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AIR OPERATIONS BY THE ALLIED EXPEDITIONARY AIR FORCE IN N.W. EUROPE FROM NOVEMBER 15TH, 1943 TO SEPTEMBER 30TH, 1944.

The following despatch by the late Air Chief Marshal Sir Trafford Leigh-Mallory, K.C.B., D.S.O., Air Commander-in-Chief, Allied Expeditionary Air Force, was submitted to the Supreme Allied Commander in November, 1944.

On relinquishing my command of the Allied Expeditionary Air Force I have the honour to submit the following Despatch, covering its operations under my command during the period from 15th November, 1943 to 30th September, 1944.

Since this Despatch covers the air support of the assault of Europe and the subsequent land operations, it necessarily includes reference to the strategical operations of the United States Eighth Air Force and the Royal Air Force Bomber Command in addition to the operations of these two Air Forces and the Royal Air Force Coastal Command directed to the tactical support of the assault.

As the period covered by the Despatch extends over ten and a half months of the most heavy and concentrated air war in the history of the world, I have not attempted to deal with the events on a day-to-day basis. Rather I have taken the tasks undertaken in the preliminary and preparatory phases and in the assault and post-assault phase and have attempted to show how these tasks were fulfilled, as well as briefly indicating what I feel are some of the outstanding features of these air operations.

PART I—COMMAND AND CONTROL

Formation of A.E.A.F.

By a Directive (reference COSSAC (43) 81) dated 16th November, 1943, issued by your Chief of Staff, I was informed that the Combined Chiefs of Staff had appointed me Air Commander-in-Chief of the Allied Expeditionary Air Force under yourself as the Supreme Allied Commander, and that I was to exercise operational command of the British and American tactical air forces supporting the assault of Western Europe from the United Kingdom. I was also informed that a United States General would be appointed Deputy Air Commander-in-Chief, Allied Expeditionary Air Force. Major-General William O. Butler was the first General Officer to hold this post. He served in this capacity from 1st January, 1944, to 25th March, 1944, and was succeeded by Major-General Hoyt S. Vandenberg who occupied the position until 8th August, 1944. Major-General Ralph Royce then held this appointment until the disbandment of A.E.A.F. on 14th October, 1944.

Forces available

2. The forces under my command comprised the Royal Air Force Second Tactical Air Force, the United States Ninth Air Force and the forces of the Air Defence of Great Britain. The Royal Air Force Second Tactical Air Force and the formations of the Air Defence of Great Britain passed to my command on 15th November, 1943; the United States Ninth Air Force passed to my operational command on 15th December, 1943, but was not released from its commitment to assist the United States Strategic Air Forces in " Pointblank " operations until 10th March, 1944.

3. You will recall that a definition of the role of the strategic air forces was not covered in the original Directive to me, but was deferred to a later date. However, my plans were made on the assumption that I should be able to count on the full support of the strategic air forces when it was required.

4. On 17th November, 1943, I issued a Directive to the Air Marshal Commanding, Royal Air Force Second Tactical Air Force and to the Commanding General, United States Ninth Air Force, in which I informed them of my appointment as Air Commander-in-Chief and of the respective dates on which their units came under my operational control. I further directed that these forces should proceed, without delay, to prepare for operations in support of two British and two American Field Armies in an assault on the Continent. I also issued a Directive to the Air Marshal Commanding, Air Defence of Great Britain, setting out the functions and organisation of the Air Defence of Great Britain, following on its conversion from Royal Air Force Fighter Command.

5. On 6th December, 1943, I issued a further Directive to the forces under my command, outlining the " Overlord " plan and defining the control that I would exercise as Air Commander-in-Chief. A table showing these forces and the chain of command is at Appendix " A " (not reproduced).

Operation " Pointblank "

6. During the preliminary period of preparation for the assault, in late 1943 and early 1944, the medium and light bomber forces of the Allied Expeditionary Air Force continued to lend support to Operation " Pointblank." This was the name given to the combined bomber plan of the strategical bombing forces which had as its aims, first, the reduction of the fighter forces of the G.A.F., second, the general reduction in the war potential of Germany, and third, the weakening of the will of the German people to continue the struggle. The co-ordination of these operations was effected through a Combined Operational Planning Committee, which was a joint British/American Fighter and Bomber Committee responsible for planning daylight operations when the United States Army Air Force heavy bombers took part. During this preliminary period, the operations by Allied Expeditionary Air Force medium and light bombers in conjunction with, and in support of United States Eighth Air Force were given precedence over any other daylight operations. A second Committee, known as the 11 Group Planning Committee, co-ordinated operations of the medium and light bombers of the Allied Expeditionary Air Force other than those in the support role mentioned above. The activities of the fighter forces of the Allied Expeditionary Air Force as escort to, and in support of, bombing operations were also co-ordinated through these Committees.

Ninth Air Force Released from " Pointblank " Commitments

7. On 10th March, 1944, I forwarded a Directive to Commanding General, United States Ninth Air Force, advising him that you, as the Supreme Allied Commander, had decided that the time had come for the operations of the Ninth Air Force to be directed towards the preparation for Operation " Overlord " and that it would, therefore, operate exclusively under the Allied Expeditionary Air Force and be released from the commitment to assist the United States Eighth Air Force in " Pointblank " operations. As an exception to this ruling, such fighters of the United States Ninth Fighter Command as were suitable and available continued to operate as escort to the United States Eighth Air Force when required.

8. At this time also, I advised the forces under my command that the most important assistance the Allied Expeditionary Air Force could give the Army during the preparatory phase would be by attacking the enemy's rail communications, with the object of so disorganising his railway system that he would find it difficult to supply his divisions in Northern France when the fighting started and still more difficult to bring reinforcements into the lodgment area. Selected rail centres were, therefore, put in the first priority for attack.

Role of Strategic Air Forces

9. Until March, 1944, strategic air forces comprising the United States Eighth Air Force and Royal Air Force Bomber Command, continued to be employed on Operation " Pointblank " under the direction of the British Chief of Air Staff acting as a representative of the Combined Chiefs of Staff. In March, 1944, as the completion of the preparatory tasks for Operation " Overlord " became more urgent, the Combined Chiefs of Staff directed that " Overlord " should have priority over " Pointblank " and that the direction of strategic air forces should pass from the British Chief of Air Staff to yourself as the Supreme Allied Commander, on 14th April, 1944.

10. You instructed your deputy, Air Chief Marshal Sir Arthur W. Tedder, G.C.B., to exercise for you general supervision of all air forces, particularly in the co-ordination of the efforts of heavy bomber forces to be employed on operations " Pointblank " and " Overlord ". I was responsible to you for all air operations in connection with the latter plan and I accordingly passed to Air Chief Marshal Tedder my requirements for heavy bomber effort both in the preparatory and assault phases. During May, 1944, the Deputy Supreme Allied Commander decided that all air operations could be more easily planned and laid on at a single headquarters, and the Air Operations Planning Staff of Supreme Headquarters was moved to my Headquarters. The Deputy Supreme Allied Commander and the Commanders of the strategical and tactical air forces then regularly attended my daily conferences at Stanmore, thus enabling all operation orders covering all air forces occupied with " Overlord " tasks, to be co-ordinated and given rapidly to the forces to be employed.

Formation of Advanced A.E.A.F.

11. In order to achieve the most economical and effective employment of the air forces at my disposal for the assault and its subsequent development, I considered it essential that the air operations in immediate and direct support of the land battle should be specially co-ordinated and directed. I, therefore, decided to establish a small operational organisation to be known as Advanced Allied Expeditionary Air Force. Under my general direction, the Commander Advanced A.E.A.F. was given the task of directing and co-ordinating the planning for and operations of such forces of the United States Ninth Air Force and Royal Air Force Second Tactical Air Force as were allotted to him from time to time.

12. Air Marshal Sir Arthur Coningham, K.C.B., D.S.O., M.C., D.F.C., A.F.C., was appointed Commander, Advanced Allied Expeditionary Air Force, and he undertook this responsibility on detachment from the Second Tactical Air Force. The Commander, Advanced A.E.A.F. was the one air commander with whom the Commander-in-Chief, 21st Army Group dealt in his capacity as Commander-in-Chief, Land Forces, during the initial phases of the operation. The Commander, Advanced A.E.A.F. had the necessary authority to implement the requests for air action made by the Army, referring to me any requests for air support beyond the resources of the two tactical air forces. Headquarters, Advanced A.E.A.F. was set up at Uxbridge on 1st May, 1944. Its War Room, where meetings to co-ordinate operations of the tactical air forces were held daily, was adjacent to the Combined Operations Room and the Combined Control and Reconnaissance Centres referred to below.

Machinery of Control of Tactical Air Forces

13. Throughout the preparatory and assault periods, the control of the fighter bombers and the light and medium bombers of the two tactical air forces was exercised through a Combined Operations Room located at Uxbridge. This Operations Room was staffed by representatives of the United States Ninth Air Force and the Royal Air Force Second Tactical Air Force. Also under the direction of the Commander, Advanced A.E.A.F., a Combined Control Centre was set up and operated by the Air Officer Commanding No. 11 Group, Royal Air Force, with the full collaboration of the Commanding General, United States IXth Fighter Command and with authoritative representation of the United States Army VIIIth Fighter Command. This Combined Control Centre was manned by a British/American staff and was, in effect, the Operations Room of No. 11 Group, Air Defence of Great Britain, with the complete static signals system of the old organisation developed over a long period and augmented by additional communication facilities. This Centre planned, co-ordinated and controlled all fighter operations in the initial phases of the operations; it was also responsible for issuing executive instructions for the fighter bombers.

14. A Combined Reconnaissance Centre was also operated under the command of the Commander, Advanced A.E.A.F. to co-ordinate and direct the visual and photographic reconnaissance efforts of both the British and United States reconnaissance forces, during the initial phases.

15. At Appendix "B"* is a diagram, setting out the chain of control and the locations of various Headquarters at the time of the Assault. Modifications in this chain of control were made later as they became necessary. Headquarters, Royal Air Force Second Tactical Air Force and Headquarters, United States Ninth Air Force moved overseas on 4th August, 1944, and Headquarters, Advanced A.E.A.F. moved to the Continent on 9th August, 1944; to economise in communications, this Headquarters was located alongside Headquarters, United States Ninth Air Force. It continued in the field alongside this latter Headquarters (which was located next to 12th United States Army Group), in the advance from the Cotentin Peninsula to the Paris area, where it was located at Versailles. Main Headquarters, A.E.A.F. moved from Stanmore to the Continent on 8th September, 1944, and was located alongside your own Headquarters at Julouville. Communications at that place were quite inadequate to meet the needs of a headquarters of the size concerned, and Main Headquarters A.E.A.F. moved with Supreme Headquarters to Versailles on 19th September, 1944.

16. Plans had been drawn up for the further move of Advanced Headquarters, A.E.A.F. with Advanced Headquarters Ninth Air Force to Verdun. In view of impending developments, chiefly the absorption of A.E.A.F. into S.H.A.E.F., these plans were not put into operation. Headquarters, Advanced A.E.A.F. was therefore merged into Headquarters Main A.E.A.F. at 1200 hours on 23rd September, 1944.

PART II.—POLICY AND PLANNING.

(a) *Operations prior to D-Day.*

Operation "Overlord".

17. Operation "Overlord" was part of a large strategic plan designed to bring about the defeat of Germany by heavy and concerted assaults on German-occupied Europe from the United Kingdom, the Mediterranean and Russia. A Joint Study and Outline Plan for Operation "Overlord" was completed in July, 1943. This plan was elaborated in more detail under the title "Neptune"—Initial Joint Plan and Maintenance Project/Administrative Plan—by the Allied Naval Commander-in-Chief, the Commander-in-Chief, 21st Army Group and myself. Operation "Neptune" provided for the launching of an assault from the United Kingdom across the English Channel, designed to secure a lodgment area on the Continent, from which wider offensive operations could be developed.

18. To cover the operations of all air forces allotted to Operation "Neptune", an Overall Air Plan was evolved, which set out briefly the Joint Plan, the command and control of air forces involved, the principal air tasks and their development through the preliminary and preparatory phases, the assault and follow-up, and air operations subsequent to the assault and securing of the lodgment area. The main features of the Overall Air Plan are more fully dealt with in paragraphs 25 and 26 below.

19. To supplement the Initial Joint Plan for Operation "Neptune", joint instructions and memoranda were issued by the Commanders-in-Chief of the Naval, Army and Air Forces.

Administrative and Signals Planning.

20. To supplement the Overall Air Plan, additional Operational and Administrative Instructions were prepared and issued. In particular, comprehensive Administrative plans were issued for the Royal Air Force formations in A.E.A.F. and the United States Ninth Air Force. These Administrative plans, which were issued separately, were based on three previously agreed fundamental decisions:—

(*a*) The relative administrative responsibilities of the Army and Air Forces in the field. The division laid down was closely followed and, in practice, worked excellently.

* Appendices not reproduced.

(*b*) Since the United States Army Air Force and the Royal Air Force respectively depended on separate administrative systems, no attempt to combine them should be made, except where advantage was clearly to be gained.

(*c*) The main base was to be the United Kingdom, and the principal administrative units were not to be moved to the Continent until it was clearly advantageous to do so.

21. These Administrative Plans were supplemented from time to time by additional Administrative Instructions issued by my Headquarters.

22. The completeness of these administrative plans and the accuracy of forecasting which was used enabled the air forces involved to fulfil all of the commitments laid upon them, and in the midst of their heaviest operations, to move across the Channel without any diminution of their effectiveness. This, I feel, constitutes a major triumph of organisation. Some details of the problems involved and overcome in this planning and administration are given in Part IV of this Despatch.

23. A comprehensive Signal Plan for Operation "Neptune" was also issued by my Headquarters. This plan was implemented with success on the whole. I deal with certain features of Signals Communications in Part IV of this Despatch.

24. To supplement the Overall Air Plan as necessary, Air Staff Policy and Operational Instructions were also issued by my Headquarters. Operational Memoranda and Administrative Memoranda were additionally issued by your Headquarters in cases where two or more of the Services were affected.

Overall Air Plan.

25. In the Overall Air Plan I set out the undermentioned principal air tasks for the forces under my command and for the allotted effort of the strategical air forces and Royal Air Force Coastal Command. These tasks were decided upon after discussions with yourself and the respective Commanders-in-Chief as to the requirements of the Army and the Navy from the air forces.

(*a*) To attain and maintain an air situation whereby the German Air Force was rendered incapable of effective interference with Allied operations.

(*b*) To provide continuous reconnaissance of the enemy's dispositions and movements.

(*c*) To disrupt enemy communications and channels of reinforcement and supply.

(*d*) To support the landing and subsequent advances of the Allied armies.

(*e*) To deliver offensive strikes against enemy naval forces.

(*f*) To provide air lift for airborne forces.

26. The co-ordination of the Air Plans with those of the other services was achieved by weekly meetings between the other Commanders-in-Chief and myself, together with our respective Chiefs of Staff and Chief Planners. These meetings, held alternately in the office of the planning centre of each of the three Services, ensured that each service was kept informed of the relative development of planning.

Objects of Preparatory Bombing.

