sur Oise	124	21	43.3	1
11	Sorau A/C Factory	224	88	230.8	1
	Cottbus " "	109	17	39.5	1
	Oschersleben "	138	127	360.8	6
	Bernburg	121	99	268.5	6
	Arnimswalde	296	58	136.7	4
13	Schweinfurt A/C Factory	171	153	341.2	14
	Oberpfaffenhofen A/C Factory	99	60	148.5	3
	Lechfeld A/C Factory	104	95	252.1	3
	Augsburg " "	242	210	489.1	18
17	Crossbow Target	15	14	51.0	-
18	Oranienburg (Germendorf)	167	129	243.5	3
	Oranienburg (Annahof)	109	106	204.7	-
	Rathenow	135	162	391.6	-
	Brandenburg	123	68	177.1	2
	Watten (Crossbow Target)	12	12	43.5	-
	Barnewitz	212	41	114.8	11
19	Kassel (Waldau)	111	107	245.8	-
	Kassel (Bettenhausen)	52	52	120.6	-
	Eschwege	112	56	134.7	5
	Paderborn	144	117	264.4	-
	Gutersloh	101	62	178.5	-
	Watten (Crossbow Target)	27	27	76.7	1
	Werl	122	121	284.3	-
	Lippstadt	122	124	289.8	-
20	Crossbow Targets	842	566	1882.2	9
22	Hamm rly. cent.	796	631	1581.0	15
24	Landsberg A/C Factory	58	57	133.2	-
	Oberpfaffenhofen A/C Factory	112	84	193.2	26
	Erding A/C Factory	109	109	254.4	1
	Gablingen A/C Factory	126	120	282.4	2
	Leipheim A/C Factory	102	97	244.6	2
	Friedrichshafen	239	211	493.6	8
25	Metz (Airfield)	119	98	264.5	1
	Nancy (Airfield)	108	43	103.8	1
	Mannheim (Rly. Centre)	197	7	16.6	5
	Wizernes (Crossbow Target)	27	27	103.0	-
	Dijon/Longvie	124	121	337.9	-
26	Brunswick	347	292	688.8	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>April</u> <u>1944</u>					
27	Crossbow Targets	596	476	1850.3	3
	Nancy/Essey	106	103	271.7	2
	Toul/Croix de Metz	60	60	176.7	-
	Chalons sur Marne railway centre	75	72	215.5	-
	Blainville railway centre	124	117	338.8	-
	Le Culot A/F	120	99	255.5	2
28	Crossbow Targets	270	177	542.1	4
29	Berlin	669	579	1418.5	46 + 18 (Target of opport- unity)
30	Lyon/Bron (Airfield)	115	114	283.0	1
	Crossbow Target	55	52	203.0	-
	Clermont/Ferrand (A/C Factory)	124	118	293.0	-
<u>May</u>					
1	Crossbow Targets	100	78	284.8	-
	Troyes railway centre	52	52	156.0	1
	Rheims " "	58	57	171.0	-
	Brussels " "	72	59	210.0	-
	Liege " "	79	40	157.0	-
	Saareguemines railway centre	62	63	189.0	-
	Metz	63	43	124.5	1
2	Crossbow Target	50	50	197.0	-
3	Crossbow Target	50	47	173.0	-
4	Alkmaar A/F	237	48	132.0	-
5	Crossbow Target	34	33	126.0	-
6	Crossbow Target	161	70	261.5	-
7	Berlin	595	525	1262.9	8
	Osnabruck railway centre	181	161	453.7	1
	Munster " "	141	145	402.9	-
	Liege " "	67	19	54.5	-
8	Berlin	481	384	914.8	13
	Brunswick	301	336	904.5	23
	Crossbow Targets	98	91	237.5	5
	Brussels railway centre	63	56	160.5	-
9	Airfields N. France	830	781	1743.4	6
11	Belfort railway centre	142	67	177.5	1
	Mulhouse " "	68	64	190.5	-
	Epinal " "	73	67	167.5	3
	Saarbrucken railway centre	72	49	140.2	5
	Luxembourg " "	54	53	157.5	-
	Ehrang " "	61	60	160.9	1
	Konz " "	55	55	146.7	-
	Bettenburg " "	35	35	104.5	-
	Thionville " "	21	20	60.0	-
	Völklingen " "	18	18	52.5	-
	Brussels " "	111	93	251.3	-
	Liege " "	120	119	350.2	2
	Malines " "	21	20	60.0	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
May					
12	Merseburg/Leuna oil	240	250	503.6	1
	Lutzkendorf "	93	89	172.4	1
	Zeitz "	130	111	260.3	1
	Bohlen "	109	89	193.9	2
	Zwickau "	88	73	181.4	19
	Brux oil	177	140	310.5	10
	Gera	27	16	29.9	-
13	Osnabruck railway centre	186	177	471.5	1
	Tutow	261	226	558.8	1
	Stettin Port	222	213	458.3	10
	Stralsund	58	56	101.0	-
15	Crossbow Targets	165	128	483.5	-
19	Berlin	555	493	1066.5	15
	Kiel	-	49	109.0	1
	Brunswick	295	273	779.3	12
20	Orly A/F	90	88	249.0	-
	Villacoublay A/F	75	73	192.1	-
	Rheims A/F	68	67	161.7	-
	Rheims railway centre	64	59	172.5	-
21	Crossbow Targets	131	124	459.5	-
22	Kiel	296	292	630.4	5
	Crossbow Target	95	94	336.5	-
23	Metz railway centre	35	34	102.0	-
	Saarbrucken railway centre	141	139	355.6	-
	Homburg " "	37	37	111.0	-
	Epinal " "	36	36	97.0	-
	Bayon	36	12	36.0	-
	Airfields N. France	192	190	530.2	-
	Chaumont railway centre	54	54	158.5	-
	Etampes/Mondesir railway centre	110	97	290.2	-
	Orleans " "	18	17	51.0	-
	Chauteaudun	18	18	49.5	1
	Orleans/Bricy	172	167	487.0	1
24	Berlin	538	459	1022.0	33
	Rechlin	-	9	22.5	-
	Orly A. F.	195	174	561.3	-
	Melun "	177	168	520.2	-
	Poix "	97	58	168.5	-
25	Saareguemines railway centre	40	36	90.0	-
	Thionville " "	69	56	137.2	-
	Metz " "	70	69	167.5	-
	Nancy " "	75	75	177.9	-
	Blainville " "	36	36	90.0	-
	Fecamp Bty.	36	36	102.5	-
	Balfort railway centre	79	76	228.0	1
	Mulhouse " "	138	134	346.3	1
	Brussels " "	109	80	195.0	-
	Liege " "	104	99	241.5	2
	A/Es. N. France	77	67	165.8	-
	Montignes sur Samprer	96	66	198.2	-
	St. Valery en Caux Bty.	18	17	47.0	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>May</u>					
27	Ludwigshafen railway centre	165	135	327.5	9
	Mannheim " "	168	144	340.5	1
	Recamp Bty.	36	36	104.7	-
	Saarbrucken railway centre	154	145	386.8	2
	Konz Karthaus " "	77	72	216.0	-
	Neunkirchen " "	73	67	167.0	2
	Karlsruhe " "	105	99	239.0	5
	Strasbourg	105	101	250.5	2
	Woippy A/C Factory	97	69	171.7	-
	St. Valery en Caux Bty.	18	18	51.0	-
28	Ruhland oil	108	38	68.8	1
	Dessau	160	36	86.5	15
	Merseburg/Leuna oil	145	66	150.0	2
	Zeitz " "	151	138	329.8	1
	Konigsborn	108	105	240.2	3
	Magdeburg (oil)	86	55	114.3	6
	Lutzkendorf " "	94	64	151.0	1
29	Krzesinki A/C Factory	113	91	207.0	1
	Posen " "	58	58	130.7	1
	Sorau " "	52	52	119.7	1
	Kottbus " "	49	48	111.4	5
	Politz oil	254	226	557.8	14
	Tutow	166	166	433.8	2
	Leipzig/Mockau railway centre	159	148	348.8	7
	Leipzig/Heilerblick railway centre	55	51	114.9	2
30	Dessau A/C Factory	82	79	191.6	5
	Halberstadt A/C Factory	110	106	246.1	1
	Oschersleben " "	52	51	117.8	3
	Oldenburg " "	138	134	379.6	1
	Rotenburg	149	147	427.8	-
	Zwischenahn	71	71	196.3	-
	Crossbow targets	84	76	320.0	-
	Brussels/Schaerbeck	40	39	114.7	-
	Troyes railway centre	60	60	180.0	-
	Rheims	61	61	178.5	-
	Handorf A/F	48	39	114.2	-
	Diepholz A/F	36	35	100.2	2
31	Luxeuil	72	36	96.8	-
	A/Fs. N. France		60	179.0	-
	Hamm railway centre	51	50	148.0	-
	Osnabruck railway centre	90	88	263.5	-
	Schwerte	106	54	156.0	-
	Gescke	-	52	136.5	-
<u>June</u>					
2	Coastal Btys. N. France and Belgium	840	777	2341.0	-
	Massy/Palaiseau railway centre	75	57	167.5	-
	Juvisy/Paris " "	36	36	108.0	-
	Acheres	115	76	226.2	-
	A/Fs. N. France	76	130	387.8	8
3	Coastal Btys. N. France	559	553	1597.0	-
4	Coastal Defences N. France	236	231	665.5	1
	Coastal Defences Boulogne and Calais area	299	283	817.5	-
	A/Fs. N. France	209	195	70.9	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
June					
4	Massy/Palaiseau railway centre	96	96	282.2	-
	Melun road/rail bridge	6	5	6.5	-
	Versailles/Matelots railway centre	50	50	149.8	-
	Villeneuve St. George railway centre	35	34	99.3	-
5	Coastal Btys. N. France	641	629	1924.0	6
6	Assault area Normandy	1838	1120	3053.8	3
	Towns in assault area	652	609	1723.8	-
7	Flers	81	59	171.0	-
	Conde sur Noireau	39	56	167.5	-
	Palaise	54	53	151.8	-
	Argentan	66	66	198.0	-
	Lisieux	71	71	210.2	-
	L'Aigle	72	58	159.9	-
	Other targets Le Havre area	74	39	111.5	-
	Kerlin Bastard A/F	143	134	290.8	-
	Nantes R.R. Bridge	413	205	514.5	-
	Nantes railway centre	-	49	126.5	-
	Other Tptn. Targets N. France		107	309.5	2
8	Transportation Targets N. France	867	687	1853.4	3
	A/Fs N. France	72	48	138.5	-
10	Coastal Btys, Boulogne	88	85	229.0	-
	A/Fs N. France	536	504	1168.7	-
11	A/Fs N. France	284	244	583.2	-
	Tptn. Targets N. France	401	307	859.1	-
12	A/Fs, N. France	435	391	907.5	3
	Tptn. Targets N. France	212	192	701.4	5
13	A/Fs, N. France	240	225	511.7	-
	Rail Bridges N. France	80	66	172.7	-
	Montfort railway centre	23	21	50.5	-
	Vannes " "	32	17	42.5	-
14	Emmerich oil	61	60	176.5	-
	A/Fs, N. France	1353	1196	2895.7	14
	Crossbow Target	39	58	149.0	-
15	Misburg oil	209	171	418.0	-
	A/Fs, N. France	564	500	1242.7	2
	Tptn. Targets N. France	433	384	1078.4	2
	Crossbow Target	60	59	176.0	-
16	A/Fs, N. France	174	140	412.7	1
	Crossbow Target	174	173	473.5	-
17	A/Fs, N. France	580	449	1153.9	3
18	Hamburg Port	673	633	1602.2	4
	Misburg oil	157	97	232.8	3
	Stadt A. F.	45	47	120.3	-
	Bremerhaven Port	127	94	236.9	-
	Westermunde Oil	46	40	110.0	3
	Oslebshausen Oil	106	34	84.0	-
	Brunsbüttel Oil	56	54	131.7	-
	Crossbow Target	63	58	221.0	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses	
June 19	A/Fs. N. France	432	259	538.9	6	
	Crossbow Targets	680	511	1129.1	-	
20	Hamburg oil	485	467	1366.1	7	
	Politz "	277	245	574.7	31	
	Ostermoor oil	69	71	206.0	-	
	Konigsborn Ord. Depot	54	52	115.3	1	
	Fallersleben Aero Engine Works	138	137	305.5	-	
	Magdeburg oil	104	99	213.0	5	
	Misburg oil	174	166	494.5	1	
	Crossbow Targets	495	279	756.6	2	
	A. F. s. N. France	24	55	109.7	-	
	Hazebrouck railway centre	12	11	21.6	-	
21	Crossbow Targets	70	70	203.2	-	
	Berlin	580	523	1278.7	18	
	Berlin/Niederschonweide A/C Factory	50	54	115.1	7	
	Berlin/Marienfeld A/C Factory	56	30	76.3	3	
	Basdorf Aero Engine Works	87	81	185.1	5	
	Ruhland oil	146	113	200.8	3	
	Genshagen aircraft works	209	152	378.9	7	
	Crossbow Targets	269	217	593.3	1	
22	Ghent railway centre	69	69	205.8	-	
	Lille " "	77	76	226.5	1	
	Rouen	48	46	103.2	1	
	Electrical Installations N. France	72	48	140.9	1	
	A/Fs. N. France	192	158	434.3	2	
	Tours-Saumur bridge	9	9	10.5	-	
	Crossbow Target	70	69	204.5	-	
	Gennevilliers fuel dump	69	67	168.0	-	
	St. Ouen dock area	37	35	86.4	-	
	Melum railway centre	24	22	54.0	-	
	Tournau en Bric	49	49	115.7	-	
	23	Crossbow Targets	232	211	531.8	-
		A/Fs. N. France	214	233	464.3	-
Nanteuil bridge		23	14	28.0	-	
24	Bremen oil	319	257	643.2	1	
	A/Fs. N. France	406	272	743.7	4	
	Saumur rail bridge	38	38	89.5	-	
	Tours La Riche rail/road bridge	36	36	108.0	1	
	Crossbow Targets	221	163	418.8	-	
25	A. Fs. N. France	293	282	620.7	5	
	Montbartier Fuel Dump	70	63	146.7	1	
	Crossbow Targets	233	217	526.6	1	
	Zebra Targets	180	176	-	2	
	Railway Bridges N. France	243	197	445.2	1	
	A. Fs. N. France	178	101	244.8	5	
27	Crossbow Targets	225	181	475.9	6	