27. I considered that the primary objective of preparatory bombing should be to impose the greatest possible delay in the movement of the enemy reinforcements and supplies, and to this end, the railway bombing plan was designed. The object of this plan was to produce a lasting and general dislocation of the railway system in use by the enemy. By so doing the capacity of the system as a whole would be greatly reduced, and the task of dealing with isolated movement once the battle was joined would be made all the easier. Accordingly, the primary targets planned for attack were the railway centres where the most important servicing and repair facilities of Northern France and the Low Countries were located; the secondary targets were the principal marshalling yards, particularly those which possessed repair facilities. The selection of targets was made difficult in some cases by the necessity of avoiding heavy civilian casualties or damage to historic buildings. Where railway centres were situated in thickly populated areas (as at Le Bourget, for example), alternative centres were chosen in order to isolate them. A further limitation was imposed by the necessity to pinpoint the attacks on these targets; this demanded visual bombing conditions for day attacks and clear weather during moon periods for night attacks. The possibility of unreliable weather, particularly round about D-Day, was one of the major factors which dictated an early commencement of this plan; in fact the weather did seriously hamper its execution. The development of the railway plan and some indication of its success are set out in Part III of this Despatch.

28. Complementary to the railway plan, a further plan was made, covering the destruction of road and rail bridges. This plan which called for the cutting of the Seine bridges below Paris and the bridges over the Loire below Orleans was put into operation at D−30.

29. In the formulation and adoption of these plans to cause the maximum overall interference with enemy movements, it was fully appreciated, that the more successful were our attacks, the more embarrassing it would be to the Allied Armies when they came to move through the same area. This disadvantage though serious, was felt by the planners to be outweighed by the advantage of preventing the enemy from bringing in to the assault area sufficient reinforcements to contain the Allied bridgehead. I have dealt with this subject further in the section dealing with post-assault operations in Part III of this Despatch.

30. Other preparatory bombing plans included attacks on coastal batteries, enemy naval and military targets and the Radar chain. It was necessary to remember when making these plans that the enemy should not be given any indication of the area selected for the assault. The principal effect of this on the preparatory air operations was that at least two attacks were made on each type of target outside of the projected assault area to one attack on a target within that area.

Estimation of G.A.F. Capabilties.

31. I was confident that the German Air Force would constitute no serious threat to our operations on land, sea or in the air. However, I could not dismiss the possibility that the enemy was conserving his air forces for a

maximum effort against the Allied assault forces. A bombing plan was therefore prepared which aimed at driving the G.A.F. fighters on to bases as far from the battle as were the Allied fighter forces, by destroying its bases within 130 miles radius of the assault area. Enemy bomber bases even further inland were also scheduled for attack.

32. Moreover, as I considered it possible that an intense air battle might last for anything up to a week following the launching of the assault, it was necessary to have on hand a strong enough force of fighter aircraft to ensure that the enemy would be completely mastered in any such battle. I refer to the constitution and use of this fighter force in Part III of this Despatch.

" Crossbow " Operations.

33. Throughout the whole of the preliminary and preparatory phases of the operation, I had to take into account the need to maintain a sufficient weight of bombing attacks on " Noball " targets. " Noball " was the code word used to designate the sites being prepared by the enemy for attacks on the United Kingdom with flying bombs and rockets. The operations against these sites carried out under the title of " Crossbow " had begun as early as 5th December, 1943, and constituted a considerable diversion of bomber effort. This bombing, while it did not, of itself, succeed in completely eliminating the menace of the flying bomb, was fully justified, in view of the fact that the original scheme had to be abandoned by the Germans. Details of the effort involved and an indication of the results achieved are given in Part III of this Despatch.

34. The diversion of bombing effort on to " Noball " targets, however, was not wholly unprofitable, even if judged from the point of view of " Neptune " alone. The medium and light bomber crews gained invaluable experience in finding and attacking small and well concealed targets and inevitably improved their standard of bombing accuracy. Moreover, much of the flying in these winter and spring months was carried out in very bad weather conditions. Again the crews gained invaluable experience in instrument flying through bad weather. These were all gains that were to stand us in good stead later in the battle.

(b) *Operations during the Assault.*

35. My plan for the use of air power in direct support of the assault called for the fulfilment of the following principal air tasks:—

(*a*) To protect the cross-channel movement of the assault forces against enemy air attack, and to assist the Allied naval forces to protect the assault craft and shipping from enemy naval forces.

(*b*) To prepare the way for the assault by neutralising the coast and beach defences.

(*c*) To protect the landing beaches and the shipping concentrations from enemy air attack.

(*d*) To dislocate enemy communications and control during the assault.

To accomplish these tasks, detailed plans were produced and a record of the manner in which these plans were put into operation appears in Part III of this Despatch.

(c) *Operations Subsequent to D-Day.*

36. The planning of air operations during the post-assault phase of the battle was along two lines. The first part included the continuation and expansion of attacks designed to interfere with the movements of enemy supplies and reinforcements, in addition to other detailed plans covering the operations of the heavy bomber forces in close support. These plans were produced at my main headquarters. The second part of post-assault planning covered the changing needs of the ground situation and this day-by-day planning was co-ordinated and controlled through the headquarters of Advanced A.E.A.F.

37. In the foregoing paragraphs I have set out briefly the main principles which guided the planning of air operations before, during and after the assault. A general picture of these air operations as planned is given in the attached map.* More detailed descriptions of the individual plans evolved to implement these principles will be found in Part III where such descriptions fit in more logically. In the final part of this Despatch I have included some considerations governing our general planning.

38. I should like to emphasise that my Planning Staff, like my Operations Staff, was Allied in the true sense of the word, and that both the American and British components worked together most successfully under the direction of my Senior Air Staff Officer, Air Vice Marshal H. E. P. Wigglesworth, C.B., C.B.E., D.S.C.

PART III—NARRATIVE OF OPERATIONS.

(a) *Preliminary Period.*

Air Superiority essential.

39. Air superiority was the principal prerequisite for the successful assault of Europe from the West. The winning of air superiority was therefore the cardinal point of air planning. Air operations to ensure that the requisite degree of air superiority had been gained by D-Day were begun in the preliminary phase and continued during the preparatory phase. On D-Day itself a series of concentrated attacks was made on the G.A.F. airfields in the pre-selected area; but as a result of the earlier operations, I was confident that the necessary degree of air ascendancy had been gained sometime before D-Day and advised yourself, the Allied Commanders and the Chiefs of Staff to this effect. In the event, the German Air Force was more impotent than I expected.

40. I have set out in the following paragraphs some of the efforts of the strategical bomber forces directed to securing air superiority during the preliminary period. The medium and light bomber forces of the A.E.A.F. were throughout this period engaged in support of the stragetical bomber programme and in meeting the commitment for attacks on flying bomb and rocket sites.

41. The long-term strategic bombing plan directed against enemy centres of production and assembly of aircraft and aircraft components, principally by the United States Eighth Air Force and also by Royal Air Force Bomber Command, and the United States Fifteenth Air Force operating from the Mediterranean, inflicted crippling blows on the supply and maintenance organisation of the German Air Force.

* Maps not reproduced.

Moreover, the heavy daylight raids of the United States Eighth Air Force into Germany achieved a steady attrition of the German fighter forces.

Attrition of the G.A.F.

42. How crippling these blows were on German aircraft production is illustrated by information obtained from intelligence sources. A comprehensive picture of the effects of direct air attack in terms of enemy single-engine fighter production during the five months from 1st November, 1943 to 1st April, 1944 can be gained from the estimates below:—*

	Planned	*Achieved*
November	1,280	600
December	1,335	600
January	1,415	650
February	1,480	600
March	1,555	500
	7,065	2,950

43. The difference between the production planned and achieved totals 4,115 aircraft, an average loss to the enemy of more than 820 single-engined fighters per month.

44. These figures ignore the heavy losses sustained by German Air Force fighters in air attacks on their airfields and in combat; also the effective attacks on the factories producing twin-engined fighters must be taken into account.

45. Parallel with the attacks on production centres by the strategic air forces, a campaign of day and night intruding against enemy airfields, designed to hamper enemy training schedules as well as to destroy the enemy in the air, was carried out by aircraft of A.E.A.F. with very great success. In addition, many heavy attacks were made in the preliminary period on the enemy's airfields, which achieved considerable destruction of airfield facilities.

46. It became evident during this period (November, 1943, to May, 1944) that the High Command of the German Air Force was pursuing a policy of conserving its air forces for the defence of vital targets only. This policy made it extremely difficult to get the G.A.F to fight. Even large scale fighter sweeps failed to produce any serious reaction. However, in the period from 15th November, 1943, the date of the formation of A.E.A.F., to the 5th June, 1944, the eve of D-Day, the Allied forces accounted for the following enemy aircraft in air combat alone (see foot of page).

47. This enormous attrition of G.A.F. strength is based on claims of enemy aircraft destroyed in combat alone; no account is taken in these statistics of aircraft destroyed on the ground. Of the figures given above no less than 2,655 enemy aircraft were destroyed by Allied Air Forces operating out of the United Kingdom during what I have termed the preparatory period of the assault, namely 1st April to 5th June, 1944. I deal with the planned attacks on the G.A.F. and its bases in France during this preparatory period in para. 129 et seq.

(b) *Preparatory Period.*

Method of Presentation.

48. Since the war began all attacks against enemy targets have, in some measure, influenced the situation prevailing on the eve of the assault. The commencement of the preparatory phase for this Despatch I have, however, fixed at 1st April, 1944, except in so far as detailed co-ordinated plans for attacks on targets of specific importance within the framework of the "Neptune" plan were in operation earlier. In these cases, I have included all the attacks made in accordance with the complete plan.

49. For convenience of presentation, I have dealt with these preparatory operations under the headings set out below. These headings cover the various operations planned and carried out to fulfil the tasks laid on to the air forces (see paragraph 25):—

Dislocation of Enemy Lines of Communication, including Destruction of Bridges.
Neutralisation of Coastal Defences.
Disruption of Enemy Radar Cover and W/T facilities.
Attacks on Military facilities.
Harassing of Coastwise Shipping and Sea Mining.
Attacks on Airfields.
Air Reconnaissance.
Protection of the Assembling Assault Forces.
"Crossbow" Operations.

	Destroyed	*Probably Destroyed*	*Damaged*
A.E.A.F.			
Aircraft on offensive operations	711	79	308
Aircraft on defensive operations over the United Kingdom and Channel areas	167	23	39
	878	102	347
Guns of Anti-Aircraft Command	73	5	22
Eighth Air Force—by Bombers	2,223	696	1,188
—by Fighters	1,835	202	705
R.A.F. Bomber Command	201	52	267
R.A.F. Coastal Command	28	3	22
Grand Totals	5,238	1,060	2,551

* Subject to modification in the light of information subsequently received.

Strength of A.E.A.F. at 1st April, 1944.

50. Details of the composition of the forces at my disposal at 1st April, 1944, are given at Appendix "C".* The number of operationally available aircraft on hand at that date in these Commands was as follows:—

Type	*Ninth Air Force*	*Royal Air Force*
Medium Bombers	496	70
Light Bombers	96	38
Fighter and Fighter Bombers	607	1,764
Transport Aircraft	865	225
Gliders	782	351
Reconnaissance Aircraft	63	156
Artillery Observation Aircraft	—	164
	2,909	2,768

Dislocation of Enemy Lines of Communication.

51. Next to the winning of air superiority, the dislocation of the enemy's lines of communication was the most important task set the Air Force (see paragraph 27). The basic intention of my plan for attack on the enemy lines of communication was to force the enemy off the railways, initially within an area of 150 miles from the battle front. There were two broad plans for doing this; one was a short term policy which involved attacks on certain rail centres during the period immediately before D-Day; the other was a longer term plan of destroying the potential of the railway system in North-Western Europe.

52. The short term policy involved attacks on 17 specially selected rail focal points, plus an extra 7 points as cover. It was claimed for this plan that if the attacks were made immediately before D-Day, the enemy's reinforcements by rail would be adequately delayed. Further, it would allow the bomber forces to continue attacks on "Pointblank" and other strategic targets until just before D-Day. Complete success would, of course, have been necessary, with all the 17 primary targets to achieve the desired result; moreover, several of the targets chosen were unsuitable for air attack, either by virtue of their location or their nature as bombing targets. Other disadvantages of this plan were that any failure to achieve complete success on the primary targets would have meant that the enemy could direct traffic through such gaps as would be left; the attacks would have to be made at a time when other demands on the available bomber forces were strongest; the successful outcome of a programme covering such a short period would depend entirely upon favourable bombing weather conditions—such conditions could never be guaranteed even in the summer.

53. The longer term plan involved attacks on a large number of repair and maintenance centres designed to reduce the movement potential and the motive power of the railway system, supported by complementary action in cutting railway lines and bridges on the canalized routes nearer D-Day. There were, however, limitations to this longer term plan. It would take longer to implement and would involve a greater diversion of the total effort of the bomber forces. If successful, it would hamper the Allies as effectively as it did the enemy, when the Allies came to move over the same territory. It was, however, a much more certain way of achieving the primary object stated above in paragraph 51, and was less dependent upon a period of good weather near D-Day.

54. In March, 1944, in consultation with the British Chief of Air Staff, Marshal of the Royal Air Force Sir Charles Portal, G.C.B., D.S.O., M.C., the Commanders of the Strategical Air Forces and the representatives of the land forces, you accepted the longer term plan, and the targets selected for attack were allocated to the respective forces (see paragraph 57).

55. Later, the initial plan was amplified and the area selected for attack was greatly expanded. In fact, finally it had little limitation.

56. Attacks by heavy and medium bombers on railway centres were maintained up to and after D-Day. From D-7 they were supplemented by attacks designed to cut the lines and halt or destroy such traffic as could still be moved. In these tasks, fighter bombers played the major part, although the medium and heavy bombers also cooperated. The principal targets in these attacks were bridges, junctions, cross-overs and tunnels, as well as locomotives and rolling stock. I deal with these attacks in paragraph 74 onwards; but in view of special features involved in the attacks on bridges, I deal with those attacks separately, for the sake of clarity, in paragraph 83 onwards.

57. *Allocation of Targets.* A total of eighty rail targets of primary importance were scheduled for attack by A.E.A.F., Royal Air Force Bomber Command and the United States Eighth Air Force. These targets were finally allocated as follows:—

A.E.A.F.	18
R.A.F. Bomber Command... ...	39
U.S. Eighth Air Force	23

58. In addition to these targets, the United States Fifteenth Air Force were allocated fourteen targets in Southern France and nine targets in Germany. However, this Command did not operate against these targets in Southern France until 25th May, 1944 and then only for three days. The targets allocated to them in Germany were not attacked.

59. A number of railway centres not included in the Directive were also lightly attacked, but I have not included these in the general survey of results which follows.

60. By D-Day, of the eighty targets allocated, fifty-one were categorised as being damaged to such an extent that no further attacks were necessary until vital repairs had been effected; twenty-five were categorised as having been very severely damaged, but with certain vital installations still intact, necessitating a further attack; the remaining four were categorised as having received little or no damage, and needing a further attack on first priority.

* Appendices not reproduced.

61. The proportion of successes in this respect was as follows:—

Force	*Cat "A"*	*Cat "B"*	*Cat "C"*
A.E.A.F.	14	2	2
R.A.F. Bomber Command	22	15	2
U.S. Eighth Air Force	15	8	—

62. In the period of the operation of this rail plan, i.e., 9th February to D-Day, a total of 21,949 aircraft operated against the eighty selected targets and dropped a total weight of 66,517 tons of bombs. The scale of effort was as follows:—

Force	*Sorties*	*Bombs*
A.E.A.F.	8,736	10,125 tons
R.A.F. Bomber Command	8,751	44,744 tons
U.S. Eighth Air Force	4,462	11,648 tons
	21,949	66,517 tons

63. In the attacks made by the United States Fifteenth Air Force on 25th May, 1944, and the subsequent two days, 1,600 sorties were flown against 14 targets and 3,074 tons of bombs were dropped. Of these 14 targets allocated in Southern France, at D-Day five were Category "A", one was Category "B" and eight were Category "C".