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>June</u>					
28	Saarbrücken railway centre	348	331	922.8	1
	A. Fs. N. France	271	229	457.4	1
	Fismes Bridge	36	36	72.0	-
	Anizy "	34	20	40.0	-
29	Leipzig/Ball bearings	47	17	42.5	
	Leipzig/Heiterblick	46	41	93.1	2
	A/C Factory				
	Leipzig/Taucha A/C Factory	40	32	80.2	-
	Kothen oil	96	2	4.0	-
	Magdeburg oil	85	83	226.2	2
	Bernburg A/C Factory	82	56	146.6	2
	Oschersleben A/C Factory	72	78	209.7	1
	Aschersleben " "	52	45	128.1	3
	Bohlen oil	147	82	179.8	4
	Fallersleben A/C Factory	56	41	102.9	1
	Wittenberg " "	-	61	133.9	-
30	A. Fs. N. France, Belgium	148	136	317.5	-
<u>July</u>					
1	Crossbow Targets	13	9	20.5	-
2	Crossbow Targets	329	280	711.0	1
3	Arad Rumania Oil	55	55	145.5	-
4	A. Fs. N. France	438	252	543.8	1
5	A/Fs. Netherlands	77	57	161.0	-
	Crossbow Targets	103	101	336.9	-
	Beziars railway centre	70	70	173.0	-
	Kiel	235	231	658.7	-
7	Leipzig Mochau Factory	155	97	237.4	-
	Leipzig Taucha Engine Factory	107	117	272.6	2
	Leipzig/Abtaundorf A/C Factory	49	14	34.5	-
	Leipzig/Heiterblick " "	51	32	79.2	-
	Leipzig DKF Factory	56	48	119.8	3
	Halle A/C Factory	66	63	156.3	6
	Aschersleben A/C Factory	75	74	207.2	1
	Bernburg " "	101	92	259.0	20
	Lutzkendorf oil	109	101	224.5	1
	Merseburg/Leuna oil	160	52	106.4	2
	Bohlen "	100	81	179.6	-
8	Crossbow Targets	917	172	431.2	2
9	Crossbow Targets	176	48	111.7	1
11	Munich	771	785	1746.4	17
	Munich A/C Factory	295	184	420.5	3
12	Munich	1177	1117	2708.5	24
13	Munich	370	353	863.3	4
	Munich A/C Factory	247	100	245.2	2
	Saarbrücken railway centre	308	298	908.0	1
14	Cadillac Operation (Supply drops to Resistance Movt)	324	319	-	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
July 16	Munich	597	178	430.0	9
	Stuttgart	-	261	622.4	-
	Saarbrücken railway centre	421	407	1140.5	-
	Augsburg	-	54	132.7	1
17	Bridges road/rail N. France	634	527	1409.0	1
	Crossbow Targets	172	140	356.1	-
18	Army Support, Operation Goodwood	637	571	1425.6	1
	Peenemünde Hydrogen Plant	383	378	918.1	3
	Zinnowitz nr. Peenemünde	55	37	92.5	-
	Hemmingstedt oil	110	55	133.2	-
	Kiel (oil)	159	106	252.9	-
19	Lechfeld A/F	109	97	225.0	3
	Hollriegels Chemical Plant	109	107	266.5	4
	Augsburg A/C Factory	144	126	280.7	4
	Laupheim A/F	57	45	114.9	1
	Leipheim "	50	49	115.2	-
	Kempton "	139	62	153.0	-
	Schweinfurt	214	173	401.6	-
	Strasbourg railway centre	71	71	210.5	-
	Ebelsbach Engineering Works	54	54	130.0	-
Saarbrücken railway centre	90	51	144.8	2	
20	Leipzig	109	75	170.7	9
	" Mockau A/C Factory	36	23	57.0	1
	Kothen " " "	70	68	169.8	1
	Dessau " "	108	107	253.0	-
	Dessau " "	35	12	30.0	-
	Kothen " "	36	12	25.1	-
	Gotha A/C Factory	100	72	200.0	-
	Erfurt A/F	137	125	329.4	-
	Eisenach A/C Factory	193	21	56.9	-
	Merseburg/Leuna oil	162	155	375.9	2
	Lutzkendorf	107	52	127.0	-
Russelsheim M.T. Plant	107	102	258.1	1	
21	Ebelsbach Ball Bearings	111	83	192.2	2
	Schweinfurt " "	109	99	232.3	1
	Oberpaffenhofen A/C Factory	70	54	137.1	9
	Allach/Munich " "	100	35	83.5	1
	Neubing " "	70	48	115.0	-
	Regensburg " "	106	90	233.5	3
	Ludwigshafen	-	59	147.0	-
	Saarbrücken	-	95	229.4	3
Munich	-	78	197.1	6	
23	A/Fs. N. France	245	244	474.5	1
24	Army Support St. Lo	1575	484	952.9	3
25	Army Support St. Lo	1563	1508	3430.8	5
27	Brussels Signals Depot	49	34	97.0	-
	Coastal Installations, Gravelines	95	21	62.5	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>July</u>					
28	Merseburg/Leuna oil	720	653	1605.0	7
29	Merseburg/Leuna oil	608	565	1388.2	9
	Bremen/Oslebshausen oil	450	444	1247.0	2
	A/Fs. N. France	96	74	208.1	-
31	Munich .	575	565	1416.2	9
	Schleissheim A/F	48	45	112.5	-
	Munich/Allach A/C Factory	36	36	90.0	1
	Ludwigshafen Chem. Plant	464	437	1204.8	6
	A/Fs. N. France	94	82	189.5	-
<u>Aug.</u>					
1	A/Fs. N. France	365	338	824.9	4
	Chartres Bridge	36	36	72.0	-
	Nogent sur Seine	34	46	160.0	-
	Rouen oil Depot	66	65	192.9	-
	Crossbow Targets	158	36	82.0	-
	Tours/Parcay A/F	95	75	223.4	-
	Cadillac Operation	195	191	-	1
2	Nogent sur Seine Bridge	32	31	105.5	-
	Neuvy sur Liure "	36	36	124.3	-
	Sens Fuel Dump	26	26	78.0	-
	Paris Gennevilliers Fuel Dump	52	51	124.7	-
	Paris Dugny " "	39	38	93.6	1
	Crossbow Target	60	34	99.5	1
	Crossbow Targets	387	272	713.0	-
	Jussy Bridge	39	25	75.0	2
	Beaufor Bridge	38	38	113.5	-
3	Merkviller oil	108	106	260.7	4
	Mulhouse railway centre	73	54	161.8	1
	Saarbrucken railway centre	72	60	177.7	1
	Strasbourg " "	72	68	203.8	-
	Joigny/Laroche Bridge	39	36	71.0	-
	Troyes "	39	39	95.8	-
	Crossbow Targets	341	274	767.0	1
	Harnes Oil	60	15	45.0	-
	Courchelettes Oil	28	28	83.8	-
	Brussels A/F	75	63	154.3	-
4	Peenemunde Hydrogen Peroxide Works	221	221	530.0	2
	Anklam A/C Factory	72	70	175.0	1
	" A/F	108	108	250.4	-
	Schweim A/C Factory	100	88	212.1	-
	Kiel U Boat Factory	89	89	253.0	2
	Rostock Air Armament Factory	89	75	192.9	2
	Wismar A/C Factory	71	71	178.7	-
	Rostock " "	76	72	175.0	-
	Hamburg/Rhenania oil	134	50	143.2	1
	Harburg Ebano "	110	109	265.5	1
	Bremen Oslebshausen oil	60	53	135.8	2
	Hemmingstedt oil	78	40	118.7	-
	Crossbow Targets	105	23	65.4	-
	Coastal Installations	24	22	65.5	-
5	Nienburg Oil	177	175	670.5	2
	Hannover/Lengenhagen A/F	143	140	367.8	-
	Dolbergen oil	73	72	175.2	-
	Brunswick Aircraft Factory	99	95	257.7	1