64. The first of the really heavy and damaging attacks on rail centres was that made by Royal Air Force Bomber Command on Trappes on the night of 6th-7th March, 1944.

65. An immediate interpretation of photographs taken after this attack showed extremely heavy damage throughout the yards, the greatest concentration of craters being in the "Up" reception sidings. 190 direct hits were scored on tracks, as many as three tracks having, in several cases, been disrupted by one bomb. Numerous derailments and much wreckage were caused by 50 bombs which fell among the lines of rolling stock with which the yard was crowded. All the tracks of the main electrified line between Paris and Chartres which passes through this yard were cut, several of the overhead standards having been hit, and at the east end of the yard, at least five direct hits were scored on the constriction of lines. To the north-east of the target, the engine shed was two-thirds destroyed.

66. Of the other early attacks carried out in March and early April, some of the most successful were those on Paris/La Chappelle, Charleroi/St. Martin, Paris/Juvisy, Laon and Aachen, at each of these centres the locomotive servicing and maintenance facilities were rendered almost, if not completely, useless and great havoc was wrought in the marshalling yards. At Paris/Noisy le Sec, the whole railway complex was almost annihilated. Other damaging attacks in this early period were made on Ottignies, Rouen, Namur, Lens and Tergnier. Nine of these 11 attacks were carried out by R.A.F. Bomber Command.

67. From the first attacks, the enemy energetically set about endeavouring to make good the damage inflicted, but Trappes, first attacked by Bomber Command on 6th-7th March, 1944, was still under repair at the end of April.

68. For the effort involved, the results of the attack on Charleroi/St. Martin on 18th April, 1944, are worth citing, but this attack is only typical of many of these blows at the enemy communications. A force of 82 Marauders and 37 Bostons of the United States Ninth Air Force attacked the railway centre between 1835 and 1905 hours, dropping a total of 176 tons of bombs on the target. Photographic interpretation after this attack showed that the locomotive repair shop and two locomotive depots were very heavily damaged. The marshalling yard was ploughed up and all through traffic stopped. A single through track was later established on the north side of the yard and was completed by 2nd May, 1944, 14 days later. A double track through the marshalling yard was re-established by 11th May, 1944, but at D-Day (6th June), the marshalling yard was still unserviceable and the repair facilities could not be used.

69. During the last days of April and throughout the month of May, 1944, the same high degree of success achieved by the early attacks was maintained. A growing paralysis was being extended over the rail networks of the Region Nord, west of a line Paris-Amiens-Boulogne and South Belgium. In these areas, all the principal routes were, at one time or another, interrupted. Other centres to the east and south of Paris had also been attacked.

70. In the last week of April, Aulnoye, Villeneuve-St. Georges, Acheres, Montzen, St. Ghislain, Arras and Bethune were all attacked. During May, the heaviest attacks were made on Mantes/Gassicourt, Liege, Ghent, Courtrai, Lille, Hasselt, Louvain, Boulogne, Orleans, Tours, Le Mans, Metz, Mulhouse, Rheims, Troyes and Charleroi.

71. Photographic interpretation continued to show the devastating effect on the centres attacked, and other intelligence sources confirmed this evidence, as well as supplying indications of damage to signals and ancillary services, damage which did not appear in photographs.

72. In order to extend the paralysis inflicted on the regions north and west of Paris, attacks were made in the period immediately before D-Day, on the eastern routes to Paris and the important avoiding routes round the south of that city, and on centres on the Grande Ceinture. Attacks on these centres were considerably restricted by the necessity of avoiding causing heavy civilian casualties or damage to historic buildings. A typical example of this restriction was furnished by the important junction of Le Bourget which, because of the strong probability of bombing causing heavy civilian casualties, was not attacked at all.

73. At D-Day, I believed the primary object of the rail plan had been fully realised. The events which followed confirmed my belief. After the Allied advance, enquiry from the

French railway authorities indicated very clearly that pre-D-Day attacks achieved the purpose intended. The Nazi controlled transport system was very badly disorganised. It had therefore, become extremely vulnerable to the attention of the medium and fighter bombers, which, in the periods just before and after the assault, caused great destruction to immobilised rolling stock.

74. *Attacks on Locomotive Power.*—Attack on repair depots and facilities was the main method of achieving the desired reduction in traction power. It was accepted that these attacks would, at the same time, damage and destroy locomotives. For example, in one such attack, about five per cent. of the locomotives in the Region Nord were put out of service. In addition, however, it was planned to attack directly trains and locomotives on open lines.

75. I first initiated special large scale fighter sweeps against trains and locomotives in Northern France and Belgium on 21st May, 1944. On this day, concentrated efforts were made in certain areas in France, with some attention to connections from Germany and Belgium. Fighters of A.E.A.F. and the United States Eighth Air Force swept over railway tracks covering a very wide area and created havoc among locomotives, passenger trains, goods trains and oil wagons.

76. On this day, 21st May, 504 Thunderbolts, 233 Spitfires, 16 Typhoons and 10 Tempests of A.E.A.F. operated throughout the day, claiming 67 locomotives destroyed, 91 locomotives damaged and six locomotives stopped. Eleven other locomotives were attacked with unknown results and numerous trains were attacked and damage inflicted on trucks, carriages, oil wagons, etc.

77. On this same day, United States Eighth Air Force Fighter Command sent out 131 Lightnings, 135 Thunderbolts and 287 Mustangs against similar targets in Germany. They claimed 91 locomotives destroyed and 134 locomotives damaged. In addition, one locomotive tender, six goods wagons and three box cars were destroyed, whilst seven goods wagons, seven trains, three rail cars, four box cars and thirteen trucks were damaged, and sixteen trains set on fire.

78. From 22nd May to D-Day, A.E.A.F. flew 1,388 sorties with the primary purpose of attacking locomotives. In this period they claimed 157 locomotives destroyed and 82 damaged, as well as numerous trucks.

79. On 25th May, United States Eighth Air Force Fighter Command flew 608 sorties over France and Belgium, with the result that 41 locomotives, 1 troop train with approximately 300 men and 19 trucks were destroyed, and 25 locomotives and 50 trucks were damaged. Though outside the " Neptune " area, it is interesting to record that on 29th May, aircraft of Eighth Air Force Fighter Command flew 571 sorties over Eastern Germany and Poland, attacking 24 locomotives, 32 oil tank cars, 16 box cars and 3 freight trains with unobserved results. In addition to these special attacks, aircraft of Eighth Air Force Fighter Command frequently attacked locomotives and trains amongst other ground targets, when returning from escorting heavy bombers.

80. The total effort by fighters against rolling stock from 19th May to D-Day was as under:—

A.E.A.F.	2,201 sorties
U.S. Eighth Air Force ...	1,731 sorties
	3,932 sorties

81. With the capacity and flexibility of the enemy rail system destroyed, the enemy armies in the field were denied the freedom of movement necessary to mount decisive counter-attacks. Further, the enemy armies and their supplies were forced on to the roads, thus not only slowing up their movement and making them more vulnerable to air attack, but also by compelling the enemy to use motor transport making him draw more heavily on his precious reserves of oil and rubber. Air attacks on these road movements eventually forced the enemy to move mainly by night.

82. During the assault and post-assault phases, this stranglehold on the enemy rail communications was effectively maintained. Details of the attacks involved and some evidence of the delay produced in the enemy build-up are given in Part III (*c*) of this Despatch.

83. *Destruction of Bridges.*—As I have already explained, complementary to the plan to destroy, by air attack, the enemy's rail motive power, I planned also to endeavour to destroy all the principal rail and road bridges leading into the assault area. If these were destroyed, not only would the enemy's rate of build-up in that area be further checked and his flow of reinforcements and supplies be further impeded, but also his ability to escape rapidly from the assault area in the event of his being forced to retreat would be very seriously impaired. The implications of the attacks on bridges were, therefore, somewhat wider than those of the other attacks on his communications system. In conjunction with these other attacks, the attacks on bridges were designed to seal off the assault area and so force the enemy to stand and fight, and since he could not easily retreat, any defeat would be decisive.

84. A bridge is, by nature of its size, very difficult to hit and, by nature of its construction, even more difficult to destroy completely. Calculation suggested that approximately 600 tons of bombs per bridge would be needed if the task were entrusted to heavy bombers. In fact, it was found that an average of 640 tons of bombs per bridge was needed. What was not at first realised was how effectively, and relatively cheaply, the task could be carried out by fighter bombers. It was learnt from the attacks on bridges by the aircraft of A.E.A.F. that a bridge could be destroyed for the expenditure of approximately 100 sorties, that is between 100 and 200 tons of bombs.

85. In order not to betray a special interest in the " Neptune " area, attention was paid in the preparatory phase principally to the bridges over the Seine, with some others over the Oise, Meuse and the Albert Canal, leaving to the assault phase the task of attacking bridges south of Paris to Orleans and west along the Loire.

86. On 21st April, 1944, the first of a series of attacks against bridges was made by Typhoons. Subsequent attacks were carried

out by formations of fighter bombers which included Thunderbolts, Typhoons and Spitfires and by the medium bombers of the United States Ninth Air Force. The early operations were of an experimental nature, the intention being to explore the possibilities of attacks by fighter bombers and medium bombers against this type of target. The success of the early operations by fighter bombers surpassed expectations. It is probable that in one or two early attacks, a lucky hit exploded the demolition charges that had been set in place by the Germans and in such cases, the destruction caused was out of all proportion to the effort expended. Nevertheless, proof was speedily available that fighter bombers could carry out the task of destroying bridges effectively and relatively cheaply.

87. As D-Day approached, so the intensity of the attacks increased, until a crescendo of effort was achieved over a period of about 10 days prior to D-Day. These attacks were carried out, in the main, by fighter bombers and medium bombers of the United States Ninth Air Force, although Royal Air Force Second Tactical Air Force and the heavy bombers and fighter bombers of the United States Eighth Air Force also provided a contribution to the success of the plan. The marked success of the low level fighter bomber attacks of the Ninth Air Force, as well as the results obtained by the medium bombers is a tribute to the high standard of bombing accuracy developed by this force during the preparatory period. These attacks were often met by heavy anti-aircraft fire, and the resultant losses were not light.

88. The outcome of these attacks was that, on D-Day, twelve railway bridges and the same number of road bridges over the River Seine were rendered impassable. In addition, three railway bridges at Liege and others at Hasselt, Herenthals, Namur, Conflans (Pointe Eifel), Valenciennes, Hirson, Konz-Karthaus and Tours, as well as the important highway bridge at Saumur, were also unserviceable.

89. After D-Day, the assault on bridges of tactical and strategical importance to the enemy was maintained and the results are confirmed in prisoner of war reports of the disruption and delay in the movement of troops and equipment which the enemy experienced. Details of these attacks are given in Part III (*d*) of this Despatch.

90. The statistical summary below is necessarily incomplete as, in many cases, road and rail bridges were attacked as targets of opportunity by fighter bombers of A.E.A.F. and the Eighth Air Force while engaged on offensive patrols against miscellaneous targets. In these instances, therefore, no separate appreciation of attacks on bridges, is possible.

91. *Attacks on Road and Rail Bridges for period 21st April-6th June.*

Force	*Attacks*	*Sorties*	*Bombs*
	(*a*) *Rail*		
A.E.A.F.	78	3,897	2,784 tons. 904 × 60-lb. R.Ps.*
U.S. Eighth Air Force	11	201	227·5 tons
	(*b*) *Road*		
A.E.A.F.	28	987	1,210 tons 495 × 60-lb. R.Ps.*
U.S. Eighth Air Force	1	24	24 tons

92. There can be no doubt that the enemy's transport difficulties after D-Day were the result of the cumulative and combined effects of all the attacks levelled against his communications system. The attacks on nodal points in the railway system, the complementary attacks on bridges and the line-cutting by fighter bombers, all contributed to the restriction placed upon enemy movements.

Neutralisation of Coastal Defences

93. I now come to air operations directed to the support of the landing (see paragraph 25). These operations had to be begun well in advance of D-Day. It was essential, as far as possible, to destroy the enemy's capacity to prevent Allied shipping from approaching the assault area and to blind him to that approach. I deal below, therefore, with air operations during this preparatory period directed to the neutralisation of the enemy's coastal defences and the disruption of his Radar cover.

94. There were forty-nine known coastal batteries capable of firing on shipping approaching the assault area. Included in this number were some batteries still under construction. In the conditions that would obtain at the time of the assault, it would clearly be impossible for the naval forces successfully to engage all the coastal batteries. They, therefore, had to be dealt with before the landing and the air forces undertook this task at the request of the Naval and Army Commanders. I did not consider that aerial attacks against batteries whose casemates were completed were likely to be very effective. Fortunately those batteries in the Cherbourg area were the last to be casemated, and it was possible therefore, to attack many of them while they were still incomplete.

95. To avoid showing particular interest in the assault area, it was planned to attack batteries outside the assault area ranging as far north as Ostend, in the proportion of two outside to one within the area.

96. Interpretation reports revealed that, in a great many instances, the bombing was more successful than I at first expected; by D-Day, the majority of the coastal batteries within the area had been subjected to damaging attack.

* R.P=rocket projectile.

97. *Attacks on Coastal Batteries for period 10th April-5th June.*

(*a*) *Inside Assault Area*

Force	*Sorties*	*Bombs*
A.E.A.F.	1,755	2,886·5 tons 495 × 60-lb. R.Ps.
U.S. Eighth Air Force	184	579·0 tons
R.A.F. Bomber Command	556	2,438·5 tons
	2,495	5,904 tons 495 × 60-lb. R.Ps.

(*b*) *Outside Assault Area*

Force	*Sorties*	*Bombs*
A.E.A.F.	3,244	5,846 tons
U.S. Eighth Air Force	1,527	4,559 tons
R.A.F. Bomber Command	1,499	6,785 tons
	6,270	17,190 tons

Total for the period 10th April to 5th June, 1944—8,765 sorties, 23,094 tons of bombs and 495 × 60-lb. R.Ps.

98. Of these attacks, one of the most outstanding was that carried out by 64 Lancasters of R.A.F. Bomber Command, with 7 Mosquitoes acting as a Pathfinder Force. During this raid, on the night of 28th-29th May, 356 tons of H.E. bombs were dropped on the coastal battery at St. Martin de Varreville, with excellent results. These results, reported by A.P.I.S. Medmenham, after a photographic reconnaissance sortie made on 29th May, were confirmed by a captured German report made by the troop commander of the battery. The two reports are given below for comparison.

Photographic Reconnaissance Report.

A heavy concentration of craters is seen in the target area with excellent results.

Damage to Casemates:

No. 1. Five very near misses, all within 45 feet. Casemate walls damaged.

No. 2. Damaged by at least five near misses.

No. 3. Destroyed and no longer identifiable; six near misses.

No. 4. Excavation undamaged.

Damage to Command Post:

Demolished by a direct hit and five near misses or probable hits.

Damage to Accommodation:

Personnel shelters in rear of each emplacement all indistinguishable amidst the craters.

Captured German Report.

The position is covered with craters . . . .

Several direct hits with very heavy bombs were made on No. 3 shelter (casemate) which apparently burst open and then collapsed. . . . . The rest of the shelters remain undamaged.

. . . . . the iron equipment hut which contained signals apparatus, the armoury, the gas chamber and artillery instruments received a direct hit, and only a few twisted iron girders remain.

. . . . . the men's canteen received several direct hits and was completely destroyed. The messing huts, containing the battery dining room, the kitchen and clerks' office, were completely destroyed by near misses. A concrete-built hot shower bath was completely destroyed by a direct hit; as well as the nearby joiner's shop.

99. Effective attacks were also carried out by aircraft of R.A.F. Bomber Command against the six-gun battery at Morsalines, and by Marauders of the United States Ninth Air Force on the batteries at Houlgate, Ouistreham and Point de Hoe.

100. Out of forty sites allotted to A.E.A.F., thirty-seven were attacked, sixteen out of eighteen in the assault area and twenty-one out of twenty-two outside. Of these, nine in the area and fourteen outside received hits on one or more emplacements. Forty-eight sites were allotted to R.A.F. Bomber Command, fourteen of which were outside. Hits on essential elements were secured on five batteries in the area and nine outside. Of the fifty-two targets allotted to the United States Eighth Air Force, thirty-two of which were in the assault area, only six sites in the area and sixteen outside were attacked. Some of the batteries were allotted to two commands.

101. In addition to the targets listed in the plan, many other coastal defence targets in and out of the area were attacked as targets of opportunity.

102. During the hours of darkness preceding the actual assault, a tremendous air bombardment was directed on to the batteries which could not be destroyed within the assault area, aimed at neutralising them during the critical assault period. This the attacks succeeded in doing. Details of the effort employed are given in Part III (*c*) of this Despatch.

Disruption of Enemy Radar Cover and W/T Facilities.

103. The enemy Radar cover on the Western Front was complete from Norway to the Spanish border. This cover was obtained by a chain of coastal stations, each composed of a number of installations. The density of these stations was such that there was a major site, containing an average of three pieces of equipment, every ten miles between Ostend and Cherbourg. This coastal chain was backed by a somewhat less dense inland system and by numerous mobile installations. The attached map* shows the location of the principal enemy Radar sites and the coverage of this Radar Chain.

104. The scale and variety of equipment in this Radar organisation was such that completely to destroy the system by air attack alone would have been a formidable proposition. This, however, was not necessary—the destruction of certain vital Radars and the comprehensive jamming of others could so gravely interfere with the operation of the system as almost to make it useless. I therefore decided to attack Radar stations between Ostend and the Channel Islands in accordance with the following principles:—

(*a*) Radar installations which could not be jammed electronically, or were difficult to jam, should be destroyed:

(*b*) Radar installations capable of giving good readings on ships and of controlling coastal guns should be destroyed:

(*c*) Radar installations likely to assist the enemy in inflicting casualties to airborne forces should be destroyed:

(*d*) Two targets outside the assault area were to be attacked for every one attacked in the area.

The attacks had a dual purpose. They aided both current air operations and naval operations in the Channel, and they prepared for the assault by blinding the enemy.

105. On 10th May, 1944, a series of attacks was begun against the long range aircraft reporting stations, and on 18th May, on the installations used for night fighter control and the control of coastal guns. On 25th May, 42 sites were scheduled for attack. These sites included 106 installations; at D-3, fourteen of these sites were confirmed destroyed.

106. To conserve effort, I then decided, three days before D-Day, to restrict attacks to the twelve most important sites; six were chosen by the naval authorities and six by the air authorities. These twelve sites, containing thirty-nine installations, were all attacked in the three days prior to D-Day.

107. Up to D-Day, 1,668 sorties were flown by aircraft of A.E.A.F. in attacks on Radar installations. Typhoons in low level attacks flew 694 sorties and fired 4,517 × 60-lb. R.Ps. Typhoons and Spitfires made 759 dive-bombing sorties, dropping 1,258 × 500-lb. bombs and light and medium bombers dropped 217 tons of bombs. In addition, the sites and equipment were attacked with many thousands of rounds of cannon and machine-gun fire.

108. These Radar targets were very heavily defended by flak and low level attacks upon them demanded great skill and daring. Pilots of the R.A.F. Second Tactical Air Force were mainly employed and losses among senior and more experienced pilots were heavy. There is no doubt, however, that these attacks saved the lives of countless soldiers, sailors and airmen on D-Day. The following details of some of the successful attacks made during the last three days before the assault, show the outstanding results obtained by Typhoon and Spitfire pilots in low level attacks pressed home to very close range.

(*a*) *Cap de la Hague/Jobourg.* This site was attacked by rocket firing Typhoons of 174, 175 and 245 Squadrons, Second Tactical Air Force, on 5th June, and 200 × 60-lb. R.Ps. were fired. The "Hoarding", an installation used for long range aircraft reporting, was destroyed. Three of the attacking aircraft were destroyed by flak.

(*b*) *Dieppe/Caudecote.* This site was attacked by 18 R.P. Typhoons of 198 and 609 Squadrons, Second Tactical Air Force, on 2nd June. 104 × 60-lb. R.Ps. were fired, with the result that the "Hoarding" was destroyed and the "Freya" and "Wuerzburg" installations, used for medium range aircraft reporting, night fighter control and control of coastal guns, were damaged. One of the Typhoons was destroyed by flak.

(*c*) *Cap d'Antifer.* This station was attacked several times. On 4th June, 23 Spitfires of 441, 442 and 443 Squadrons, Second Tactical Air Force, dive-bombed with 23 × 500-lb. M.C. instantaneous bombs; nine direct hits were scored. The "Chimney" and one "Giant Wuerzburg" were destroyed, and other installations damaged.

109. In addition to the attacks on the enemy Radar stations, attacks were also made on the most important of his navigational beam stations and on certain special W/T stations.

110. *Navigational Stations.* There were two enemy radio navigational stations important to the assault area, one at Sortosville, south of Cherbourg, and the other at Lanmeur, near Morlaix. Both of these stations were attacked, the first target being destroyed and the second rendered unserviceable, at least temporarily.

111. *W/T Stations.* Four W/T stations of the highest importance were subjected to attack by R.A.F. Bomber Command. These attacks were triumphs of precision bombing and completely achieved their object. Details of these attacks are given below.

(*a*) *Boulogne/Mt. Couple.* This large installation contained about 60 transmitters. The first attack was unsuccessful, but two nights later, 31st May/1st June, in an attack by 105 heavy bombers dropping 530 tons of bombs, at least 70 heavy bombs were placed on the target, which is some 300 yards long and 150 yards wide. Only a negligible fraction of the transmitters on this site survived the attacks, a maximum of three being subsequently identified in operation.

(*b*) *Beaumont Hague/Au Feure.* This installation was attacked on the night of 31st May/1st June by 121 aircraft; 498 tons of bombs were dropped and good results were obtained. The main concentration of bombs

* Maps not reproduced.

fell just outside the target area, but a number scored direct hits. The station was rendered completely unserviceable.

(*c*) *Dieppe/Bernaval le Grand.* The attack on this station on the night of 2nd/3rd June was completely successful. 104 aircraft dropped 607 tons of bombs. The majority of the eight or nine blast-wall protected buildings received direct hits, and the remainder suffered so many near misses that their subsequent operational value was negligible. In addition, the aerial masts were all demolished, and the two dispersed sites were also hit.

(*d*) *Cherbourg/Urville-Hague.* This station is now known to have been the headquarters of the German Signals Intelligence Service in North-Western France. The attack on this important W/T centre was made on 3/4th June by 99 aircraft dropping 570 tons of bombs. The results were remarkable, the centre of a very neat bomb pattern coinciding almost exactly with the centre of the target area. The photographic interpretation report may be quoted verbatim:

> "The station is completely useless. The site itself is rendered unsuitable for rebuilding the installation, without much effort being expended in levelling and filling in the craters."

112. The success of this last attack on the Headquarters of the German Air Force Signals Intelligence must have been a major catastrophe for the enemy, and it may well be that it was an important contributory factor to the lack of enemy air reaction to the assault.

113. *Radio Counter-Measures.* On the night of 5/6th June in the opening phase of the assault, counter-measures against such installations as were still active were put into operation. These counter-measures covered five separate and distinct tasks:—

(*a*) a combined naval/air diversion against Cap d'Antifer:

(*b*) a combined naval/air diversion against Boulogne:

(*c*) a jamming barrage to cover the airborne forces:

(*d*) a V.H.F. jamming support for the first three counter-measures:

(*e*) feints for the airborne forces.

These various components of the counter-measure plan were inter-dependent and the results can, therefore, best be summarised by giving an indication of the enemy's reactions.

114. The most important fact concerning this reaction was that the enemy appeared to mistake the diversion towards Cap d'Antifer as a genuine threat; at all events, the enemy opened up, both with searchlights and guns on the imaginary convoy. Further, the V.H.F. jamming support which was flown by a formation of aircraft operating in the Somme area apparently led the enemy to believe that these aircraft were the spearhead of a major bomber force, as he reacted with twenty-four night fighters, which were active approximately three hours, hunting the "ghost" bomber stream.

115. The other counter-measures all fulfilled their purpose and it can be stated that the application of radio counter-measures immediately preceding the assault proved to be extraordinarily successful. Only three out of the total number of 105 aircraft employed on these operations were lost, and the crew of one of these aircraft was saved.

116. While it is not possible to state with certainty that the enemy was completely unaware of the cross-Channel movement of the assault forces, the success of the plan to disrupt his Radar cover and W/T facilities both by attacks and by the application of counter-measures, can be judged on the results obtained. In the vital period between 0100 and 0400 hours on 6th June, when the assault Armada was nearing the beaches, only nine enemy Radar installations were in operation, and during the whole night, the number of stations active in the "Neptune" area was only 18 out of a normal 92. No station between Le Havre and Barfleur was heard operating. Apart from the abortive reaction mentioned in paragraph 114, no enemy air attacks were made till approximately 1500 hours on D-Day, and this despite the presence of more than 2,000 ships and landing craft in the assault area, and despite the fact that very large airborne forces had, of necessity, been routed down the west coast of the Cherbourg Peninsula right over the previously excellent Radar cover of the Cherbourg area and the Channel Islands.

117. These results may be summarised as follows: the enemy did not obtain the early warning of our approach that his Radar coverage should have made possible; there is every reason to suppose that Radar controlled gunfire was interfered with; no fighter aircraft hindered our airborne operations; the enemy was confused and his troop movements were delayed.

118. Prior to the launching of Operation "Neptune" each service had almost complete freedom to use radio counter-measures, as desired. To eliminate any clash of interests when very large forces would be employed in confined areas, an inter-Service staff was set up at my Headquarters. The primary concern being to get the Armada safely across the Channel, it was agreed that for the 30-hour period immediately prior to the moment of assault, control should be vested in the Allied Naval Commander-in-Chief; subsequently, control of radio counter-measures became my responsibility. The advisory staff with representatives of the three Services, assisted both the Allied Naval Commander-in-Chief and myself.

Attacks on Military Facilities

119. As well as preparing the way for the assault forces by attacking the enemy's coastal defences and Radar system, it was planned to prepare the way further for the landing by reducing the enemy military potential, both in the assault and rear areas. Certain ammunition and fuel dumps, military camps and headquarters were considered suitable targets for attack, in order to fulfil this purpose.

120. In the period 1st May to 5th June, 1944, the following effort was made on these targets.

Force	*Sorties*	*R.Ps. Fired*	*Bombs dropped*
A.E.A.F.	423	282 × 60-lb.	152 tons
R.A.F. Bomber Command	1,139	—	5,218 tons
	1,562	282 × 60-lb.	5,370 tons

121. The following details of some of these attacks indicate the very great damage done to the enemy supply dumps, and the attacks must also have had considerable moral effect on enemy personnel in addition to the actual casualties inflicted.

122. On the night of 3rd/4th May, R.A.F. Bomber Command attacked in force the tank depot at Mailly-le-Camp. 1,924 tons of bombs were dropped and assessment photographs show the whole target to have been severely damaged. In the mechanical transport section and barracks, 34 out of 47 buildings were totally destroyed. Even more remarkable results were obtained by an attack on an ammunition dump at Chateaudun carried out on the same night. Eight Mosquitoes of R.A.F. Bomber Command attacked with approximately 13 tons of bombs. The bombs were dropped very accurately and caused sympathetic detonation throughout the dump. In the resulting explosion, the entire western wing of the depot, containing 90 buildings, was completely destroyed.

123. The Bourg Leopold military camp in Belgium was heavily attacked on two occasions. On 11th/12th May, aircraft of R.A.F. Bomber Command dropped 585 tons of bombs on this depot. On the night of 27th/28th May, a force of 324 aircraft, also from that Command, dropped 1,348 tons of bombs, and photographic reconnaissance revealed very heavy damage throughout the whole area of the camp. Six large buildings and at least 150 personnel huts received direct hits.

124. Smaller in scale, but very effective, were the attacks made by A.E.A.F. aircraft on other targets of this type. On 2nd June, a force of 50 Thunderbolts of the United States Ninth Air Force attacked a fuel dump at Domfront. 54 × 500-lb incendiaries and 63 × 1,000-lb. G.P. bombs were dropped and severe damage was caused to this dump.

Harassing of Coastwise Shipping and Sea Mining.

125. As a result of the successful attacks on the overland communications of the enemy, his coastal shipping became increasingly important. The task of dealing with this shipping was very largely the work of R.A.F. Coastal Command, but Typhoons of A.E.A.F. also operated on occasions in an anti-shipping role under the operational control of Coastal Command, and Spitfires of A.E.A.F. provided when needed fighter escort to the strike aircraft of Coastal Command. The sea mining programme was carried out by R.A.F. Bomber Command in direct consultation with the British Admiralty.

126. During the period 1st April to 5th June, 1944, R.A.F. Coastal Command flew 4,340 sorties on the anti-shipping and anti-U-Boat patrols in the Bay of Biscay, along the Dutch Coast and in the Channel. During these sorties, 103 attacks were made on shipping and 22 on U-Boats.

127. The minelaying had as its objectives not only the interruption of enemy coastal shipping, but also in the closing stages of preparation for the assault, the laying of minebelts, to afford protection to the Allied assault and naval bombardment forces from attacks by E and R boats, especially those operating from Le Havre and Cherbourg.

128. In the period 1st April to 5th June, R.A.F. Bomber Command flew 990 sorties and laid 3,099 mines in the areas east of Texel and along the Dutch, Belgian and French coasts. Other mines were also sown in German home waters, including many in the Baltic Sea.

Attacks on Airfields.

129. I have already dealt (see paragraphs 42 to 47) with the preliminary operations designed to wear down the G.A.F. and render it powerless seriously to interfere with the assault. As D-Day approached however, it became necessary to ensure that our measure of air superiority was fully adequate to our needs. Plans had accordingly been made for direct attacks upon the enemy air force, particularly in France and the Low Countries. The effect of these plans was to deny the German Air Force the advantage of disposition which its fighter squadrons would otherwise enjoy as compared with our own in the initial stages of the assault. It was, therefore, necessary to neutralise a considerable number of airfields within a radius of 150 miles of Caen. The primary object of these attacks was to destroy the aircraft repair, maintenance and servicing facilities and thereby cause the maximum interference with the operational ability of the German Air Force.

130. I planned that these attacks should start at least three weeks before D-Day, and they actually began on 11th May, 1944. It was necessary to bear in mind in the planning of these attacks that no indication should be given as to the selected area for the Allied landings.

131. *Allocation of Targets.*—Forty main operational airfields were selected for attack. Twelve were assigned to R.A.F. Bomber Command and the remaining twenty-eight to A.E.A.F. and the United States Eighth Air Force.