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>Aug.</u>					
5	Brunswick Aircraft Factory	33	33	91.6	1
	Brunswick Tank Factory	45	43	125.0	-
	Brunswick Aircraft Factory	72	69	184.1	4
	Brunswick " "	78	68	186.9	2
	Fallersleben M.T. Works	90	85	274.0	-
	Magdeburg A/C Factory	112	92	223.5	1
	Magdeburg Tank Factory	91	86	202.6	2
	Halberstadt A/F	75	71	201.5	1
	Crossbow Targets	38	38	52.9	-
6	Frantic Mission Gdynia A/C Factory	75	75	109.2	-
	Brandenburg A/C Factory	215	196	463.9	3
	Genshagen	177	172	395.5	8
	Harburg/Rhenania oil	130	126	343.2	3
	Harburg/Ebano "	34	33	89.6	-
	Hamburg Deutsche "	55	53	153.0	2
	Hamburg/Schlieman "	33	32	92.0	-
	Kiel Torpedo Works	92	58	160.0	2
	Hamburg/Schulau	72	72	203.2	1
	Berlin/Marienfelde A/C Factory	92	82	194.0	4
	Berlin/Niederschönweide A.F.V. Plant	51	45	108.0	2
	Crossbow Targets	86	25	60.4	-
7	Fuel Installations N. France	383	266	683.5	1
	Nanteuil rail/road bridge	36	36	106.5	-
	Frevent rail embankment	35	15	60.0	-
	Doullens Bridge	38	37	147.5	-
8	Crossbow Targets	148	115	296.5	-
	A/Fs. N. France	263	174	444.2	-
	Army Support S. of Caen	679	444	1349.1	9
	Frantic Mission Busaux Caux A/F	36	36	71.3	-
	Zillistea	37	37	70.0	-
9	Sindelfingen A/C Factory	53	25	71.0	-
10	Joigny La Roche Bridge	32	31	116.5	-
	Clamecy/Coulanges Bridge	37	39	145.4	-
	Pacy sur Armancon oil Depot	35	30	74.8	-
	St. Florentin oil dump	37	23	55.5	-
	Sens oil dump	26	26	75.0	-
11	Strasbourg Fuel Dump	140	132	368.0	1
	Saarbrücken railway centre	73	60	172.5	2
	Belfort " "	76	76	187.5	-
	Mulhouse " "	77	75	182.0	-
	Pacy sur Armancon Fuel Dump	36	36	103.0	-
	St. Florentin	35	34	83.0	-
	A/Fs. N. France	170	157	349.3	-
	Army Support, Brest	285	277	870.3	-
12	Frantic Mission Toulouse A/F	70	69	171.0	-
	A/Fs. N. France	540	526	1345.5	3
13	Army Support, Seine Area	1062	983	2008.7	10
	Le Manoir Bridge	73	69	206.0	2
	St. Malo Bty.	34	34	136.0	-
	Ile de Cezembre	69	69	274.0	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
Aug. 14	Stuttgart/Echterdingen A/C Factory	74	71	177.2	-
	Sindelfingen A/C Factory	106	12	30.0	-
	Mannheim " "	114	110	268.7	1
	Mannheim/Sandhoften A/F	74	72	183.7	-
	Ludwigshafen oil	149	131	277.9	1
	A/Fs. N. France	275	263	661.7	-
	Fismes rail/road bridge	47	34	129.0	-
	Angouleme	39	38	109.5	-
	Saintes railway centre	38	38	114.0	-
15	A/Fs. N.W. Germany	661	638	1690.4	15
	A/Fs. Netherlands	242	238	525.8	1
16	A/Fs. Germany	206	186	483.1	-
	Halle A/C Factory	36	27	67.5	6
	Sohkeuditz A/C Factory	71	58	142.6	1
	Dessau " "	102	99	234.2	4
	Kothen " "	71	71	188.5	-
	Magdeburg/Neustadt A/C Factory	69	67	189.5	1
	Bohlen oil	107	88	206.2	3
	Magdeburg/Rothensee " "	103	86	225.0	2
	Rositz " "	108	105	252.0	-
	Zeitz " "	110	100	226.3	6
18	Roye/Amey A/F	48	32	77.3	2
	Railway Bridges N. France	257	229	677.2	-
	A/Fs. N. France	255	266	645.6	-
	Woippy A/C Factory	71	58	159.1	-
	Laneuveville Fuel Dump	36	35	86.8	-
	Pacy sur Armancon Fuel Dump	39	39	98.4	-
	Bourron/Marlotte " "	39	38	94.6	-
24	Merseburg/Leuna oil	217	191	450.5	11
	Misburg " "	95	88	217.4	-
	Brux " "	144	132	295.8	2
	Ruhland " "	143	135	304.6	1
	Ereitel	73	68	161.2	-
	Weimar Armament Works	144	121	298.0	5
	Brunswick A/C Factory	100	99	280.5	1
	" " "	131	125	312.9	2
	Kiel Walther Works	24	13	37.5	-
	Kiel Jet Engine Works	24	24	68.5	2
	Kolleda A/F	71	32	80.0	-
	Hannover/Langenhagen A/F	78	73	210.7	-
25	Peenemunde Hydrogen Works	174	144	358.0	5
	Neubrandenburg A/F	112	108	267.5	-
	Anklam A/F	76	73	181.0	-
	Wismar A/C Factory	106	91	219.3	1
	Schwerin A/C Factory	109	106	306.0	-
	Rostock " "	120	116	308.5	3
	Lubeck " "	84	82	199.0	1
	Rechlin " "	184	179	436.2	1
	Politz oil	182	169	385.0	7
	Moerdijk Bridge	10	10	20.0	-
	Henin-Lietard Oxygen Plant	35	30	87.8	-
	La Louviere Chem. Works	16	10	30.0	-
	Terte " "	17	13	39.0	-
	Willebroeck Ammonia Plant	18	18	54.0	-
	Liege/Tilleur Chem. Plant	17	12	36.0	-
26	Gelsenkirchen (Nord) Oil	110	84	160.2	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses	
Aug. 26	Gelsenkirchen (Buer) Oil	144	90	180.8	2	
	Emmerich Oil	72	36	102.5	-	
	Salzbergen Oil	72	71	203.5	-	
	Ludwigshafen Oil	101	49	125.5	-	
	Dulmen Fuel Depot	73	73	219.4	-	
30	Kiel Germania U-Boat Yards	288	284	695.2	-	
	Bremen A/C Factory	335	327	750.3	-	
	Crossbow Targets	298	208	552.5	-	
Sept. 3	Ludwigshafen (oil)	329	325	969.2	2	
	5	Ludwigshafen (oil)	287	272	652.8	2
		Karlsruhe railway centre	201	185	466.3	4
		Stuttgart (Aero Eng. and M.T. Pl.)	209	203	491.0	2
	8	Ludwigshafen (oil)	358	344	1011.0	5
		Karlsruhe railway centre	274	243	637.0	4
		Mainz (Ordnance Depot)	380	309	741.0	-
	9	Ludwigshafen (Chemicals and Oil)	111	103	303.3	3
		Mannheim (Railway)	287	284	840.0	3
		Mainz (Railway)	314	212	522.8	3
		Dusseldorf (Armament Plant)	365	248	590.5	7
	10	Gaggenau (Motor works)	142	140	408.0	2
		Stuttgart railway centre	61	60	178.0	1
		Stuttgart (Sindelfingen)	104	73	209.7	1
		Stuttgart (Zuffenhausen)	70	69	202.0	-
		Ulm railway centre	259	247	624.8	-
		Furth (A/C Components)	78	62	150.0	-
		Nurnberg (tanks)	181	170	402.2	3
		Giebelstadt (aircraft)	115	112	273.3	-
	11	Lutzkendorf (oil)	144	85	203.7	-
		Merseburg (oil)	182	96	239.3	12
		Misburg (oil)	93	87	243.2	-
		Hannover (Eng. Works)	94	84	287.0	4
		Magdeburg (Ordnance depot)	64	60	131.3	3
		Ruhland/Schwarzheide (oil)	106	22	53.0	11
		Brux (oil)	78	39	94.0	-
		Bohlen (oil)	113	75	177.0	4
'Frantic' - Chemnitz		76	74	176.0	-	
12	Brux (oil)	145	78	189.7	4	
	Ruhland (oil)	141	58	142.5	15	
	Misburg (oil)	96	23	61.8	4	
	Kiel (aero-engines)	67	58	149.5	-	
	Hemmingstedt (oil)	66	66	165.0	-	
	Magdeburg (Ordnance depot)	74	72	149.7	8	
	Magdeburg (oil)	147	145	325.8	2	
Bohlen (oil)	113	37	86.5	2		

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
Sept.					
13	Lutzkendorf	108	76	186.2	-
	Merseburg (oil)	180	133	330.0	8
	Ulm (motor transport)	67	65	152.5	
	Weissenhorn (oil)	42	42	100.7	1
	Schwabirche (airfield)	87	64	167.0	3
	Stuttgart	112	109	296.8	-
	Ludwigshafen (oil)	113	75	215.5	4
	Hemmingstedt (oil)	11	5	12.5	-
	'Frantic' - Miscolez	74	72	171.5	-
19	'Frantic' - Szolnok railway centre	92	91	192.5	-
	Hamm railway centre	226	213	586.5	2
	Unna (ordnance depot)	70	58	165.4	-
	Soest railway centre	110	37	110.5	-
21	Mainz railway centre	145	141	407.2	-
	Koblenz railway centre	173	144	398.5	2
	Ludwigshaven oil	148	144	407.8	-
26	Osnabruck (railway and steel works)	403	382	944.7	2
	Hamm railway centre	304	58	191.5	2
	Bremen (motor transport)	402	143	404.5	-
28	Magdeburg oil	217	23	57.0	-
30	Handorf airfield	149	14	41.5	-
	Hamm railway centre	243	28	76.0	-
Oct.					
2	Kassel (ordnance depot)	287	106	258.2	-
	Cologne (Ford Motors)	114	111	275.0	-
	Hamm railway centre	304	43	109.0	-
3	Wesseling (oil)	114	87	217.5	-
	Lachen (airfield)	145	113	297.5	-
	Gaggenau (Naval armament plant)	180	144	420.5	-
	Giebelstadt	106	49	119.5	-
5	Rheine railway centre	121	107	298.9	-
	Lippstadt (airfield)	121	174	491.3	-
	Paderborn (airfield)	109	31	86.8	-
	Munster (airfield and repair depot)	181	144	414.5	4
	Munster (airfield)	174	67	178.7	2
6	Neubrandenburg (assembly plant)	74	73	180.0	-
	Stargard (A/F training school)	71	36	90.0	-
	Stettin (A.F.U. and M.T. plant)	68	12	30.0	-
	Hamburg (Ordnance depot)	89	89	238.4	-
	Hamburg (aero engines)	79	79	220.1	-
	Wenzendorf (jet plane assembly)	85	54	153.0	-
	Berlin (Gun Park)	72	68	162.3	1
	Berlin (aero engine plant)	145	140	282.1	1
	Berlin (ordnance depot)	72	69	164.2	-
	Berlin (tank plant)	106	89	212.5	15