132. Fifty-nine other operational bomber bases with important facilities located in France, Belgium, Holland and Western Germany within range of the assault area and ports of embarkation in the United Kingdom were also selected for attack, as opportunity permitted, by aircraft of the United States Eighth and Fifteenth Air Forces, the latter based in the Mediterranean area.

133. From 11th May, 1944 to D-Day, thirty-four of the most important airfields were attacked by 3,915 aircraft dropping 6,717 tons of bombs with the result that four airfields were placed in Category " A " and fifteen in

Category " B ". Twelve airfields of the second list were attacked by the Eighth Air Force with very satisfactory results.

134. The following categories of airfield damage were used:—

Category " A "—major installations completely destroyed; no further attacks needed.

Category " B "—major installations severely damaged; further attacks warranted.

Category " C "—minor damage; further attacks required.

135. *Statistical Summary of Attacks on Airfields during the period 11th May to D-Day.*

Force	*Attacks*	*Sorties*	*Bombs*
A.E.A.F.			
Ninth Air Force	56	2,550	3,197 tons
Second T.A.F.	12	312	487 tons
R.A.F. Bomber Command	6	119	395 tons
U.S. Eighth Air Force	17	934	2,638 tons
	91	3,915	6,717 tons

136. These attacks on enemy airfields accomplished the desired object of placing the enemy under the same handicap as the Allied fighters by forcing them to operate from airfields a long way from the assault area. They were also largely responsible for the lack of enemy air interference with our landings and undoubtedly contributed much to the ineffectiveness of the German Air Force at the really critical times.

Photographic Reconnaissance.

137. The photographic reconnaissance units of the Allied air forces were the first to begin active and direct preparation for the invasion of Europe from the West. For more than a year, much vital information was accumulated which contributed very greatly to the ultimate success of the assault. The variety, complexity and moreover, the detailed accuracy of the information gathered and assiduously collated was of great importance in the preparatory phase of the operation.

138. Each particular service had its own requirements and individual problems which only photographic reconnaissance could hope to solve. Then again, within each service, specialised sections relied to a great extent for their information on these sources, e.g. as early as possible after each major bombing attack, damage assessment sorties were flown.

139. Photographic coverage of the entire coastline from Holland to the Spanish frontier was obtained to gather full details of the coastal defences. Verticals and obliques were taken of beach gradients, beach obstacles, coastal defences and batteries. Full photographic coverage from Granville to Flushing, both in obliques and verticals, was obtained. This very large coverage also served to hide our special interest in the selected assault beaches.

140. Obliques were taken at wave top height, three to four miles out from the coast, in order to provide the assault coxswains with a landing craft view of the particular area to be assaulted or likely to be their allotted landing spots. Then obliques were flown 1,500 yards from the coast at zero feet, to provide platoon assault commanders with recognition landing points. Further obliques were taken, again at 1,500 yards from the shore, but at 2,000 feet to provide, for those who were planning the infantry assault, views of the immediate hinterland.

141. Inland strips were photographed behind the assault areas, looking southwards, so that infantry commanders could pinpoint themselves after they had advanced. Again, it was necessary to photograph hidden land behind assault areas, so that the infantry commanders would know the type of terrain behind such obstructions as hills or woods.

142. Bridges over rivers were photographed and special attention was paid to the river banks to enable the engineers to plan the type of construction necessary to supply temporary bridges in the event of the enemy blowing up the regular bridges.

143. The prospective airfield sites were selected by the engineers after they had studied the vast quantity of reconnaissance photographs available. The success of the Airfield Construction Units, some details of which are given in Part IV of this Despatch, is testimony to the value of this reconnaissance.

144. It was also necessary to cover all the likely dropping areas for the use of the airborne divisions, and to pay special attention to each area for concealed traps such as spikes, etc. These traps were observed on photographs of many sites chosen and it was necessary to make other plans accordingly.

145. Flooding areas, too, throughout Holland, Belgium and France were all photographed at different periods, thus ensuring to the Army Commander full knowledge of these defences in planning the deployment of his forces. The extent to which army commanders depended upon photographic reconnaissance may be gauged by the volume of cover they received. In the two weeks prior to D-Day, one R.A.F. Mobile Field Photographic Section alone made for Army requirements more than 120,000 prints.

146. Continued photographic reconnaissance was also flown covering enemy communication centres, petrol, oil and lubricant dumps, headquarters, inland defences and military concentrations. These reconnaissances provided invaluable information as to the enemy order of battle and his capabilities.

147. Many small scale sorties were flown for Combined Operations, enabling them to make landings at selected spots, long before the real offensive was launched and to bring back vital information.

148. Another important task undertaken was the photographing of Allied landing craft, equipment and stores in the United Kingdom, to facilitate experiments with the type of camouflage most likely to be effective.

149. The demands of all three services for photographic cover were very varied and so great in number that it was necessary to set up a controlling body to deal with them. Accordingly, the Central Reconnaissance Committee was established at your headquarters. This inter-service committee received requests for photographic cover from all services and allocated the task to the most suitable reconnaissance force. One of the most important functions of this Committee was to watch the security aspect of the reconnaissance effort and by ensuring that this effort was judiciously distributed, conceal from the enemy our special interest in the assault area.

150. The bulk of this invaluable reconnaissance effort was flown by aircraft of A.E.A.F. which, in the period 1st April to 5th June flew no less than 3,215 photographic reconnaissance sorties. Aircraft of other commands, however, including 106 Group, R.A.F. Coastal Command and United States Eighth Air Force, operating under the control of R.A.F. Station, Benson, also contributed notably to this work, flying a total of 1,519 sorties during the same period. The excellent co-operation between British and American reconnaissance units in fact enabled the needs of all services to be fully met by D-Day.

151. If we had had to rely, however, entirely on orthodox high altitude reconnaissance aircraft for this work, not more than a small proportion of these needs could have been met. The weather in Western Europe, never very suitable for high altitude photography, was particularly bad in the early part of the year. There was an urgent need for a medium/low altitude photographic reconnaissance aircraft to supplement high altitude reconnaissance. It was decided, therefore, to convert some Mustang fighters into tactical and strategical medium/low altitude reconnaissance aircraft. They were equipped with oblique cameras, were armed to protect themselves and were fast enough to outpace most German fighters.

152. Low altitude reconnaissance, however, whether visual or photographic was at all times a hazardous business in view of the risk of being jumped by higher flying enemy fighters. None the less, early results achieved by Mustangs were very encouraging and eventually a number of reconnaissance squadrons were partly re-equipped with converted Mustangs to supplement their high altitude aircraft. Their work proved invaluable and the development of this aircraft for photographic reconnaissance work has been one of the outstanding lessons of the air war.

Protection of the Assembling of the Assault Forces.

153. I stated in paragraph 25 that one of the main tasks of the air forces was to support the landing of the Allied armies in Europe. As a corollary, the air force was required to protect the assembling of the assault forces. A.E.A.F. was directly charged with this responsibility.

154. More than 2,000 ships and landing craft were used to lift the initial assault forces and other equipment, and they were supported by task forces of over 100 warships including battleships and more than 200 escorts and other naval vessels. In all, over 6,000 ships and landing craft were employed in the first week.

155. The assembly, preparation and loading of these ships and other special beach installations necessitated the concentration of enormous forces in the ports and harbours of the south coast of England, in the Bristol Channel and in the Thames Estuary, over long periods, with especially heavy concentrations in the final six weeks. Moreover, large scale embarkation had to be practised to ensure that speed and flexibility could be attained. To provide this practice, a series of exercises were staged in which the forces to be employed were brought into the concentration areas and in some cases, embarked and sailed to practice assault beaches on the south coast of England.

156. *Enemy Action against Assault Forces.*—It was estimated by my Planning Staff that the German Air Force would have available 850 aircraft, including 450 long range bombers to use against the Allied assault operation. I anticipated that these bomber forces would be used against shipping in ports and in transit, both in bombing attacks and in sea mining. It was further estimated that this force would be capable of the following scale of effort over a period of three weeks during the assembling and loading periods:—

	Sorties.
Sustained per night	25
Intensive per night for 2-3 nights per week	50-75
Maximum in any one night ...	100-150

157. In fact, the enemy activity did not reach this maximum scale of effort. There were three periods of activity in the six weeks prior to 6th June, and they involved only 377 bombing sorties.

158. On 25th-26th April, approximately 40 aircraft operated against Portsmouth and Havant. On 26-27th April, approximately 80 aircraft again attacked Portsmouth and a triangular area between the Needles, Basingstoke and Worthing. On 29-30th April, approximately 35 aircraft operated over and off Plymouth.

159. The second phase of these attacks took place on the nights 14-15th and 15-16th May, when approximately 100 and 80 aircraft respectively operated against Southampton and along the coast, and against Weymouth.

160. The third phase was during 28-29th 29-30th and 30-31st May; on the first of these nights, approximately 35 aircraft attacked from Dartmouth to Start Point and on the next two nights small forces operated indiscriminately.

161. The night fighter forces of the Air Defence of Great Britain were ready to deal with this activity. Of the total of 377 enemy sorties, night fighters claimed 22 destroyed, 6 probably destroyed and 5 damaged, while a further 2 were destroyed by anti-aircraft fire.

162. A valuable contribution to the defence of the assembly areas for the assault forces was made by balloons and anti-aircraft guns. Units were provided for this purpose by R.A.F. Balloon Command, the R.A.F. Regiment, Anti-Aircraft Command and certain Anti-Aircraft artillery formations of the United States forces. Operational control of these units was in general exercised on my behalf by the Air Marshal Commanding, Air Defence of Great Britain.

163. The work of these units not only in protecting the assembly, but later, in defence

against attacks by Flying Bombs, was of exceptional value to the launching and maintenance of the assault. I deal with certain other features of this work later in this Despatch.

164. It was also of the utmost importance to deny to the enemy, air reconnaissance of Southern England. Special precautions had to be taken to this end.

165. Mastery of the air over the Channel, wrested from the enemy in earlier years by aircraft of R.A.F. Fighter Command (later Air Defence of Great Britain), had done much to ensure this end already. Daylight operations of enemy aircraft overland were almost unheard of and it was appreciated that only dire necessity would prompt the enemy to expose his aircraft and pilots to the heavy risk they would run in attempting to spy out our preparations. None the less, the enemy had now so much at stake that a great effort on his part was to be expected. To deal with possible enemy reconnaissance efforts, therefore, I directed that standing high and low level fighter patrols should be maintained by aircraft of Air Defence of Great Britain during daylight hours over certain coastal belts.

166. In the six weeks immediately prior to D-Day, however, the enemy flew only 125 reconnaissance sorties in the Channel area and 4 sorties over the Thames Estuary and the east coast. Very few of these sorties approached land, most of them being fleeting appearances in mid-Channel. Our fighters rarely got even a glimpse of these enemy aircraft, which could have seen very little and could only have taken back, therefore, information of very small value; but as an extra deterrent, standing patrols were maintained as far out as 40-50 miles south of the Isle of Wight and intruder aircraft were directed to the enemy airfields in the Dinard area, from which it was believed such enemy reconnaissance aircraft as appeared were operating. In the result, the enemy appears to have learnt very little.

167. These defensive measures, coupled with the others to which I have already referred, achieved for the assault a complete tactical surprise on D-Day and did much to ensure the safety of the cross-Channel movement of the assault forces. The weather factor relating to this aspect of the operations is considered in paras. 405 and 406.

168. On many days Allied air forces flew more photographic reconnaissance sorties in one day than the enemy flew in the whole of the vital period of six weeks prior to D-Day. In view of the fact that the enemy was aware, in general terms, of our intention to invade the Continent the small scale of his air reconnaissance effort is, to say the least, extraordinary.

" Crossbow " Operations.

169. It became known early in 1943 that the enemy was preparing an attack on the United Kingdom with flying bombs and rockets launched from the French coast. Much experimental work on these projectiles had been done in the Baltic Sea area, and it was believed that the enemy would shortly be in a position to begin constructing sites, from which the projectiles could be launched. Construction began chiefly in the Pas de Calais and the Cherbourg areas during the autumn of 1943.

170. Considerable research into the nature of these novel weapons was carried out by Operational Research Sections and by a special Committee set up in the Air Ministry, and it was concluded that they represented a potentially serious menace, both to the United Kingdom and to the preparation and build-up of forces for the projected Operation " Neptune ". Accordingly, it became necessary to divert part of the available air effort to attacks on these constructional sites in order to prevent the threat becoming a reality.

171. At this time it was not considered desirable to divert any large part of the heavy bomber effort from the commitment on " Pointblank " targets. I was, therefore, made responsible for taking the necessary countermeasures with the forces of A.E.A.F. In addition, however, a proportion of the effort of the heavy bombers of the United States Eighth Air Force was made available to me for this task on days when weather was unsuitable for deep penetration raids into Germany. The United States IXth Bomber Command was committed, up to 1st April, to assist the strategical air forces with diversionary raids, and therefore, was not always available for these operations. R.A.F. Bomber Command was also originally allotted five sites for attack, but this commitment was subsequently re-allotted to A.E.A.F.

172. As is now known, the menace was not under-estimated, and the air effort prior to D-Day did not succeed wholly in removing it.

173. The sites were classified as follows:—

(*a*) Ski-sites—(so called because of a big store room construction which from the air looked very like a ski)—designed for launching flying bombs.

(*b*) Rocket sites—larger constructions designed for the launching of heavy rocket projectiles.

(*c*) Supply sites.

174. The sites were given the code word of " Noball " and operations against them were carried out under the code word " Crossbow ". These operations began on 5th December, 1943, and accordingly the summary of activity in this section of the Despatch is shown from this date to D-Day.

175. On 5th December, 1943, 63 ski sites and 5 rocket sites had been identified. It appeared that the sites in the Pas de Calais area were aligned on London and those in the Cherbourg area on Bristol. It was calculated that the enemy was completing new sites at the rate of three every two days.

176. A schedule of priorities based on the British Air Ministry recommendations was carefully worked out. It was most important to ensure that no more bombs than were absolutely necessary to neutralise one target should be dropped before an attack was made against the next target on the priority list. A system was devised of " suspending " a site from further attack, whereby a Command which considered that it had inflicted sufficient damage to a site to neutralise it temporarily, was authorised to notify any authority concerned that the site was " suspended " from further attack, pending photographic confirmation of the damage done.

177. The attacks on sites prior to D-Day are listed below. At D-Day it was estimated that out of 97 identified flying bomb sites, 86 had been neutralised, and out of 7 identified rocket sites, 2 had been neutralised.

178. In addition, heavy attacks were launched on several special supply or storage sites which had been observed under construction.

179. The ski sites were normally well hidden, either in or at the edge of woods, well camouflaged and heavily defended by flak so that low flying attacks on them were costly. In photographs their presence was recognised not only by the shape and layout of the buildings, particularly the comprehensive water supply system, but also by the specially built roads and railways that led to them.

180. It was not appreciated before D-Day that in addition to these specially constructed ski sites, there were modified ski sites with all the facilities of the original sites except for the distinctive ski buildings and the water supply system. After D+7, the day on which the enemy first launched flying bombs against the United Kingdom, photographic reconnaissance revealed the existence of 74 of these modified sites. They were camouflaged more completely than the original sites and made use of existing roads and buildings. Details of attacks on these modified ski sites or launching sites are included in my account of air operations in the post-assault phase.

181. The exact number of flying bombs which the known number of ski sites were capable of launching against the United Kingdom if they had not been attacked by aircraft can only be estimated, but it is thought that some 6,000 flying bombs per 24 hours is a reasonable estimate. The success of the air forces, therefore, in attacking and neutralising Germany's capacity to use this secret weapon may be judged in terms of the figures of actual flying bombs launched after D-Day. These figures are set out in the account of the post-assault phase.

182. *Summary of Attacks on Ski Sites prior to D-Day.*

Force	*Sorties*	*Bombs*
A.E.A.F.	22,280	13,515 tons
U.S. Eighth Air Force	4,589	7,968 tons
	26,869	21,483 tons

Summary of Attacks on Rocket Sites prior to D-Day

Force	*Sorties*	*Bombs*
A.E.A.F.	434	667 tons
U.S. Eighth Air Force	2,045	7,624 tons
	2,479	8,291 tons

Summary of Attacks on Supply Sites and Dumps prior to D-Day

Force	*Sorties*	*Bombs*
A.E.A.F.	852	1,148 tons and 126×60-lb. R.Ps.
U.S. Eighth Air Force	166	479 tons
	1,018	1,627 tons and 126×60-lb. R.Ps.

Statistical Summary of Preparatory Operations

183. The following statistics show the immense scale of the effort of the Allied air forces operating from the United Kingdom against both " Overlord " and " Pointblank " targets during the preparatory phase 1st April to 5th June, 1944. That the achievements referred to in the foregoing paragraphs were not accomplished without considerable cost in skilled manpower is evident from the aircraft casualty figures included. Statistics covering personnel casualties in the preparatory period are included in the schedule at paragraph 408 in Part III (*d*).

Preparatory Operations
Period 1st April—5th June, 1944

Force	*Aircraft despatched*	*Tons of bombs dropped*	*Aircraft lost in combat*	*E/A destroyed in combat*
A.E.A.F.:—				
Ninth A.F.	53,784	30,657	197	189
2nd T.A.F.	28,587	6,981	133	66
A.D.G.B.	18,639		46	111
R.A.F. B.C.	24,621	87,238	557	77
U.S. Eighth A.F.:—				
VIIIth B.C.	37,804	69,857	763	724
VIIIth F.C.	31,820	647	291	1,488
	195,255	195,380	1,987	2,655

Total sorties as above	195,255
R.A.F. Coastal Command	5,384
	200,639

184. The sorties of Coastal Command included are only those on anti-shipping and anti-U-boat patrols in the Bay of Biscay and Channel areas and off the Dutch coast. The weight of depth charges, bombs, etc., dropped and casualties or claims arising from these sorties are not included.

(c) *The Assault*

Decision to make the Assault

185. After consultations with the Commanders-in-Chief of the three services, during May, you had fixed the date of the Assault for 5th June. The decision as to date had to be taken in good time to permit of the completion of final preparations. Some of the ships in the invasion Armada, for example, had to sail a week before the time planned for the assault.

186. As the date approached, the weather forecasts pointed to very serious deterioration in conditions for D-Day. On 3rd June, you summoned a conference at your Advanced Headquarters at Portsmouth to consider the weather situation. This conference included yourself, the Deputy Supreme Commander, Air Chief Marshal Sir A. W. Tedder, G.C.B., your Chief of Staff Lieutenant General W. B. Smith, Admiral Sir Bertram H. Ramsay, K.C.B., K.B.E., M.V.O., and his Chief of Staff, General Sir Bernard L. Montgomery, K.C.B., D.S.O., and his Chief of Staff, and the Heads of the Naval, Army and Air Meteorological Services. I attended this conference with my Senior Air Staff Officer, Air Vice-Marshal H. E. P. Wigglesworth, C.B., C.B.E., D.S.C.

187. The first meeting took place at 2100 hours on 3rd June. It lasted until after midnight, when you decided to postpone any decision until the meteorological staffs could collect later reports.

188. The second meeting took place at 0400 hours on 4th June, and in the light of weather forecasts then available, you decided to postpone the time of the assault for 24 hours, primarily on the grounds that the air forces would be unable to provide adequate support for the crossing and assault operations, and could not undertake the airborne tasks.

189. The meeting reassembled at 2100 hours on 4th June, and after considerable deliberation a decision was again deferred to enable the meteorological staffs to study later data.

190. The final meeting took place at 0430 hours in the morning of 5th June. Weather conditions forecast for the following day were still far from satisfactory and from the air point of view, below the planned acceptable minimum.

191. Nevertheless, taking into account the fact that the adverse weather conditions imposed an equal handicap on the enemy air forces, I considered, and I gave this as my opinion, that the Allied air effort possible would provide a reasonable measure of air protection and support and that airborne operations would be practicable.

192. After considering also the weather conditions as affecting the land and sea operations, you made the decision that the assault was to take place on the first high tide in the morning of the 6th of June and that the airborne forces were to be flown over and dropped in their allotted zones before dawn of that day.

The Assault is made

193. The assault was on a five divisional front on the east side of the Cherbourg Peninsula immediately north of the Carentan Estuary and the River Orne.

194. The First United States Army landed between Varreville and Colleville-sur-Mer; 1 R.C.T.* landed between Varreville and the Carentan Estuary, 2 R.C.T. between the Carentan Estuary and Colleville-sur-Mer. The Second British Army with five brigades, landed between Asnelles and Ouistreham. These seaborne forces were supported on their flanks by two airborne forces, two United States Airborne Divisions being dropped and landed in the area of St. Mere Eglise, and a British Airborne Division in the area between the Rivers Orne and Dives. The map† facing shows the landing beaches and the positions gained in the first three weeks of the assault.

195. The first airborne forces landed before dawn on 6th June and the landing barges and craft coming in on the first tide, touched down at 0630 hours. Follow-up forces were landed with the second tide, and in the evening, additional airborne forces were flown in.

196. There was no enemy opposition to the original passage of the assault or airborne forces. This fact is all the more remarkable when it is remembered that many of the ships had, of necessity, been at sea for periods of some days.

197. I have set out in Section (*b*) of Part II at paragraph 35, the tasks undertaken by the air forces in support of the assault. For convenience of presentation, these tasks have been dealt with under the five headings shown below:—

Protection of the Cross-Channel Movement,
Neutralisation of Coastal and Beach Defences,
Protection of the Beaches,
Dislocation of Enemy Communications and Control,
Airborne operations.

198. The Order of Battle of A.E.A.F. as at D-Day is set out at Appendix "D",† the strength of aircraft available was as follows:—

Type	*United States Forces*	*Royal Air Force*	*Grand Total*
Medium Bombers	532	88	620
Light Bombers	194	160	354
Fighter and Fighter Bombers ...	1,311	2,172	3,483
Transport Aircraft	1,166	462	1,628
Reconnaissance Aircraft	158	178	336
Artillery Observation Aircraft ...	—	102	102
A.S.R. (Miscellaneous)	—	96	96
Powered A/C Total	3,361	3,258	6,619
Gliders	1,619	972	2,591
Grand Total	4,980	4,230	9,210

* R.C.T.=Regimental Combat Team.

† Maps and Appendices not reproduced.

Protection of the Cross-Channel movement.

199. The task of assisting the naval forces to protect the passage of the assault armies from surface and U-boat attack, was undertaken chiefly by R.A.F. Coastal Command though aircraft of A.E.A.F. assisted in this task. I deal with these operations in more detail in paragraph 387 et seq. Here I need only mention that on D-Day and D + 1, aircraft of R.A.F. Coastal Command flew 353 sorties on anti-shipping and anti-U-boat patrols. A line of patrols was provided at either end of the Channel. The air protection thus afforded contributed much to the safety of the Allied shipping from both surface and underwater attack by enemy naval forces.

200. Fifteen squadrons of fighters were allotted the task of protecting the shipping lanes. These squadrons flew 2,015 sorties during the course of D-Day and D + 1, the cover being maintained at six squadron strength throughout this period. Owing to the lack of enemy reaction, I was able later to reduce this cover to a two squadron force.

201. For convenience of presentation, I have set out the full plan for the employment of fighter forces during the assault and post-assault phase in the next section. (See paragraph 308 et seq.)

Neutralisation of Coastal and Beach Defences.

202. The task of neutralising as many of the coastal defence positions as possible during the crucial period of the assault was shared by naval and air bombardment. The air bombardment plan called for attacks to commence just before dawn on D-Day.

203. R.A.F. Bomber Command commenced the bombardment with attacks on the following ten selected heavy coastal batteries in the assault area:—

Coastal Batteries	*Sorties*	*Tons of Bombs*
Crisbecq	101	598
St. Martin de Varreville	100	613
Ouistreham	116	645
Maisy	116	592
Mont Fleury	124	585
La Parnelle	131	668
St. Pierre du Mont	124	698
Merville/Franceville	109	382
Houlgate	116	468
Longues...	99	604
	1,136	5,853 tons

204. As R.A.F. Bomber Command left the assault area, United States Eighth Air Force heavy bombers took over the bombardment role. In the thirty minutes immediately preceding the touch-down hour, 1,365 heavy bombers attacked selected areas in the coastal defences, dropping 2,796 tons of bombs. The result of these operations added to the previous air bombardment and combined with the naval shelling, neutralised wholly or in large part almost all of the shore batteries and the opposition to the landings was very much less than was expected.

205. Medium, light and fighter bombers then took a hand in the attacks on the enemy defensive system by attacking artillery positions further inland and other targets in the coastal defences. The immense scale of this effort may be gauged from the statistics which appear after para. 233.

206. The heavy bombers of the United States Eighth Air Force operated again later in the day, and although cloud interfered with bombing about midday, necessitating the recall of some missions, a further 1,746 tons of bombs were dropped. In all, the Eighth Air Force flew 2,627 heavy bombers and 1,347 escort and offensive fighter sorties during the day.

207. *Spotting for Naval Gunfire.* The naval bombardment took place according to plan. In this bombardment, aircraft of A.E.A.F. played an important role. The Fleet Air Arm had stated early on in the planning that it would be unable to find from its own resources enough aircraft to provide for spotting for the gunfire of all the capital ships it was planned to use. Accordingly, despite the unfortunate diversion of effort from air resources that were far from inexhaustible, I had agreed that two squadrons of Spitfires from A.D.G.B. and two wings (each of three squadrons) of Mustangs from R.A.F. Second Tactical Air Force should be trained for this task. At various times, therefore, well before D-Day, these squadrons had been trained with No. 3 Naval Fighter Wing.

208. The result was that on D-Day and subsequently, we were just able to meet the heavy calls for spotting for naval gunfire that were made on us. On D-Day, no less than 394 sorties were flown on this task, of which 236 were flown by five squadrons of A.E.A.F. Each of the two Spitfire squadrons, No. 26 Squadron and No. 33 Squadron made 76 sorties in the course of the day. In all, during the period of consolidation in the beach-head, that is from 6th June to 19th June, a total of 1,318 sorties on naval gunnery spotting were flown. Of this total, aircraft of A.E.A.F. flew 940. Five aircraft of A.E.A.F. were destroyed on these operations during this period.

209. It may be pointed out here that further calls were made on these same A.E.A.F. squadrons at later stages in the campaign. The gunfire of the capital ships bombarding the isolated German garrisons in the fortresses of Cherbourg in late June, and of St. Malo and Brest in late August, was spotted for by these squadrons. On these duties a further 124 sorties were flown apart from those flown by aircraft of Fleet Air Arm.

Protection of the Landing Beaches.

210. In addition to the cover given to the cross-Channel movement of the assault forces, I provided a continuous daylight fighter cover of the beach-head areas. Nine squadrons in two forces of six squadrons of low cover and three squadrons of high cover continuously patrolled over the British and American beaches. A reserve of six fighter squadrons on the ground were also kept at readiness to strengthen any point if the enemy came up to challenge.

211. On D-Day alone, 1,547 sorties were flown on beach-head cover. Night fighters also patrolled continuously during the hours of darkness over the beach-head and shipping lanes; six squadrons of Mosquitoes were available for these operations. Details of the organisation and control and of the scale of effort of the fighter forces are set out in the next section of this Despatch (see paragraph 308).

212. *Balloon Defence of the Beach-head.*— To supplement the defences provided by fighter aircraft and anti-aircraft guns, it had been decided to provide balloon protection for all beaches and artificial ports (Mulberries). It was thought that balloons would give valuable protection against low-flying attacks and would permit economies in the number of light A.A. weapons that would be needed in the early stages of the assault.

213. Operational control of these balloons was vested in the local A.A. Defence Commander. In practice, balloons flew at 2,000 feet by night and just below cloud base by day. Suitable control funnels, within which balloons were grounded by day, were arranged so as to avoid interference with approaches to air strips.

214. In Part IV of this Despatch I give further details of some of the difficulties experienced and overcome in planning the employment of these balloons. Here I need only comment on the results achieved. The passive nature of balloon defence and the monotonous lack of results make it difficult to compute its value. There were practically no reports of low-level bombing attacks by enemy aircraft during the periods the balloons were flying, and such bombing as did occur was scattered, doing little damage to the beach maintenance and none to the Mulberries. One enemy aircraft was destroyed by a balloon on the beaches in the U.S. sector. Apart from the positive value of balloons as a deterrent to low-flying enemy attacks, I feel that the presence of balloons has, in itself, a definite morale value for both Naval and Army personnel.

Dislocation of enemy communications and control.

215. Air operations to dislocate enemy control of operations in the field were begun on the day before the assault. This dislocation of the enemy control went even further than the previous attacks on his Radar chain. The latter had blinded the enemy to the movement of the Allied assault forces; the air operations now proceeded to impede and disrupt in advance any possible enemy moves to make good his initial setback. To do this I tried during the initial stage of the assault, to break up the enemy machinery of control and signals communications and by so doing to make as difficult as possible the co-ordination of enemy counter-attacks. Chateaux known to house German Corps and Divisional Headquarters and also German Army telephone exchanges were attacked on the evening of 5th June and through D-Day by fighters with bombs and rocket projectiles. These operations undoubtedly seriously embarrassed the enemy, both during the assault and later, when a large number of enemy headquarters were knocked out.

216. The Air Forces also were quite successful in causing casualties among German Generals. Field Marshal Rommel himself was fatally wounded in an air attack and it is believed that a further six to eight Commanders were also casualties. The killing in an air attack of a Divisional Commander during a critical stage of the fighting at St. Lo is thought to have had an important effect on the course of the Battle.

Airborne Operations.

217. The general plan of the airborne operations called for the dropping and landing of three divisions of parachute and gliderborne troops, and for the initial reinforcement and resupply of these formations.

218. Two of these divisions were the 101st and 82nd United States Airborne Divisions and their task was to assist in the capture of the Cotentin Peninsula by aiding the seaborne landing of the First United States Army, and by preventing enemy reinforcements from moving into the peninsula from the south. The particular tasks of these divisions were to capture the areas of St. Mere Eglise and St. Martin and the neighbouring coastal defences.

219. The third division was the 6th British Airborne Division and its task was to operate on the left (eastern) flank of 1st Corps of the Second British Army, in the area between the Orne and Dives Rivers. The particular tasks of this division were:—

(*a*) to secure intact, and hold, the two bridges over the River Orne-Caen canal at Bonouville and Ranville:

(*b*) to neutralise an important enemy coastal battery and capture or neutralise a key strongpoint:

(*c*) to secure a firm base, including bridgeheads east of the River Orne:

(*d*) to prevent enemy reinforcements (including Panzer units) from moving towards the British left flank from the east and south-east.

To accomplish these objects, 3 and 5 Paratroop Brigade Groups flew in with a limited number of gliders carrying details of the 6th Airborne Division Headquarters on the night of D-1/D-Day, and were followed by the 6th Air Landing Brigade on the evening of D-Day.