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>Oct.</u>					
7	Ruhland (oil)	143	59	147.5	1
	Politz (oil)	144	141	345.0	17
	Kassel (aero engine)	82	67	188.1	-
	Kassel (tank works)	142	153	450.0	3
	Magdeburg (oil)	183	25	71.0	-
	Magdeburg (Tanks and A.F.V. plant)	64	63	181.0	1
	Bohlen (oil)	138	87	206.5	11
	Lutzkendorf (oil)	108	91	212.0	1
	Merseburg/Leuna (oil)	173	115	278.0	3
11	Wesseling (oil)	131	57	169.0	4
12	Bremen (FW comps. and M.T. plants)	242	238	624.0	1
14	Saarbrucken railway centre	90	90	240.0	-
	Kaiserslautern railway centre	118	118	333.7	-
15	Cologne railway centre	149	13	32.1	1
	Cologne (gas producer units)	74	24	71.2	-
	Reisholz (oil)	73	61	160.2	1
	Monheim (oil)	70	64	168.4	-
	Heligoland	23	23	78.5	-
18	Cologne (Ford Motors)	109	68	199.5	-
	Leverkusen (Chemical Plant)	77	40	113.5	3
19	Mannheim (A.F.V. plant)	221	25	74.5	-
	Gustavsburg (A.F.V. works)	176	50	172.0	-
25	Gelsenkirchem (oil)	272	119	303.9	-
26	Munster	36	36	495.4	-
	Bottrop (oil)	111	65	166.0	-
28	Munster railway centre	180	177	489.8	3
30	Heligoland (U-boat base)	26	26	90.0	-
<u>Nov.</u>					
1.	Gelsenkirchen (oil)	280	256	667.1	-
	Rudesheim (oil)	37	13	30.5	-
2	Sterkrade (oil)	139	119	254.5	1
	Castrop (oil)	133	131	361.0	1
	Bielefeld (viaduct)	202	120	334.0	-
	Merseburg/Leuna (oil)	-	571	1323.8	27
4	Bottrop (oil)	129	103	220.0	-
	Gelsenkirchen (oil)	137	133	370.8	-
	Neuenkirchen (oil)	227	139	371.2	-
6	Bottrop (oil)	99	87	198.1	-
	Sterkrade (oil)	137	134	434.0	-
	Duisburg (oil)	114	65	136.3	-
8	<sup>e</sup> Rhine railway centre <sub>k</sub>	129	57	154.2	-
9	Tactical targets in Thionville area	441	37	103.5	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>Nov.</u>					
10	Cologne (airfields)	194	183	338.6	-
	Wiesbaden (airfield)	214	100	175.6	-
11	Gelsenkirchen (oil)	124	100	237.7	-
	Bottrop (oil)	134	134	368.4	1
	Oberlahnstein railway centre	182	143	396.0	-
16	Tactical targets in Eschweiler area	726	713	2351.4	-
	Tactical targets in Duren area	487	478	1521.5	-
21	Flak site near Merseburg	11	11	23.9	-
	Merseburg/Leuna (oil)	-	210	483.5	-
	Hamburg Rhenania	-	171	475.2	-
23	Gelsenkirchen (oil)	160	146	319.7	-
25	Bingen railway centre	254	252	629.2	-
26	Altenbeken (viaduct)	140	113	337.0	5
	Misburg (oil)	336	112	319.2	25
	Bielefeld (viaduct)	244	26	99.0	-
27	Bingen railway centre	179	151	302.8	-
	Offenburg railway centre	336	324	875.4	-
29	Altenbeken (viaduct)	146	144	441.0	1
	Bielefeld (viaduct)	153	151	509.5	-
30	Bohlen (oil)	216	67	165.7	1
	Zeitz (oil)	217	123	293.0	10
	Merseburg (oil)	304	101	229.7	14
	Lutzkendorf (oil)	214	148	364.2	2
	Homburg railway centre	104	103	251.3	-
	Neuenkirchen railway centre	180	181	442.1	1
	Merseburg/Leuna	-	149	365.4	-
<u>Dec.</u>					
2	Oberlahnstein railway centre	152	125	359.0	-
	Bingen railway centre	142	134	360.1	11
4	Soest railway centre	221	188	553.8	-
	Bebra	300	198	552.4	-
	Mainz railway centre	226	4	7.2	-
5	Munster railway centre	118	90	237.7	-
9	Stuttgart (airfields)	185	119	219.1	-
	Stuttgart railway centre	217	91	225.9	1
10	Bingen railway centre	214	173	415.3	-
	Koblenz railway centre	299	166	352.4	-
11	Mannheim (RR bridge)	183	159	436.0	1
	Maximiliansau (RR bridge)	162	158	405.2	-
12	Hanau railway centre	287	275	710.0	3
	Aschaffenburg	87	87	210.2	-
	Darmstadt railway centre	479	458	1338.3	-
18	Mainz railway centre	220	170	430.7	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
Dec.					
19	Choke points and railway centres Ardennes area	237	212	588.1	-
23	Ehrang railway centre	148	146	387.9	-
	Junkerath (Comm. Centre)	31	30	70.8	-
	Dahlem (Comm. Centre)	29	27	71.7	-
	Ahrweiler (Comm. Centre)	51	49	124.4	-
	Homburg railway centre	114	104	268.0	-
24	Coastal Battery nr. La Pallice	11	8	16.0	-
	Airfields Central Germany	1357	1002	2101.9	9
	Communications Centres, Ardennes Area	579	504	1187.0	2
25	Kaiserslautern (RR Overpass)	38	38	112.0	-
	Bad Munster (RR bridge)	35	9	27.0	-
	Morscheid (RR trestle)	38	35	102.1	1
	Eller (RR bridge)	32	31	91.5	-
	Communications Centres, Ardennes Area	208	171	478.2	-
26	Sinzig (RR bridge)	36	35	97.0	-
	Niederlahnster railway centre	26	35	86.7	-
	Ardenach railway centre	35	9	27.0	-
	Neuweid (RR bridge)	37	23	69.0	-
27	Euskirchen railway centre	76	73	195.0	-
	Bullay (RR bridge)	35	34	101.5	-
	Altenahr (RR bridge)	38	25	75.0	-
	Gerolstein (RR junction)	70	58	153.5	-
	Kaiserslautern railway centre	33	33	90.0	-
	Homburg railway centre	56	45	108.1	-
	Kaiserslautern (RR bridge)	27	15	43.0	1
	Neuenkirchen railway centre	58	57	147.3	-
	Fulda railway centre	124	113	332.2	-
	Andernach railway centre	67	63	168.3	-
	Neuweid (RR bridge)	7	8	23.7	-
28	Remagen (RR bridge)	73	71	209.5	-
	Siegburg railway centre	38	36	97.5	-
	Troisdorf railway centre	71	11	25.5	-
	Bruhl railway centre	75	75	204.4	-
	Rheinbach railway centre	72	34	90.9	-
	Homburg railway centre	58	38	103.1	-
	Neuenkirchen railway centre	53	27	72.9	-
	Kaiserslautern (RR bridge)	35	31	84.0	-
	Kaiserslautern railway centre	58	123	340.2	2
	Coastal Battery at Pte. de la Coubre	16	7	18.8	-
	Bullay railway bridge	29	20	55.0	-
29	Bullay (RR bridge)	74	73	210.0	-
	Remagen (RR bridge)	59	31	107.8	-
	Neuweid (RR bridge)	27	54	161.4	-
	Communications Centres, Ardennes Area	600	527	1314.0	3

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses	
<u>Dec.</u> 30	Bullay (RR bridge)	72	71	213.0	-	
	Bischoffsheim railway centre	105	34	87.2	1	
	Kaiserslautern (RR bridge)	108	72	214.5	-	
	Euskirchen (RR junction)	91	92	244.8	-	
	Altmahr (RR bridge)	63	61	184.3	-	
	Remagen (bridge)	58	29	82.7	-	
	Mechernich railway centre	88	87	244.1	-	
	Neuweid (RR bridge)	55	58	162.0	-	
31	Bitburg (Comm. centre)	36	35	89.8	-	
	Kordel (detraining centre)	69	69	167.6	-	
	Neuss railway centre	109	109	292.4	-	
	Krefeld railway centre	105	83	223.1	-	
	Prum (Comm. centre)	36	37	90.7	-	
	Blumenthal	36	33	80.6	-	
	Koblenz (bridge)	120	112	395.0	-	
	Neuweid (bridge)	58	56	157.0	-	
	Euskirchen (RR junction)	62	29	81.2	-	
	Remagen (bridge)	57	53	137.7	-	
	Engers (bridge)	60	58	203.3	-	
	Wenzendorf (A/C factory)	81	62	181.5	-	
	Hamburg (oil)	250	237	648.3	22	
	Hamburg (U-boats)	74	72	179.5	2	
Misburg (oil)	115	101	231.5	2		
<u>1945</u> <u>Jan.</u>	1	Magdeburg (oil)	227	11	23.6	5
		Remagen (bridge)	30	6	15.1	-
		Koblenz (bridge)	57	57	183.0	-
		Koblenz (bridge)	56	30	105.0	1
		Engers (bridge)	57	9	30.1	-
		Dollbergen (oil)	67	54	127.6	-
		Ehmen (P.O.L. Depot)	35	24	44.6	-
	2	Koblenz (bridge)	61	59	185.1	-
		Koblenz (bridge)	64	66	179.6	-
		Engers (RR bridge)	47	45	120.0	-
		Neuweid (bridge)	60	59	162.1	-
		Remagen (RR bridge)	57	56	146.5	-
		Bad Kreuznach (RR junction)	70	67	199.8	-
		Bad Kreuznach railway centre	73	71	209.5	1
		Kaiserslautern (RR bridge)	35	34	100.5	1
	3	Siegfried Line (woods at Lebach)	144	130	468.7	-
		Transportation Targets, Ardennes Area	363	355	980.9	2
	4	Transportation Targets, Ardennes Area	360	628	1702.1	-
	5	Coastal Battery near Pte. de la Coubre	11	10	16.7	-
5	Niederbresig (landing ground)	71	69	127.6	-	
	Niedermendig (landing ground)	71	53	96.9	-	
	Hanau railway centre	92	60	147.0	-	
	Frankfurt railway centre	89	81	201.6	-	
	Transportation Targets, Ardennes Area	390	335	1310.8	-	

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
Jan.					
6	South Cologne (RR bridge)	73	72	211.0	-
	Cologne (suspension bridge)	72	34	102.0	-
	Kempenich (Comm. centre)	74	72	212.2	-
	Bonn (Rhine Rd. bridge)	33	32	82.5	-
	Kaiserslautern (bridge)	35	35	100.5	-
7	Cologne (RR bridge)	146	106	293.0	2
	Transportation Targets, Ardennes Area	623	572	1614.2	1
8	Transportation Targets, Ardennes Area	456	382	1018.7	1
10	Cologne (A/D)	100	83	153.8	-
	Gymnich (airfield)	113	51	93.6	1
	Bonn (airfield)	112	65	121.3	2
	Euskirchen (airfield)	97	96	176.2	-
	Steinbruck (bridge)	51	25	67.1	-
	Dasburg (bridge)	35	33	81.1	-
	Wewelen (bridge)	51	43	120.6	-
	Schonberg (bridge)	45	55	149.1	-
	Cologne (bridges)	254	129	374.0	2
	Karlsruhe railway centre	121	106	311.0	-
13	Maximiliansau (RR bridge)	144	141	417.0	1
	Mannheim (Rd. and RR bridge)	75	26	76.5	3
	Germersheim (RR bridge)	72	71	212.0	-
	Rudesheim (bridge)	116	89	243.8	-
	Kaiserslautern (railway)	60	86	237.8	-
	Worms (RR bridges)	87	85	234.2	1
	Mainz (bridges)	212	119	276.5	-
	Bischofsheim (railway centre)	139	121	297.0	2
14	Cologne (bridges)	178	173	504.5	1
	Ehmen (oil)	90	89	234.8	-
	Hemmingstedt (oil)	91	91	251.1	-
	Hallendorf (oil and steel works)	152	145	387.3	-
	Derben (oil)	210	184	549.0	12
	Magdeburg (oil)	146	91	225.0	4
16	Ruhland (oil)	165	13	30.0	1
17	Bielefeld (RR Via.)	147	37	105.0	-
	Paderborn railway centre	148	147	409.8	-
	Harburg (oil)	79	58	154.1	4
	Hamburg (oil)	76	74	206.2	-
	Hamburg (U-boat base)	72	72	195.7	4
18	Kaiserslautern railway centre	120	120	334.7	-
20	Sterkrade (oil)	281	34	87.5	-
	Mannheim (Road-Rail bridge)	220	45	112.5	1
21	Aschaffenburg (tank factory)	104	67	198.0	-
	Heilbronn railway centre	96	2	5.0	-
	Mannheim railway centre	135	110	296.0	-
	Mannheim (A.F.V. factory)	101	20	52.5	-
	Mannheim (Road-Rail bridge)	92	16	47.5	-
22	Sterkrade (oil)	199	179	432.0	5

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>Jan.</u>					
23	Neuss railway centre	187	157	426.2	1
28	Cologne (bridge)	110	42	100.5	-
	Cologne railway centre	288	224	67.5	-
	Gneisenau (oil)	64	54	146.4	2
	Kaiserstuhl (oil)	139	114	296.5	5
	Duisburg (RR bridge)	103	80	225.5	-
	Hohenbudberg railway centre	231	155	435.0	-
29	Niederlandstein (RR centre)	112	111	525.5	-
	Siegen (RR centre)	182	144	418.8	-
	Kassel (A.F.V. and M.T. plant)	223	71	192.0	-
<u>Feb.</u>					
1	Mannheim railway centre	290	76	220.3	-
	Wesel road bridge	113	113	315.0	-
	" railway bridge	112	26	66.0	-
	Ludwigshafen railway centre	140	70	206.5	-
3	Berlin	979	978	1745.9	16
	Magdeburg oil	420	91	225.6	2
	" railway centre	-	276	616.7	-
	Berlin (H <sup>2</sup> X)	-	215	533.5	2
9	Lutzkendorf (oil)	288	236	579.5	1
	Paderborn (viaduct)	74	72	215.5	-
	Arnsberg (RR viaduct)	75	75	223.5	1
	Bielefeld (RR viaduct)	70	70	142.5	-
	Magdeburg (oil)	293	10	23.1	1
10	Ijmuiden (U-boat pens)	9	9	40.5	-
14	Dresden railway centre	441	316	782.0	-
	Wesel (Road bridge)	39	36	106.0	-
	Magdeburg	-	337	798.5	-
15	Dresden (Railway centre)	-	210	463.1	-
	Secondary Target.	-	-	-	-
	Cottbus Secondary Target	-	434	1658.2	1
16	Gelsenkirchen (oil)	108	92	268.6	4
	Dortmund (oil)	254	177	492.0	1
	Salzbergen (oil)	75	30	82.8	-
	Hamm railway centre	219	79	234.0	-
	Wesel (RR bridge)	76	26	78.0	-
19	Dortmund (oil)	111	74	217.3	-
	Bocchum (oil)	112	98	290.5	-
	Gelsenkirchen (oil)	187	72	207.5	1
	Siegen (Jugental tank works)	97	86	226.9	1
	Siegen railway centre	94	94	249.4	-
20	Nuremberg railway centre	363	12	35.5	-
	Nuremberg (railway yards and shops)	439	140	339.8	1

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>Feb.</u>					
22	Stendal railway centre	74	73	214.2	1
	Wittenberge (RR bridge)	36	36	108.0	-
	Ulzen railway centre	73	73	214.2	-
	Wittenberge (RR junction)	36	36	108.0	-
	Wittstock railway centre	36	12	33.0	-
	Salzwedel railway centre	72	59	174.8	-
	Luneberg railway centre	40	39	115.5	-
	Ludwigslust railway centre	36	35	103.0	-
	Sangerhauser railway centre	31	11	23.5	-
	Vienenburg railway centre	31	23	51.5	-
	Halberstadt railway centre	62	57	113.5	-
	Kreinsen railway centre	58	48	128.3	-
	Northeim railway centre	49	48	124.5	-
	Rheine railway centre	62	52	144.1	-
	Hildesheim railway centre	56	56	152.9	-
23	Fulda railway centre	59	10	24.2	-
	Weimar railway centre	57	57	136.0	-
	Treuchtlingen railway centre	72	61	175.0	-
	Neumarkt railway centre	74	73	210.2	-
	Crailsheim railway centre	74	50	143.0	-
	Ansbach railway centre	75	74	219.0	-
	Kitzingen railway centre	73	73	219.0	-
	Neuss railway centre	24	24	64.2	-
	Bremen shipyard	-	198	575.3	1
24	Wesel (RR bridge)	71	70	203.0	-
	Hamburg (oil)	-	289	815.7	-
25	Friedrichshafen (tank plant)	116	63	187.5	-
	Munich railway centre	180	174	512.5	2
	Munich (main station and railway)	361	328	965.5	-
	Giebelstadt (airfield)	96	96	217.2	-
	Aschaffenburg railway centre	111	110	255.1	-
	Aschaffenburg (tank plant)	60	46	106.9	-
	Schwabisch (airfield)	92	92	216.7	-
	Neuberg (oil)	151	88	261.0	-
26	Berlin	-	1089	2778.0	6
27	Wilhelmshaven railway centre	23	23	58.8	-
	Leipzig railway centre	-	717	1932.7	1
	Halle " "	-	314	731.6	2
28	Schwerte railway centre	74	74	208.8	-
	Soest railway centre	144	144	393.1	1
	Hagen railway centre	153	151	429.7	-
	Arnsberg (RR viaduct)	98	95	253.2	-
	Siegen railway centre	77	77	213.9	-
	Meschede (casting plant)	79	78	208.1	-
	Bielefeld (RR viaduct)	85	81	228.5	-
	Friedburg (Goods Depot)	22	22	57.5	-
<u>March</u>					
1	Heilbronn railway centre	73	49	143.7	-
	Reutlingen railway centre	72	69	206.9	-
	Bruchsal railway centre	117	115	336.3	-
	Neckarsulm railway centre	110	73	214.5	-
	Goppingen railway centre	73	35	101.2	-
	Ulm railway centre	-	415	1322.6	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>March</u>					
2	Bohlen (Flak Batteries)	36	36	90.0	2
	Bohlen (oil)	289	60	137.5	-
	Rositz (oil)	115	38	82.8	-
	Magdeburg (oil)	219	45	107.7	1
	Ruhland (oil)	293	24	57.8	-
	Dresden railway centre	-	406	1080.8	8
3	Misburg (oil)	111	11	32.8	-
	Ruhland (oil)	218	23	57.5	-
	Magdeburg (oil)	216	212	485.9	4
	Nienburg (RR bridge)	93	39	117.0	-
	Brunswick (MT plant)	81	77	235.3	2
	Brunswick (oil)	76	53	165.8	-
	Brunswick (tank plant)	72	62	193.7	1
	Dollbergen (oil)	73	37	128.5	-
	Dedenhausen (oil)	75	53	159.9	-
	Nienhagen (oil)	65	56	195.2	1
3/4	Emden railway centre	22	18	45.8	-
4	Schwabmunchen (A/C Components)	70	68	169.2	-
	Ulm (A.F.V. plant)	144	84	249.8	-
	Ulm (Ordnance Depot)	149	136	399.5	-
5/6	Wiesbaden (RR station)	21	21	54.7	-
7	Dortmund (oil)	73	24	69.0	-
	Dortmund (oil)	153	65	188.2	-
	Soest railway centre	150	149	378.3	-
	Bielefeld (RR viaduct)	92	80	235.2	-
	Datteln (oil)	219	179	583.8	-
	Castrop (oil)	115	77	267.7	-
7/8	Dortmund railway centre	19	19	50.8	1
8	Essen (oil)	115	114	344.3	-
	Bottrop (oil)	110	37	110.0	-
	Gelsenkirchen (oil)	113	75	224.9	-
	Huls (oil)	110	110	330.7	-
	Siegen railway centre	134	114	316.6	-
	Betzdorf railway centre	127	70	192.7	-
	Dillenburg railway centre	95	63	166.5	-
	Langendreer (oil)	229	268	551.8	-
	Dortmund (oil)	134	111	384.2	-
	Frankfurt (Casting and Pressed Parts Factory)	158	111	354.6	-
8/9	Dortmund railway centre	15	15	36.7	-
9	Kassel (loco. works)	190	190	472.2	2
	Kassel railway centre	76	76	162.3	-
	Kassel (A.F.V. and M.T. Works)	72	64	182.6	1
	Osnabruck railway centre	95	93	202.0	-
	Rheine railway centre	93	93	230.9	-
	Munster railway centre	103	103	235.6	1
	Frankfurt railway centre	310	244	595.5	3
	Frankfurt (V.D.M. Casting Plant)	113	51	163.6	1

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>March</u>					
10	Sinsen railway centre	111	86	185.8	-
	Coesfeld railway centre	116	38	82.9	-
	Schwerte railway centre	116	116	249.0	-
	Hagen railway centre	109	41	89.0	-
	Paderborn (RR workshop)	128	128	315.3	-
	Bielefeld (RR viaduct)	126	114	310.5	-
	Arnsberg (RR viaduct)	116	113	318.0	-
	Soest railway centre	146	144	348.8	-
	Dortmund railway centre	382	335	821.4	-
	Munster railway centre	13	13	31.5	-
12	Betzdorf railway centre	117	117	261.5	-
	Dillenburg railway centre	110	110	237.9	-
	Wetzlar railway centre	75	74	186.5	-
	Friedberg railway centre	76	75	176.8	-
	Marburg railway centre	113	113	245.2	-
	Siegen railway centre	180	141	316.8	-
	Swinemunde Port	-	660	1606.6	1
14	Vlotho (RR bridge)	111	72	214.5	-
	Lohne (RR junction)	147	144	311.9	-
	Bad Oyenhausen (RR bridge)	115	114	338.5	-
	Hildesheim (V.D.M. Jet castings)	72	60	205.3	-
	Gutersloh railway centre	128	127	317.8	-
	Holzwickede	144	31	70.5	-
	Nienhagen (oil)	76	58	197.0	-
	Hannover (A.F.V. Plant)	266	227	716.8	-
	Misburg (oil)	67	37	126.0	-
	Seelze railway centre	114	75	167.5	2
	Ijmuiden (E-boat Pens)	9	9	40.5	-
	Wiesbaden (Goods Depot)	7	7	13.5	-
15	Zossen (Army H.Q.)	655	573	1392.6	1
	Oranienburg railway centre	670	617	1729.8	7
	Munster (station)	14	14	36.0	-
17	Bohlen (oil)	226	149	422.0	-
	Molbis (oil)	178	90	273.0	-
	Munster railway centre	176	165	395.0	-
18	Berlin (RR station)	443	25	62.3	-
	Berlin (Tank Plant)	169	75	144.7	-
	Berlin (Tank and Arm. Plant)	167	118	234.1	-
	Berlin secondary targets	-	967	2550.2	-
19	Baumanheim (A/C Comp. Plant)	124	124	284.3	-
	Neuburg (A/F and A/C Assby.)	126	125	284.9	1
	Leipheim (A/F and A/C Assby.)	86	84	189.7	-
20	Hemmingstedt (oil)	125	114	307.9	1
	Hamburg (U-boats)	79	13	39.0	-
	Hamburg Port Area	-	287	831.5	3
21	Ijmuiden (E-boat pens)	3	3	11.2	-
	Airfields N.W. Germany	1272	1170	2937.6	2