220. A limited number of S.A.S. troops were dropped in selected areas before and after D-Day for special missions, by aircraft of No. 38 Group.

221. The airlift of all these forces was provided by the transport aircraft of A.E.A.F.

United States IXth Troop Carrier Command carried the American divisions and No. 38 Group and No. 46 Group of the Royal Air Force, carried the British Force.

222. *U.S. IXth Troop Carrier Command.*— The paratroops of the 101st Division were dropped by aircraft of the United States IXth Troop Carrier Command in the general area of St. Mere Eglise, shortly after midnight on the night of June 5th-6th (Operation Albany). The glider force of the 101st Division went in at dawn of D-Day into the same area, in 58 gliders (Operation Chicago). A re-supply mission was flown for the 101st Division on the night of D+1 (Operation Keokuk). This re-supply mission was necessary as there had been no contact between the 101st Division and the seaborne assaulting forces.

223. Paratroops of the 82nd Division were flown in in aircraft of IXth Troop Carrier Command and dropped in the general area of St. Sauveur le Vicomte (Operation Boston), shortly after midnight of 5th-6th June. Glider elements of this division were flown in as follows:—

52 Gliders at dawn of D-Day (Operation Detroit).

177 Gliders at dusk of D-Day (Operation Elmira).

98 Gliders at dawn of D + 1 (Operation Galveston).

101 Gliders at dusk of D + 1 (Operation Hackensack).

Re-supply missions for the 82nd Division were flown on the nights of D +1 and D + 2 with 148 and 117 aircraft respectively, carrying a total of approximately 432 tons of supplies. (Operations Freeport and Memphis.)

224. *Nos. 38 and 46 Groups, Royal Air Force.* The tasks of these groups were as follows:—

(*a*) Dropping of S.A.S. troops—

(i) D – 1/D-Day:

Reconnaissance parties to be dropped in each of six areas (Operation Sunflower 1).

(ii) D + 1/2:

Dropping of task forces in Brittany (Operation Coney).

(iii) D + 3/4:

Dropping of base parties in the six areas mentioned above (Operation Sunflower II).

(iv) Re-supply to base parties as required (Operation Sunflower III).

(*b*) Dropping and landing of 3rd and 5th Paratroop Brigade Groups plus a proportion of Division troops on the night of D – 1/D-Day (Operation Tonga).

(*c*) Landing of the 6th Air Landing Brigade on the evening of D-Day (Operation Mallard).

(*d*) Re-supply of the 3rd and 5th Paratroop Brigade Groups on the night of D/D + 1 (Operation Robroy I).

(*e*) Subsequent re-supply mission for the 6th British Airborne Division (Operation Robroy II, III, etc.).

225. All these operations were carried out successfully, and with a remarkably low casualty rate, as will be evident from the statistics following para. 233. Total losses amounted to 3½ per cent. and 2⅛ per cent. respectively of the British and American sorties flown.

226. These airborne operations constituted the greatest air lift of assault forces that had ever been attempted. Up to date, they are exceeded only by the immense operations of the First Allied Airborne Army in mid-September. The accuracy with which these forces were delivered to the allotted zones contributed greatly to the rapid success of their coups de main.

227. *Provision of Air Support.* All the airborne forces and re-supply missions which were flown in daylight were given adequate fighter cover; in addition, the fighter cover to the assault areas and reserves were held in readiness to assist in the protection of these forces. There were no losses due to attack by enemy aircraft on any formation of troop carriers.

228. In the period D-Day to D + 4, 1,839 sorties were flown by special fighter escort to airborne forces, and a further 419 sorties were flown as escort to later re-supply missions. As additional support, special forces of intruders operated against anti-aircraft positions in the vicinity of the dropping and landing zones and others preceded the main forces across the coast to silence light anti-aircraft batteries on the run-in. The lightness of the casualties, which were much fewer than might reasonably have been expected, is evidence of the effectiveness of these support operations.

Review of Additional Air Operations in Support of the Assault.

229. In addition to the specific tasks set out in the preceding paragraphs, many subsidiary ones were also undertaken by the Allied air forces during the assault period. These operations are briefly reviewed in the next paragraphs.

230. Fighter escort was given to the bombers operating by day and these fighters then went on to attack enemy movements. The fighters of A.E.A.F. flew offensive patrols against all road and rail movement within the tactical area and the fighters of the United States Eighth Air Force continued this work farther afield beyond the boundary of the tactical areas.

231. A large effort was expended on reconnaissance sorties on both D-Day and D + 1. The deep reconnaissances revealed the reactions of the enemy, as shown by his movements of reinforcements to the battle area. The short range reconnaissances were also of invaluable assistance to the Army Commanders.

232. With such large forces operating, the Air/Sea Rescue Service was fully occupied. 198 patrols were flown during the two days and, together with the surface craft, these patrols succeeded in locating and rescuing a considerable number of Allied personnel.

233. The following statistics, covering the air operations in support of the assault, show the great effort of the Allied air forces on D-Day and D + 1. This effort, concentrated over a comparatively small area, surpassed in strength any air operations that had ever before been mounted.

TOTAL AIR EFFORT FOR PERIOD 2100 HOURS 5TH JUNE—2100 HOURS 7TH JUNE

	Heavy Bomber		Medium Bomber	Light Bomber	Fighter Bomber	Tonnage of Bombs	R.P. Fighters	No. of R.P's Fired	Beach-head Cover	Ship-ping Cover	Offen-sive Patrol	Defen-sive Patrol	Reconnaissance			Weather	Escort		ASR	Total Sorties
	Bomb.	Misc.											Ship-ping	Photo	Visual		Bombers	Trans-port		
D-Day																				
A.E.A.F.	—	—	693	296	665	1,517	24	192	1,547	496	73	211	20	84	384	25	484	187	87	5,276
R.A.F. B.C.	1,136	199	—	—	—	5,853	—	—	—	—	—	—	—	—	—	—	—	—	—	1,335
U.S. Eighth A.F. ...	2,627	—	—	—	—	4,542	—	—	—	—	—	—	—	—	—	—	1,347	—	—	3,974
Fleet Air Arm ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	158	—	—	—	—	158
	3,763	199	693	296	665	11,912	24	192	1,547	496	73	211	20	84	542	25	1,831	187	87	10,743
D + 1																				
A.E.A.F.	—	—	622	424	1,213	1,557	285	1,255	708	1,519	238	154	34	123	320	26	20	1,658	111	7,455
R.A.F. B.C.	1,097	63	—	—	—	3,966	—	—	—	—	—	—	—	—	—	—	—	—	—	1,160
U.S. Eighth A.F. ...	1,623	—	—	—	—	2,277	—	—	—	—	—	—	—	—	—	—	1,445	—	—	3,068
Fleet Air Arm ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	150	—	—	—	—	150
	2,720	63	622	424	1,213	7,800	285	1,255	708	1,519	238	154	34	123	470	26	1,465	1,658	111	11,833

Total Sorties as above	22,576
R.A.F. Coastal Command anti-U-boat and anti-shipping sorties ...	353
A.E.A.F. Airborne Operations	2,346
Grand Total	25,275

OPERATION "NEPTUNE"

Air Lift U.S. IXth Troop Carrier Command

Mission	Aircraft						Gliders		
	Despatched	Effective	Abortive	Missing	Destroyed	Damaged	Despatched	Released at DZ	Lost before DZ
Albany	443	433	10	—	13	83	—	—	—
Boston	378	372	6	8	—	115	—	—	—
Chicago	52	51	1	1	1	3	52	51	1
Detroit	52	52	—	1	1	6	52	46	6
Elmira	177	177	—	5	—	92	176	176	—
Freeport	208	148	55	5	3	94	—	—	—
Galveston	100	98	2	—	—	24	100	98	2
Hackensack	101	101	—	—	—	—	100	100	—
Keokuk	32	32	—	—	—	—	32	32	—
Memphis	119	117	2	—	3	35	—	—	—
	1,662	1,581	76	20	21	452	512	503	9

Analysis of Loads Carried

Troops	17,262	Gasoline ...	1,947 gallons	Ammunition ...	798,683 lbs.
M/T	281	Bombs ...	26,652 lbs.	Other Combat	
Artillery Weapons ...	333	Rations ...	87,373 lbs.	equipment ...	1,141,217 lbs.

OPERATION "NEPTUNE"

Air Lift Nos. 38 and 46 Groups, Royal Air Force

Mission	Aircraft						Gliders		
	Despatched	Effective	Abortive	Missing	Destroyed	Damaged	Despatched	Released at DZ	Lost before DZ
Tonga	373	359	14	9	—	7	98	80	18
Mallard	257	247	10	2	6	21	257	247	10
Rob Roy I	50	47	3	9	—	19	—	—	—
Rob Roy II	6	6	—	—	—	—	—	—	—
Rob Roy III	12	5	7	—	—	—	—	—	—
Rob Roy IV	15	15	—	—	—	—	—	—	—
Sunflower I	3	3	—	—	—	—	—	—	—
Sunflower II	2	1	1	—	—	—	—	—	—
Sunflower III	6	6	—	—	—	—	—	—	—
Coney	9	9	—	—	—	—	—	—	—
	733	698	35	20	6	47	355	327	28

Analysis of Loads Carried

Troops	7,162	Tanks	18	Bombs ...	2,000 lbs.
M/T	286	Bicycles	35	Other Equipment ...	731 panniers and 622 containers
Artillery Weapons ...	29	Signals Equipment ...	12		

(d) *Operations subsequent to D-Day.*

Plan of Presentation

234. As in the previous sections of the narrative part of this Despatch, I propose to deal with the operations in the period D-Day to 30th September, 1944, under types of operations, rather than on a time basis. For this purpose the following headings have been adopted:—

Attacks on Enemy Communications.

Close Support Operations.

Attacks on Coastal Garrisons.

Fighter Cover to the Assault and the Shipping Lanes.

Enemy Air Reaction and the Allied Attacks on the G.A.F. and its bases.

Defence against Flying Bombs and Attacks on "Crossbow" targets.

Operations of First Allied Airborne Army.

Attacks on Naval Targets.

Strategical Bombing—"Pointblank."

Attacks on Enemy Communications.

235. I have dealt with the task undertaken by the air forces (see para. 51 et seq.) of dislocating, prior to D-Day, the enemy rail system. I considered that one of the most important contributions which the air could make to the ground battle, after the launching of the assault, was to continue this work of dislocation. With this view you agreed, as did the other Commanders-in-Chief.

236. In order to gain a clear picture of the state of enemy road and rail communications, as I saw it at D-Day, reference should be made to the two maps* facing pages 14 and 18. The lines in Northern France and Belgium were very seriously disorganised, but the lines south of Paris/Rheims/Luxembourg were not nearly so devastated, nor were the railways south of the Seine. Of the bridges over the Seine below Paris, all except two were cut, and although the Loire bridges had not been cut, the crossings at Tours, Orleans, Angers and Saumur had all been rendered impassable by attacks on the railway junctions. In addition, there had been an enormous reduction in the capacity of the whole rail system in Northern France and Belgium.

237. The interruption of enemy communications during the post assault phase falls naturally into two separate periods:—

(*a*) From the moment the contending armies had joined battle, it became of paramount importance that the enemy should be denied the freedom of movement necessary to prepare and mount successful counter-attacks, and that the reinforcements he sought to bring into the battle zone should not only be hampered in movement, but also subjected to the severest casualties possible by air attack.

(*b*) After the break through of the Allied armies, the task of the air forces against communications was to harry the fleeing enemy columns, block the defiles and police the river crossings, thereby removing the possibility of orderly retreat.

In the following paragraphs I try to show how these two tasks were carried out.

238. *Attacks on Rail and Road Systems—June and July.*—In the earlier part of this period I was concerned to impose the maximum delay and to inflict the heaviest casualties on the flow of reinforcements and supplies to the enemy armies. The attacks were carried out according to a prepared pattern. This pattern was necessarily developed as the situation changed, following the information I received from deep and tactical reconnaissance.

239. The weather during June severely hampered operations. Frequently I was denied vital information on the progress and direction of German troop movements. Despite this handicap of weather, however, reconnaissance squadrons operated effectively, and the information they provided proved invaluable to the Army Commander as well as to myself.

240. Immediately the battle started, the enemy began to transfer his immediate reserves to the battle zone over the railways between the Seine and the Loire. Action against this movement consisted of low flying fighter bomber attacks against the trains and of line cutting by fighter bombers. The fighter bombers of the United States Ninth Air Force particularly had developed a very effective technique of line cutting. I also employed medium bombers with excellent results in attacks against sidings being used as detraining points.

241. By D+1, those parts of the enemy close reserves which had escaped these attacks had been committed to the battle. I therefore decided to initiate a series of attacks against railway junctions in the tactical area and thus establish a line beyond which enemy movements by rail to the battle zone could not proceed. R.A.F. Bomber Command attacked Rennes, Alencon, Fougeres, Mayenne and Pontaubault and followed up with attacks on the next two nights, on Dreux, Evreux and Acheres. Within the boundary of the tactical area thus drawn, A.E.A.F. fighter bombers caused such destruction that after three days, all railway and all major road movement by day had been virtually halted.

242. The enemy was forced to travel mainly by night and along minor roads. No. 2 Group of the R.A.F. Second Tactical Air Force, whose crews had been specially trained in night harassing, by the light of flares, operated light and medium bombers, frequently in very difficult weather conditions, with outstanding success against this movement.

243. Outside the tactical areas, both road and rail movements were dealt with by fighters of the United States VIIIth Fighter Command. Their fighter bomber attacks on line cutting and against railway centres, and also in offensive fighter sweeps against road and rail movements were outstandingly successful.

244. On 12th June, I re-drew the boundary of the tactical area as follows—along the Seine to Vernon, thence to Dreux, Chartres, Le Mans, Laval and St. Nazaire. Within that area the tactical air forces policed all roads and railways. Outside that area, the United States Eighth Air Force was busy attacking the Loire bridges to prevent any reinforcement from the south; but due, no doubt, to the threat of Allied invasion on the Mediterranean coast, there were no heavy enemy movements from the south for some time.

245. The principal difficulty in maintaining a complete blockade on all movement in the tactical area was the persistent bad weather which hampered the air operations very considerably. Further, the enemy showed great energy and ingenuity in repairing rail cuts and in running shuttle services between cuts. Because of these factors, the enemy was able to move a certain amount of material by rail within the tactical area itself, though he had to move mainly by night.

246. Apart from the forces in Brittany which it was anticipated would move by road, the main source from which the enemy could draw his reinforcement at this time was the Pas de Calais area. I therefore arranged for R.A.F. Bomber Command to attack centres in that area. On the night of 12-13th June, that Command made heavy attacks on Poitiers, Arras, Cambrai and two rail centres at Amiens. On the following night Douai, St. Pol and Cambrai were the targets. These attacks, together with those of the fighter and fighter bombers harassing movements on the railway lines, effectively delayed the transfer of the enemy reserves into the battle zone.

* Maps not reproduced.

247. Since most of the fuel and ammunition dumps in the tactical area were attacked at one time or another by aircraft of A.E.A.F., on armed reconnaissance, the enemy quickly began to run out of immediate reserves and was forced to use dumps further afield. As early as the second week of the battle, he was committed to drawing supplies of fuel and ammunition from dumps in the Marne area. These supply columns also had to run the gauntlet of our air attacks.