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>March</u>					
22	Dorsten (huttred camp)	74	74	195.1	-
	Bottrop (huttred camp)	37	36	76.0	-
	Westerholt (huttred camp)	116	116	251.3	-
	Feldhausen (huttred camps)	113	111	259.3	1
	Barmingholten (huttred camp)	111	111	235.7	-
	Giebelstadt (airfield)	85	75	176.6	-
	Schwabish (airfield)	82	82	187.1	-
	Kitzingen (airfield)	169	168	381.5	-
	Ahlorn (airfield)	114	99	186.7	1
	Hattingen (Barracks area)	68	67	195.1	-
	Geresheim (Barracks area)	73	73	209.7	-
	Hinsdeck (Barracks area)	82	81	213.7	-
	Mulheim (Barracks area)	76	75	181.7	-
	Frankfurt (airfield)	109	109	272.5	-
23	Goesfeld railway centre	146	145	426.2	-
	Recklinghausen railway centre	145	120	353.7	-
	Gladbeck railway centre	151	150	433.4	1
	Munster railway centre	144	142	451.8	3
	Rheine railway centre	82	79	222.2	-
	Osnabruck railway centre	84	75	230.7	-
	Hengstey railway centre	113	113	281.6	1
	Geisecke railway centre	136	90	230.2	1
	Holzwickede railway centre	150	131	329.6	-
	Unna railway centre	112	38	89.5	1
24	American Assault Area	120	120	306	6
	Operation Varsity			(Supplies)	
	British Assault Area	117	115	287	8
	Operation Varsity			(Supplies)	
	Airfields N.W. Germany	1493	1429	3963.8	5
25	Ehmen (oil)	58	58	154.1	-
	Hitzacken (oil)	136	128	336.6	-
	Buchau (oil)	56	55	140.9	4
26	Zeitz (oil)	181	12	29.5	-
	Plauen (Tank Plant)	152	139	413.5	18
28	Hannover (Tank Plant)	71	59	175.3	-
<u>April</u>					
3	Kiel (U-boat Works)	360	42	125.5	-
4	Fassberg (airfield)	224	112	314.6	1
	Parchim (airfield)	178	26	68.5	1
	Perleberg (airfield)	146	29	64.2	2
5	Ingolstadt (Ordnance Depot)	207	204	576.5	1
	Grafenwohr (Ordnance Depot)	215	24	64.7	-
	Bayreuth (Ordnance Depot)	31	7	14.5	-
	Unterschlaubersbach (airfield)	126	51	141.5	2
	Furth (Ordnance Depot)	71	62	182.0	-
	Nuremberg railway centre	73	37	109.5	-
6	Gera railway centre	109	25	61.4	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
April					
7	Hitzacker (oil)	116	115	283.8	-
	Kohlenbissen (airfield)	105	93	261.4	-
	Wesendorf (airfield)	107	107	239.4	-
	Duneberg (Munitions plant)	183	167	453.0	3
	Krummel (munitions plant)	146	126	341.5	-
	Kaltenkirchen (airfield)	151	144	379.6	6
	Buchen (oil)	76	36	108.0	2
	Gustrow (ordnance depot)	105	104	307.7	2
	Parchim (airfield)	192	134	337.8	2
8	Derben (oil)	105	31	77.5	1
	Schafstadt	73	73	171.8	-
	Furth (Me. 262 Components)	90	89	208.5	-
	Bayreuth (Ordnance Depot)	51	48	123.7	-
	Roth (airfield)	92	91	216.1	-
	Unterschlaubersbach (airfield)	57	56	125.2	-
	Hof railway centre	115	102	284.3	5
	Grafenwohr (Tank and Ordnance Depot)	213	203	605.1	-
	Eger (or Cheb) railway centre	114	111	328.2	-
	Travermunde (Dock Inst.)	12	12	30.2	-
9	Furstenfeldbruck (airfield)	140	139	334.4	-
	Wolfratshausen (Explosives Factory)	77	77	228.4	-
	Oberpfaffenhofen (airfield)	104	104	299.0	-
	Memingen (airfield)	96	96	221.6	-
	Leipheim (airfield)	88	88	208.2	-
	Landsberg (airfields)	96	95	220.1	-
	Lechfeld (airfield)	111	109	243.7	1
	Munich (airfields)	367	341	925.2	6
	Neuberg (airfield)	67	66	182.9	-
	Neuberg (oil)	76	76	228.0	-
	Stade (airfield)	14	14	33.0	-
10	Oranienburg (Ordnance Depot)	292	278	814.0	6
	Oranienburg (A/F and A/C Factory)	143	139	416.2	3
	Rechlin (airfield)	183	158	372.5	1
	Parchim (airfield)	63	32	74.0	-
	Rechlin (airfield)	103	102	229.9	-
	Brandenburg (airfield)	142	138	388.9	6
	Zerbst (airfield)	75	75	222.0	-
	Burg-Bei-Magdeburg (airfield)	153	147	435.7	1
	Neuruppin (airfield)	141	132	392.5	-
	Dessau (Goods Depot)	13	13	30.7	-
11	Kraiburg (Ammo. factory)	135	134	380.0	1
	Freiham (oil)	301	299	719.5	-
	Amberg railway centre	73	73	167.6	-
	Neumarkt railway centre	71	71	175.6	-
	Regensburg (Ordnance Depot)	31	31	85.3	-
	Regensburg (airfield)	80	78	179.7	-
	Regensburg (oil)	83	80	184.7	-
	Landshut (Ordnance Depot)	38	28	82.2	-
	Landshut (railway centre)	75	73	215.0	-
	Ingolstadt (airfield)	141	131	360.3	-
	Ingolstadt railway centre	68	68	204.0	-
	Treuchtlingen railway centre	70	70	207.0	-
	Donauworth railway centre	112	108	321.0	-
13	Boizenburg (RR junction)	10	10	22.7	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
April					
14	Royan	850	829	2357.4	2
	Pointe de la Coubre	116	116	385.6	-
	Pointe de Grave	188	178	513.8	-
	Neuruppin (airport)	9	9	19.5	-
15	Royan	933	838	1554.9	-
	Pointe de Grave	235	234	687.5	-
	Pointe de la Coubre	78	65	193.0	-
	Lechfeld (airfield)	12	12	26.5	-
16	Plattling railway centre	77	77	264.0	-
	Straubing (RR bridge)	77	76	241.7	-
	Regensburg railway centre	154	153	418.4	-
	Regensburg (RR bridges)	142	142	403.0	-
	Royan	486	486	1451.7	-
17	Dresden (RR centre)	211	203	577.0	1
	Dresden railway centre	234	113	345.7	5
	Falkenau (RR bridge)	23	15	32.5	-
	Falkenau (RR junction)	15	8	17.1	-
	Beroun (RR Station)	24	24	54.3	-
	Beroun (RR junction)	37	37	84.6	-
	Kladno (RR junction)	36	36	81.0	-
	Fischern railway centre	29	28	62.0	-
	Dresden (RR centre)	203	76	228.0	-
	Fischern (RR station)	27	27	59.5	-
	Aussig (RR Junction and Station)	87	86	255.0	-
	Roudnice (oil and railway centre)	117	116	316.3	-
18	Traunstein (transformer station)	60	10	22.3	1
	Traunstein (railway centre)	68	56	179.5	-
	Rosenheim railway centre	148	148	431.1	-
	Passau (RR bridge)	28	28	62.1	-
	Passau railway centre	52	52	112.5	-
	Zwiesel (RR bridge and junction)	57	56	126.0	-
	Kolin railway centre	120	97	287.2	-
19	Falkenberg railway centre	134	132	361.0	-
	Elsterwerda railway centre	147	135	334.3	-
	Pirna (RR bridge and facilities)	115	115	337.3	1
	Aussig railway centre	115	109	307.2	4
	Karlsbad (RR junction)	87	87	243.2	-
20	Brandenburg railway centre	138	78	189.2	-
	Seddin railway centre	66	66	162.0	-
	Treuenbrietzen railway centre	83	83	201.8	-
	Klatovy (RR junction)	56	54	124.3	-
	Irrenlohe (RR junction)	55	55	125.5	-
	Muhldorf railway centre	53	53	115.8	-
	Zwiesel (RR junction and bridge)	56	46	104.0	-
	Nauen (RR facilities)	84	82	202.5	-
	Wustermark railway centre	86	73	182.5	-
	Neuruppin railway centre	57	57	136.3	-
	Oranienburg railway centre	93	88	202.5	-

Date	Target or Purpose	Despatched	Attacking	Tonnage	Losses
<u>April</u>					
25	Pilsen (armament works)	199	196	523.0	4
	Pilsen (airfield)	106	78	187.0	2
	Salzburg railway centre	109	109	251.0	-
	Hallein railway centre	57	57	147.4	-
	Bad Reichenhall railway centre	56	56	140.5	-
	Traunstein (transformer sta.)	56	56	133.0	-
<u>May</u>					
1-6	Food Supplies to Holland	2212	2191	4181.4	1

AIRCRAFT DESPATCHED, AIRCRAFT MISSING, TONNAGE DROPPED AND NUMBER OF MINES LAID  
MONTHLY (ALL OPERATIONS)

Sources Bomber Command O.R.S. Reports for aircraft despatched and missing and Air Ministry War Room Summary of Bomber Command operations for bomb tonnages and mines.

Month	Aircraft Despatched			Aircraft Missing					Tonnage Dropped			Number of Mines Laid
	By Day	By Night	Total	By Day	Percentage of Total	By Night	Percentage of Total	Total Losses	By Day	By Night	Total on all Operations	By Night
March 1944	47	9831	9878	-	-	294	3.0	294	14.2	27684.1	27698.3	1472
April	38	10512	10550	-	-	223	2.1	223	6.7	33488.4	33495.1	2643
May	52	11822	11874	-	-	289	2.4	289	13.5	37236.6	37250.1	2760
June	2716	15057	17773	10	0.4	332	2.2	342	10364.1	46893.8	57257.9	1778
July	6847	12133	18980	25	0.4	287	2.4	312	26524.2	31065.8	57590.0	708
August	10345	10314	20659	49	0.48	191	1.9	240	40637.1	25211.7	65848.0	1586
September	10832	6540	17372	43	0.4	97	1.5	140	37646.7	14934.4	52581.1	748
October	7168	10394	17562	56	0.8	75	0.7	131	31219.9	29979.6	61199.5	1133
November	5274	9734	15008	42	0.8	102	1.0	144	24351.1	28653.8	53004.9	750
December	3766	11567	15333	31	0.8	80	0.7	111	14189.2	34828.1	49017.3	1160
January 1945	1344	9626	10970	11	0.8	121	1.3	132	5585.3	27284.5	32869.8	668
February	3730	13879	17609	10	0.3	168	1.2	178	11123.0	34707.9	45830.9	1354
March	9663	11678	21341	52	0.5	171	1.5	223	40014.6	27404.9	67419.5	1198
April	5232	8871	14103	22	0.4	50	0.6	72	15195.5	19444.9	34640.4	1362
May 1-8	3110	350	3460	-	-	3	-	3	-	179.6	179.6	-

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APPENDIX No. 12

TOTAL SORTIES DESPATCHED, AIRCRAFT LOST, TONS  
DROPPED AND NUMBER OF MINES LAID,  
BY TYPE OF OPERATION 1 MARCH 1944 - 8 MAY 1945

## (a) By Day

Type of Operation	Sorties Despatched	A/c Lost	Tons Dropped	Number of Mines Laid
Bomb Raids	54128	324	256853.4	-
Minelaying	-	-	-	-
Bomber Support & Intruders <sup>(1)</sup>	410	-	-	-
Other Sorties <sup>(2)</sup>	3966	1	-	-
Total	58504	325	256853.4	-

## (b) By Night

Type of Operation	Sorties Despatched	A/c Lost	Tons Dropped	Number of Mines Laid
Bomb Raids	103632	2195	413329.6	-
Minelaying	4282	74	-	15994
Bomber Support & Intruders	14661	94	-	-
Other Sorties	8093	82	-	-
Total	130668	2445	413329.6	15994

## (c) By Day and Night

Type of Operation	Sorties Despatched	A/c Lost	Tons Dropped	Number of Mines Laid
Bomb Raids	157760	2519	670183.0	-
Minelaying	4282	74	-	15994
Bomber Support & Intruders	15071	94	-	-
Other Sorties	12059	83	-	-
Total	189172	2770	670183.0	15994

(1) Includes High and Low Level Intruders and Counter Measures.

(2) Includes Leaflets, Special Operations, Diversionary Sweeps, Meteorological Reconnaissances etc.

(3) Sources: Bomber Command O.R.S. Reports for aircraft despatched and missing, A.M.W.R. Summary of Bomber Command Operations for bomb tonnages and mines.

## SORTIES DESPATCHED, AIRCRAFT LOST, TONS DROPPED AND NUMBER OF MINES LAID

## BY TYPE OF OPERATION (MONTHLY)

Month	Type of Operation	(a) By Day			(b) By Night				(c) By Day and Night			
		Sorties Despatched	Aircraft Lost	Tons Dropped	Sorties Despatched	Aircraft Lost	Tons Dropped	Mines Laid	Sorties Despatched	Aircraft Lost	Tons Dropped	Mines Laid
March 1944	Bomb Raids	18	-	14.2	8179	278	27684.1	-	8197	278	27698.3	-
	Minelaying	-	-	-	518	2	-	1472	518	2	-	1472
	Bomber Support and Intruders	-	-	-	136	4	-	-	136	4	-	-
	Other Sorties	29	-	-	365	10	-	-	394	10	-	-
April	Bomb Raids	10	-	6.7	8550	189	33488.4	-	8560	189	33495.1	-
	Minelaying	-	-	-	854	18	-	2643	854	18	-	2643
	Bomber Support and Intruders	-	-	-	245	7	-	-	245	7	-	-
	Other Sorties	28	-	-	763	9	-	-	791	9	-	-
May	Bomb Raids	18	-	13.5	9888	255	37236.6	-	9906	255	37250.1	-
	Minelaying	-	-	-	826	9	-	1159	826	9	-	1159
	Bomber Support and Intruders	-	-	-	348	9	-	-	348	9	-	-
	Other Sorties	34	-	-	759	16	-	-	793	16	-	-
June	Bomb Raids	2716	10	10364.1	13270	316	46893.8	-	16436	326	572757.9	-
	Minelaying	-	-	-	460	1	-	1236	460	1	-	1236
	Bomber Support and Intruders	-	-	-	998	4	-	-	998	4	-	-
	Other Sorties	81	-	-	328	11	-	-	409	11	-	-
July	Bomb Raids	6727	23	26524.2	8896	275	31065.8	-	15625	298	57590.0	-
	Minelaying	-	-	-	184	2	-	704	184	2	-	708
	Bomber Support and Intruders	-	-	-	151	4	-	-	1151	4	-	-
	Other Sorties	130	-	-	1902	6	-	-	2032	6	-	-
August	Bomb Raids	10156	33	40637.1	7637	164	25211.7	-	17795	197	65848.8	-
	Minelaying	-	-	-	414	12	-	1586	414	12	-	1586
	Bomber Support and Intruders	101	-	-	919	4	-	-	1020	4	-	-
	Other Sorties	88	-	-	1344	11	-	-	1432	11	-	-
September	Bomb Raids	10019	36	37646.7	4524	80	14934.4	-	14543	116	52581.1	-
	Minelaying	-	-	-	185	4	-	748	185	4	-	748
	Bomber Support and Intruders	118	-	-	1139	11	-	-	1257	11	-	-
	Other Sorties	695	6	-	692	2	-	-	1387	8	-	-
October	Bomb Raids	6758	55	31219.9	8671	61	29979.6	-	15429	116	61199.5	-
	Minelaying	-	-	-	257	8	-	1133	257	8	-	1133
	Bomber Support and Intruders	109	-	-	1257	5	-	-	1366	5	-	-
	Other Sorties	301	1	-	209	1	-	-	510	2	-	-
November	Bomb Raids	5176	42	24351.1	8079	91	28653.8	-	13255	133	53004.9	-
	Minelaying	-	-	-	170	1	-	750	170	1	-	750
	Bomber Support and Intruders	37	-	-	1335	5	-	-	1372	5	-	-
	Other Sorties	61	-	-	150	5	-	-	211	5	-	-
December	Bomb Raids	3720	31	14189.2	9864	83	34828.1	-	13584	114	49017.3	-
	Minelaying	-	-	-	260	3	-	1160	260	3	-	1160
	Bomber Support and Intruders	30	-	-	1339	3	-	-	1369	3	-	-
	Other Sorties	16	-	-	104	1	-	-	120	1	-	-

Month	Type of Operation	(a) By Day			(b) By Night				(c) By Day and Night			
		Sorties Despatched	Aircraft Lost	Tons Dropped	Sorties Despatched	Aircraft Lost	Tons Dropped	Mines Laid	Sorties Despatched	Aircraft Lost	Tons Dropped	Mines Laid
January 1945	Bomb Raids	1303	11	5585.3	8326	108	27284.5	-	9629	119	32869.8	-
	Minelaying	-	-	-	159	6	-	668	159	6	-	668
	Bomber Support and Intruders	1	-	-	990	7	-	-	991	7	-	-
	Other Sorties	40	-	-	151	-	-	-	191	-	-	-
February	Bomb Raids	3669	9	11123.0	11396	144	34707.9	-	15065	153	45830.9	-
	Minelaying	-	-	-	292	9	-	1354	292	9	-	1354
	Bomber Support and Intruders	10	-	-	1581	8	-	-	1591	8	-	-
	Other Sorties	51	1	-	610	7	-	-	661	8	-	-
March	Bomb Raids	9605	52	40014.6	9247	150	27404.9	-	18852	202	67419.5	-
	Minelaying	-	-	-	276	5	-	1198	276	5	-	1198
	Bomber Support and Intruders	-	-	-	1569	13	-	-	1569	13	-	-
	Other Sorties	58	-	-	586	3	-	-	644	3	-	-
April	Bomb Raids	4234	22	15195.5	6962	40	19444.9	-	11196	62	34640.4	-
	Minelaying	-	-	-	280	3	-	1362	280	3	-	1362
	Bomber Support and Intruders	4	-	-	1493	7	-	-	1497	11	-	-
	Other Sorties	994	-	-	126	-	-	-	1120	-	-	-
May 1-8	Bomb Raids	-	-	-	142	-	179.6	-	142	-	179.6	-
	Minelaying	-	-	-	43	-	-	-	43	-	-	-
	Bomber Support and Intruders	-	-	-	161	3	-	-	161	3	-	-
	Other Sorties	3110	-	-	4	-	-	-	3114	-	-	-

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BOMB RAIDS  
SORTIES DESPATCHED AND ATTACKING, TONS DROPPED

Source: Air Ministry War Room Summary of Bomber Command Operations

Month	(a) By Day					(b) By Night					(c) By Day and Night				
	Aircraft		Tonnage			Aircraft		Tonnage			Aircraft		Tonnage		
	Des- patched	Attack- ing	H.E.	Incd.	Total	Des- patched	Attack- ing	H.E.	Incd.	Total	Des- patched	Attack- ing	H.E.	Incd.	Total
March 1944	18	16	14.2	-	14.2	8179	7512	16560.5	11123.6	27684.1	8197	7528	16574.7	11123.6	27698.3
April	10	8	6.7	-	6.7	8550	8138	26505.6	6982.8	33488.4	8560	8146	26512.3	6982.8	33495.1
May	18	11	13.5	-	13.5	9888	8810	34323.0	2913.6	37236.6	9906	8821	34336.5	2913.6	37250.1
June	2716	2394	10307.5	56.6	10364.1	13270	12052	46580.6	313.2	46893.8	15986	14446	56888.1	369.8	57257.9
July	6727	6038	26352.3	171.9	26524.2	8896	8214	29607.3	1458.5	31065.8	15623	14252	55959.6	1630.4	57590.0
August	10156	8775	40292.9	344.2	40637.1	7637	6929	18911.9	6299.8	25211.7	17793	15704	59204.8	6644.0	65848.8
September	10019	7898	36607.7	1039.0	37646.7	4524	4249	8994.3	5940.1	14934.4	14543	12147	45602.0	6979.1	52581.1
October	6758	6370	27189.6	4030.3	31219.9	8671	7771	23480.7	6498.9	29979.6	15429	14141	50670.3	10529.2	61199.5
November	5176	4903	22687.7	1663.4	24351.1	8079	7377	25351.4	3302.4	28653.8	13255	12291	48039.1	4965.8	53004.9
December	3720	3048	13546.9	642.3	14189.2	9864	9076	30306.8	4521.3	34828.1	13584	12124	43853.7	5163.6	49017.3
Jan. 1945	1303	1221	5563.6	21.7	5585.3	8326	7885	22615.0	4669.5	27284.5	9629	9106	28178.6	4691.2	32869.8
February	3669	2732	9123.5	1999.5	11123.0	11396	10451	24669.8	10038.1	34707.9	15065	13183	33793.3	12037.6	45830.9
March	9605	9094	35570.3	4444.3	40014.6	9247	8881	21711.1	5693.8	27404.9	18852	17975	57281.4	10138.1	67419.5
April	4234	3267	15048.9	146.6	15195.5	6962	6641	19144.1	300.8	19444.9	11196	9908	34193.0	447.4	34640.4
May 1-8	-	-	-	-	-	142	138	177.4	2.2	179.6	142	138	177.4	2.2	179.6

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APPENDIX No. 14

MONTHLY ANALYSIS OF OPERATIONAL EFFORT  
1 MARCH 1944 - 8 MAY 1945

(a) By Night

Source: Air Ministry War Room Summary of Bomber Command Operations

Month	No Operations Undertaken	Special Duties, Mining - R. C. M., Leaflets only	Bombing Operations	Total number of nights operated	No. of nights involving sorties of:-				
					1-49	50-149	150-299	300-499	500 and over
March 1944	1	1	29	30	6	8	5	3	8
April	6	2	22	24	2	8	4	1	9
May	3	1	27	28	3	9	-	4	12
June	-	2	28	30	5	1	3	6	15
July	-	4	27	31	9	7	3	-	12
August	4	5	22	27	4	12	2	1	8
September	4	3	23	26	3	12	2	6	3
October	2	4	25	29	4	14	-	2	9
November	4	3	23	26	4	7	4	3	8
December	3	4	24	28	6	4	1	6	11
January 1945	6	4	21	25	8	6	-	1	10
February	2	3	23	26	3	6	5	1	11
March	-	2	29	31	4	8	6	3	10
April	1	6	23	29	6	5	11	-	7
May 1-8	1	5	1	6	-	-	-	1	-
<b>Total</b>	<b>37</b>	<b>49</b>	<b>347</b>	<b>396</b>	<b>67</b>	<b>107</b>	<b>46</b>	<b>38</b>	<b>133</b>

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APPENDIX No. 15

MONTHLY ANALYSIS OF OPERATIONAL EFFORT

1 MARCH 1944 - 8 MAY 1945

(b) By Day

Source: Air Ministry War Room Summary of Bomber Command Operations

Month	No Operations Undertaken	Intruders, Bomber Support, Met. Recce. only	Bombing Operations	Total Number of Days Operated.	No. of Days involving Sorties of:-				
					1-49	50-149	150-299	300-499	500 and over
March 1944	10	13	8	21	21	-	-	-	-
April	12	13	5	18	18	-	-	-	-
May	7	15	9	24	24	-	-	-	-
June	1	17	12	29	19	2	3	5	-
July	-	5	26	31	10	7	4	7	3
August	1	6	24	30	8	4	6	4	8
September	-	6	24	30	6	6	4	3	11
October	-	11	20	31	10	9	5	3	4
November	1	10	19	29	11	3	11	2	2
December	2	10	19	29	12	4	10	3	-
January 1945	8	13	10	23	14	5	4	-	-
February	-	11	17	28	15	2	7	2	2
March	-	7	24	31	7	4	9	3	8
April	1	12	17	29	14	5	6	-	4
May 1-8	-	8	-	8	-	1	1	3	3
<b>Total</b>	<b>43</b>	<b>157</b>	<b>234</b>	<b>391</b>	<b>189</b>	<b>52</b>	<b>70</b>	<b>35</b>	<b>45</b>

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DISTRIBUTION OF EFFORT OF BOMBER COMMAND

APRIL 1944 - MAY 1945 (QUARTERLY)

Months	Cities in Germany	Railway Targets	Coastal Defences Troops, etc.	Oil Targets	Crossbow Targets	G.A.F. Targets	Special Industrial Targets	Miscellaneous Targets	Naval Targets
April to June 1944	17.4%	38.4%	21.7%	-	13.2%	-	-	7.8%	1.5%
July to September	20%	15%	20%	11%	25%	6%	-	1%	2%
October to December	53%	15%	13%	14%	-	-	-	-	5%
1 January to 8 May 1945	36.6%	15.4%	14.4%	26.2%	-	4%	.7%	2%	6.1%

Source: R.A.F. Bomber Command Quarterly Review

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APPENDIX No. 15

SUMMARY OF OIL CAPACITY, PRODUCTION AND  
ATTACK DATA FOR GREATER GERMANY

Type of Plant	Hydro- genation	Fischer Tropsch	Refineries	Benzol and Misc.	Total
Number of plants attacked	16	9	40	22	87
Capacity in thousand tons per year	4,041	587	2,000+	1,632*	8,260
Percentage of total German capacity	49.0	7.1	24.2	19.7	100.
Average output in 4 months, 1944 (i.e. before attacks) in thousand tons	316	43	167	136	662
Percentage of total German output over period	47.8	6.7	25.2	20.3	100.0
Tons dropped by U.S.A.A.F.	50,650	7,462	35,719	5,009	98,840
Tons dropped by R.A.F.	36,298	29,176	9,379	12,148	87,001
Total tons dropped	86,948	36,638	45,098	17,157	185,841
Percentage of grand total tons dropped	46.8	19.7	24.3	9.2	100.0
Number of H.E. bombs U.S.A.A.F.	273,942	34,968	181,151	18,451	508,512
Number of H.E. bombs R.A.F.	107,002	95,685	28,052	33,203	263,942
<u>Total</u>	380,944	130,653	209,203	51,654	772,454
Attacks by U.S.A.A.F.	132	32	156	27	347
Attacks by R.A.F.	53	56	20	29	158
<u>Total attacks</u>	185	88	176	56	505
Percentage of attacks by U.S.A.A.F. by process	71.4	36.4	88.6	48.2	68.7
Percentage of attacks by R.A.F. by process	28.6	63.6	11.4	51.8	31.3
Percentage of total number of attacks by process	36.6	17.4	34.9	11.1	100.0
Average tonnage per attack (U.S.A.A.F.)	384	233	229	186	285
Average tonnage per attack (R.A.F.)	685	521	469	419	551
Average over-all tonnage per attack	470	416	256	306	368
Average weight per bomb (H.E.) pounds -					
U.S.A.A.F.	370	427	394	543	388
R.A.F.	678	610	669	731	660
Average weight all bombs H.E. (pounds)	457	561	431	664	482
Percentage of total tons dropped by U.S.A.A.F.					53.2
Percentage of total tons dropped by R.A.F.					46.8

+ Refineries had 3,000,000 tons crude distilling capacity and 5,000,000 tons including intermediate running capacity.  
\* Based on monthly production.

NOTE - Capacity tons figured in metric tons. Bombing tons figured in short tons. All bomb tonnages from 1st May, 1944, through 8th May, 1945 (high explosive bombs only - approximately 5,400 tons of incendiaries not included). Tonnages for targets outside Greater Germany are not included.

Source A.H.B./IA/21

TONNAGES (SHORT) DROPPED BY R.A.F. BOMBER COMMAND IN ACCORDANCE WITH MAIN DIRECTIVES

Target Systems	7 March 1944 to 6 June 1944 (First Period SHAEF Control)		7 June 1944 to 15 September 1944 (Second Period SHAEF Control)		16 September 1944 to 31 December 1944 (Top Priority Oil)		1 January 1945 to 5 May 1945 (Top Priorities Oil and Communications)	
	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort
Aircraft Factories etc.	2344	2.02	-	1 -	28	.01	-	-
Airfields	2859	2.47	11187	5.40	3164	1.49	1140	.57
Radar Installations	2586	2.24	521	.25	-	-	-	-
All Aircraft Targets	7789	6.73	11708	5.65	3192	1.50	1140	.57
Docks and Port Areas	29	.02	7757	3.71	5308	2.50	17277	8.69
Military Installations	17038	14.72	27442	13.14	46025	21.69	25330	12.74
Long Range Weapon Installations	1842	1.59	69649	33.35	-	-	-	-
Oil Plants and Equipment	-	-	13588	6.51	23843	11.24	50766	25.53
Fuel Dumps	-	-	10851	5.20	3	-	1351	.68
All Oil Targets	-	-	24439	11.70	23846	11.24	52117	26.21
Ball Bearing Plants	113	.15	-	-	-	-	-	-
Ordnance Targets	2807	2.37	4254	2.04	190	.09	-	-
Power Targets	-	-	7	-	-	-	381	.19
Steel and Coke	452	.39	16	.01	390	.18	10	.005
Other Industries	782	.68	1423	.68	3382	1.59	1876	.94
All Industrial Targets	4154	3.88	5700	2.73	3962	1.86	2267	1.14
Towns	40533	35.01	29423	14.09	102226	48.19	73130	36.78
Railway Centres	44356	38.31	31832	15.24	22113	10.45	20475	10.30
Bridges and Viaducts	-	-	902	.43	-	-	2596	1.30
Waterways etc.	-	-	-	-	5333	2.51	4271	2.15
All Transportation Targets	44356	38.31	32734	15.67	27446	12.96	27342	13.75
Miscellaneous	31	.03	-	-	134	.06	232	.12
Totals by type of target system	115772	100	283433	100	212139	100	198835	100

Source: B.B.S.U. Report The Strategic Air War Against Germany, 1939-1945

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APPENDIX No. 18

TONNAGES (SHORT) DROPPED BY VIIIITH U.S.A.A.F. IN ACCORDANCE WITH MAIN DIRECTIVES

Target Systems	17 April 1944 to 6 June 1944 (First Period SHAEP Control)		7 June 1944 to 15 September 1944 (Second Period SHAEP Control)		16 September 1944 to 31 December 1944 (Top Priority Oil)		1 January 1945 to 5 May 1945 (Top Priorities Oil and Communications)	
	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort	Tonnage	Percentage of Total Effort
Aircraft Factories etc.	11,948	16.88	23,008	14.48	2,256	1.58	3,410	1.64
Airfields	12,177	17.21	29,526	18.59	8,780	6.13	15,955	7.70
Radar Installations	-	-	173	.11	-	-	-	-
All Aircraft Targets	24,125	34.09	52,707	33.18	11,036	7.71	19,365	9.34
Docks and Port Areas	70	.10	2,441	1.54	362	.25	12,705	6.13
Military Installations	1,446	2.04	547	.34	3,351	2.34	17,792	8.59
Long Range Weapon Installations	9,239	13.06	21,710	13.66	-	-	-	-
Oil Plants and Equipment	3,834	5.42	31,641	19.92	23,200	16.20	16,502	7.96
Fuel Dumps	-	-	2,276	1.43	8	-	3,377	1.63
All Oil Targets	3,834	5.42	33,917	21.35	23,208	16.20	19,879	9.59
Ball Bearing Plants	-	-	1,355	.85	90	.06	-	-
Ordnance Targets	-	-	3,076	1.94	8,283	5.78	11,045	5.33
Power Targets	1,027	1.45	1,916	1.21	1,180	.83	458	.22
Steel and Coke	-	-	349	.22	-	-	3	-
Other Industries	897	1.27	8,966	5.64	13,474	9.41	7,280	3.51
All Industrial Targets	1,924	2.72	15,662	9.86	23,027	16.08	18,786	9.06
Towns	11,588	16.38	12,535	7.89	3,926	2.74	1,572	.76
Railway Centres	15,699	22.19	12,371	7.79	62,537	43.66	104,431	50.39
Bridges and Viaducts	559	.79	6,932	4.36	5,562	3.88	12,725	6.14
Waterways etc.	2,274	3.21	-	-	7,883	5.50	2	-
All Transportation Targets	18,532	26.19	19,303	12.15	75,982	53.04	117,158	56.53
Miscellaneous	-	-	40	.03	2,351	1.64	-	-
Totals by type of target system	70,758	100	158,862	100	143,243	100	207,257	100

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APPENDIX No. 19

BOMBER COMMAND AND EIGHTH AIR FORCE ATTACKS AGAINST TRANSPORTATION TARGETS, NOVEMBER 1944 - APRIL 1945

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Month 1944	Attacking Force	SCHEDULED TARGETS			UNSCHEDULED TARGETS			GRAND AND COMBINED TOTALS
		Tonnage dropped under visual Conditions	Tonnage dropped under non-visual Conditions	Totals and Combined Totals	Tonnage dropped under visual Conditions	Tonnage dropped under non-visual Conditions	Totals and Combined Totals	
Nov.	R.A.F. 8th U.S.A.A.F.	-	4,510	4,510	-	349	349	4,859
		902	8,530	9,432	316	3,726	4,042	13,474
		-	-	13,942	-	-	-	18,333
Dec.	R.A.F. 8th U.S.A.A.F.	-	6,663	6,663	-	11,000	11,000	17,663
		3,185	14,373	17,558	2,867	7,730	10,597	28,155
		-	-	24,221	-	-	21,597	45,818
1945								
Jan.	R.A.F. 8th U.S.A.A.F.	569	2,872	3,441	831	4,754	5,585	9,026
		678	8,486	9,164	3,032	11,208	14,240	23,404
		-	-	12,605	-	-	19,825	32,430
Feb.	R.A.F. 8th U.S.A.A.F.	182	3,972	4,154	-	2,934	2,934	7,088
		235	9,148	9,383	6,144	18,913	25,057	34,440
		-	-	13,537	-	-	27,991	41,528
Mar.	R.A.F. 8th U.S.A.A.F.	1,228	3,036	4,264	25	1,437	1,462	5,726
		4,099	8,421	12,520	2,357	12,005	14,362	26,882
		-	-	16,784	-	-	15,824	32,608
Apr.	R.A.F. 8th U.S.A.A.F.	-	5,669	5,669	-	2,240	2,240	7,909
		8,712	2,937	11,649	1,338	2,159	3,497	15,146
		-	-	17,318	-	-	5,737	23,055
TOTALS	R.A.F. 8th U.S.A.A.F.	1,979	26,722	28,701	856	22,714	23,570	52,271
		17,811	51,895	69,706	16,054	55,741	71,795	141,501
		-	-	98,407	-	-	95,365	193,772

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APPENDIX No. 20