248. During the third week in June, I again extended the tactical area, following the attacks I have described in para. 244. At this time the enemy was using two particular routes, one through Strasbourg and the other through Saarbrucken and Metz, to transfer reinforcements and supplies from Poland and Germany proper to the Western Front. How much the movement of traffic on these lines had already been embarrassed may be gauged from the move of the 9th and 10th S.S. Panzer Divisions. These divisions, which had been hurriedly pulled out of Poland, were forced to detrain as far east as Nancy and then move approximately 300 miles by road to reach the battle zone. Others detrained as far east as Mulhouse. To complete the disorganisation on these routes, I laid on attacks, at the end of June, on Metz, Blainville, Strasbourg and Saarbrucken.

249. During July, the enemy was committed to move further formations both from the Pas de Calais and the Low Countries, and some of these he tried to bring to centres in the Paris area for detrainment. Heavy attacks were accordingly laid on these centres as well as on others in the Low Countries. I also extended the tactical area to include Northern France, so that A.E.A.F. aircraft could take in the areas north of the Seine in their operations. The fighters of the Eighth Air Force continued to sweep over the routes east and south-east of Paris.

250. The following statistics show the weight of the air attacks on rail centres in the period I have been reviewing:—

Attacks on Rail Centres, Tunnels and Embankments from 6th June—31st July, 1944

Force	*Sorties*	*Tons of Bombs*
A.E.A.F.	7,736	7,147
R.A.F. Bomber Command... ...	5,738	23,440
U.S. Eighth Air Force	1,615	3,842
	15,089	34,429

251. The above figures, however, do not cover the attacks by the fighters and fighter bombers against the enemy rail movements. Their work was made easier in that the general disorganisation resulted in the enemy having at best only one or two circuitous routes open at any one time. This canalisation of traffic presented some excellent fighter bomber targets, and the pilots of A.E.A.F. and the United States Eighth Fighter Command took full advantage of them.

252. As the period of static fighting ended and the Allied armies broke out from their bridgehead, I called off the attacks on rail targets, as they were then more likely to hamper than help the Allied advance.

253. *Attacks on Bridges—June and July.*—The destruction of the bridges leading into the battle zone was also continued after the assault was launched. These attacks, as I have already explained, formed part of the general plan of attack on the enemy's transport system. At D-Day, all the Seine bridges below Paris except two were cut. During June, these two were destroyed as well as the principal bridges, both road and rail, across the Loire. Several important bridges on the lines through the gap between Paris and Orleans were also rendered impassable. The map* facing page 18 indicates the ring thus drawn about the battle area.

254. Briefly, this ring ran along the Seine and Loire. A second line of interdiction further afield had been planned, and to this end a large number of the more important bridges in the rail systems of North-Western France and Belgium were also cut; in addition, a number of minor bridges within the tactical area were rendered impassable.

255. In fact, however, this second line of interdiction was never completed. There were several reasons. Chief amongst them was the weather which curtailed operations. Next were the priority claims on the fighter bombers of the United States Eighth Fighter Command. Finally, there came a time when, because of the speed of our advance, further destruction of bridges was no longer necessary and indeed, would have been to our disadvantage. At this time I sought and secured your agreement, and that of the two Army Group Commanders-in-Chief, to stop these attacks.

256. The attacks on bridges had been mainly the work of A.E.A.F. and the United States Eighth Air Force and in the period D-Day to 31st July, the following effort was expended on these targets:—

Force	*Sorties*	*Tons of Bombs*
A.E.A.F.... ...	12,823	14,271
U.S. Eighth A.F.	3,225	9,397
R.A.F. B.C. ...	260	975
	16,308	24,643

257. *Effect of Attacks on Communications.*—The enemy endeavoured to overcome the restrictions the air attacks placed on him by moving his stores and equipment both by road and by barges down the Seine from the unloading points near Paris to the ferries he had established at Elbeuf and in the neighbourhood of Rouen, as well as along the water-ways of Northern France. Both of these channels were dealt with by air attack, and there is a large amount of intelligence material to testify to the effectiveness of these fighter bomber attacks. Prisoners of war have confirmed pilots' stories of losses and have told of divisions moving very long distances by bicycle and being committed to the land battle piecemeal, without heavy equipment, as a result of Allied air attacks.

* Maps not reproduced.

258. The following accounts of the difficulties encountered by German divisions moving to the battle zones in July are of interest in this connection:—

(*a*) Air reconnaissance indicated, and prisoner of war reports confirmed, that the 363rd Infantry Division began to move from Ghent in mid-July. A number of the entraining stations, the junctions along the route and the trains themselves were attacked. The movement became so disorganised that approximately half the trains were cancelled and the troops moved by road. The division did not reach the front until the beginning of August.

(*b*) The 331st Infantry Division attempted to move from the Pas de Calais by rail. The route originally chosen was the main line Lille-Arras-Amiens, but as a result of line cutting by fighter bombers, a diversion had to be arranged via Lille-Cambrai-Chaulnes, and later through Eastern France via Valenciennes-Aulnoye-Mezieres. This movement eventually became so involved that the attempt to travel by rail was abandoned altogether. Air reconnaissances revealed that loaded trains which had stood by at entraining stations for 48 hours were finally unloaded without having moved at all.

(*c*) The 326th Infantry Division was also moved from the Pas de Calais at this time. In this move the Germans were evidently not prepared to risk a full-scale rail movement. Less than half the division travelled by rail, and the remainder moved on bicycles by a very circuitous route.

(*d*) It has been estimated that, in favourable circumstances, the move of the 1st S.S. Panzer Division from Louvain to the Caen area would have taken about three days. In fact, although detraining took place in the vicinity of Paris, and the move was completed by road, the rail journey alone took as long as a week for some elements, presumably because their trains were committed to a "Pilgrim's Progress" as a result of incidents on almost every route attempted. Stories of delays of from two to seventeen hours as a result of bomb damage to railway tracks, were a feature of the majority of interrogation reports of prisoners from this Division. One unit was delayed for two days at a badly damaged railway junction east of Paris.

(*e*) As had been anticipated, the move of the 346th Infantry Division from the area of Le Havre was conducted entirely by road. Bicycles were the means of transport and, although there is no evidence of any serious delay caused directly by bombing or strafing of columns, it should be borne in mind that the slow and laborious crossing of the Seine in ferries and motor boats was forced on the division by the previous destruction from the air of road and rail bridges over the river. Prisoners of war report that they were exhausted on their arrival and went into action without rest, food or even halts en route.

(*f*) The 271st Infantry Division which began to move from Montpellier on 1st July took approximately 19 days to reach the Rouen area. Some of the trains were attacked at Arenes just outside Montpellier before they started and casualties totalling 1,500 were reported; other trains were delayed for several days by air attack in the Lyons-St. Etienne area. The troops which did reach the battle area marched into the Caen area under heavy air attack. The original schedules for the 49 trains in this move are interesting in that they allowed 18 hours 25 minutes for the 285 mile journey from Montpellier to Chalon sur Saone. In fact, several trains took 11 days to pass Lyons and 20 trains were blocked in the Lyons area and finally diverted via St. Etienne and Mouling.

259. *Effect of Weather on Operations.* It is clear, I believe, from the foregoing paragraphs that the Allied air forces succeeded in crippling one of the most dense and complex networks of railways and roads in the world, and in practically denying its use to the enemy. I must emphasise, however, the influence which bad weather had on these operations. Both heavy and medium bombers, because of this bad weather, were prevented time and again from taking part in planned attacks on railways and bridges. We needed weather consistently good enough to permit precision visual bombing in density and co-ordinated attacks of a type most appropriate, as regards aircraft and weapons, to the targets involved throughout the whole of this period. I am convinced that if we had had this weather the enemy would have been prevented from moving by rail at all, and his retreat, disastrous as it was for him, would have been virtually impossible and far more costly in casualties to personnel and equipment than it was.

260. *Attacks on Communications—August and September.*—The second phase of attacks on communications began when the enemy tried to get away, and this became almost entirely a fighter and fighter bomber war. Forced to move by day as well as by night to escape the encircling ground forces, the enemy was constantly harried and destroyed. The roads leading to the Seine, then the Seine crossings, pontoons and barges and finally the roads of Northern France were in turn successfully attacked and became littered with the skeletons of the German Army's transport and equipment.

261. The mounting total of this destruction is evident in the following statistics of pilots' claims of mechanical transport and A.F.V's destroyed. These figures do not include those claimed as probably destroyed or damaged:—

6th-30th June	2,400
1st-31st July	3,364
1st-31st August	4,091
1st-30th September	6,238
	16,093

262. *Value of Reconnaissance.* I cannot stress too strongly the importance of reconnaissance in planning attacks on communications. Although inclement weather interfered with the programmes for both photographic and visual reconnaissances, I was generally well informed of the moves of enemy supplies and reinforcements and was able to deal with them before they reached the battle zone. The valuable information brought back also enabled the Army Commanders to make accurate forecasts of the enemy strength and intentions. This position became completely reversed when the Allied armies moved forward. There is

evidence to show that, because the Allied fighters kept the G.A.F. reconnaissance down to a negligible effort, the German High Command was fighting completely in the dark, unaware of the Allied intentions or of the strength and direction of each thrust.

263. In the period D-Day to 30th September, 1944, the reconnaissance units of A.E.A.F. flew 4,808 sorties on photographic and 14,140 sorties on visual reconnaissances, a total of 18,948 sorties.

Close Support Operations

264. In addition to the contribution made to the success of the land battle by attacks on the enemy's communications, the air forces gave direct support to the Allied armies. These operations were laid on in three ways:—

(*a*) armed reconnaissance
(*b*) pre-arranged support
(*c*) immediate tactical support.

265. The armed reconnaissances were made by fighter bomber aircraft, which with bombs, R.P. and cannon fire, attacked a variety of targets, particularly movement seen on roads or railways. The pre-arranged support was of two kinds—attacks made according to plans prepared some time in advance and which included heavy and medium bombers; and secondly, the more normal form of attacks laid on as a result of conferences between Army and Air staff in the field, when tactical targets for the ensuing day were decided upon. For these attacks, the Army usually undertook to assist the bombers by marking the target by means of smoke signals. Immediate support was provided in the usual way by strike aircraft held in readiness to attack targets requested direct by Army forward positions, or reported by reconnaissance aircraft.

266. Much of the work of the squadrons engaged on armed reconnaissance I have described in the preceding paragraphs dealing with attacks on communications. In addition to the pre-arranged support by medium and fighter bombers (dealt with later in paragraph 284 et seq.), there were six large scale attacks by heavy bombers during the period D-Day to 30th September, apart from certain other attacks on the enemy garrisons left in the Channel ports.

267. *Pre-arranged support using heavy bombers.* The use of heavy bombers in close support to ground forces was an important development in air warfare. A word on the situation prior to the employment of heavy bombers in such a role will not, therefore, be out of place.

268. The initial impetus of the Allied assault had secured a bridgehead extending from the Cotentin Peninsula to Caen, but the enemy had been able to concentrate against this relatively short front. He held strong, well sited defence positions in depth. By stealth, ingenuity and taking advantage of frequent periods of bad weather which made air policing of road and rail in the tactical area impossible, he managed to muster just sufficient reinforcements and warlike supplies to maintain his position.

269. Concentrations of artillery had not succeeded in cracking his defences sufficiently to enable a successful breakthrough to be made without, it was considered, a prohibitive cost in both men and material. A stalemate appeared to have arisen.

270. Neither could an air bombardment sufficiently heavy and concentrated to produce a situation ripe for a successful ground attack be provided by medium, light and fighter bombers.

271. I had already submitted to you a study of the situation in which I had made suggestions as to how the air forces could help the land forces to break out of the Normandy bridgehead. After consideration of this study by the various Commands (both land and air) concerned, it was decided to use heavy bombers in the virtually novel role of army co-operation.

272. The detailed plans for these attacks were worked out at an inter-service level, being finally co-ordinated at your headquarters. The co-ordination of the actual operations of the Air Forces involved in the attacks, however, was exercised by me.

273. The first of the large scale attacks, using heavy bombers in close support took place at 0430 hours on 8th July. R.A.F. Bomber Command employed 467 bombers to drop 2,562 tons of bombs on positions North of Caen. The British and Canadian troops, held up to the North of the town for so long by the enemy, followed up the bombing with a frontal attack. By nightfall they had entered the streets of Caen. The bombing had therefore succeeded in its object and had opened a way for a break through by the ground forces.

274. The second, and largest, of these operations (Operation Goodwood) took place on 18th July, when the combined weight of the United States Eighth Air Force, Royal Air Force Bomber Command and the Allied Expeditionary Air Force supported an advance by elements of the Second British Army in the Caen area.

275. This attack was the heaviest and most concentrated air attack in support of ground forces ever attempted. No less than 1,676 heavy bombers and 343 medium and light bombers were committed to the attack and the total tonnage of bombs dropped reached 7,700 U.S. tons.

276. In view of its interest I set out the plan for this large attack in some detail. The plan provided for the destruction of enemy installations and forces to allow the ground troops to advance along the axis Escoville—Cagny. The ground forces prior to the jump-off, were generally along an east/west line through Herouvillette. R.A.F. Bomber Command were employed to destroy the installations and forces in the areas marked A, H and M on the map* facing. Cratering was acceptable in these areas to prevent the possibility of the enemy making flanking attacks over this ground. Heavy bombers of the United States Eighth Air Force were concentrated on the installations and forces in the areas marked I, P and Q. Cratering was acceptable in the first of these areas, but not in the other two, as our own forces were to pass over this ground. The medium and light bombers of the tactical air forces were detailed to neutralise the enemy forces in the areas marked C, D, E, F and G. Pinpoint targets were given in areas, C, F and G, while the whole areas marked D and E were to be swept with an even pattern of fragmentation bombs. The laying-on of this attack, involving more than 2,000 bombers, meant very careful timing.

* Maps not reproduced.

277. The other four attacks by heavy bombers were generally based on the same principle of destroying the enemy strongpoints, and cratering given areas to prevent the enemy from attacking the flanks of our forces while they were advancing through the swept but relatively undamaged centre of the assault area.

278. The third of the large scale attacks involving heavy bombers was launched on 25th July, when 1,495 heavy bombers and 388 fighter bombers of the United States Eighth and Ninth Air Forces dropped 4,790 tons of bombs in a bombardment preliminary to an advance by elements of the First United States Army across the Periers—St. Lo highway. Unfortunately some of the bombs in this attack fell short and caused some casualties to our own ground forces in the area.

279. The fourth attack was in support of the Second British Army south of Caumont. The preliminary heavy air bombardment was launched early on 30th July and 693 heavy bombers of R.A.F. Bomber Command and over 500 light and medium bombers of A.E.A.F. dropped 2,227 tons of bombs.

280. The fifth attack assisted the advance of the First Canadian Army along the Caen-Falaise road on the night of 7-8th August and during the succeeding day. 1,450 heavy bombers of the United States Eighth Air Force and of R.A.F. Bomber Command, and fighter bombers of the Second Tactical Air Force dropped 5,210 tons of bombs on enemy installations, strong points and forces in the area of the advance.

281. The sixth attack, also by R.A.F. Bomber Command, took place on the morning of 14th August and assisted the Canadian forces to advance into Falaise. 811 bombers were employed and 3,723 tons of bombs were dropped in the attack. Again, in this operation, some of the bombs fell short of the targets causing casualties to our own ground forces.

282. In each case, the ground forces were able to move into the bombarded positions practically without opposition. That they failed to exploit fully the break-through is known, but there are doubtless many reasons for this failure. In the second attack, the principal cause of delay was the bottleneck across the Caen bridges which delayed the moving of armoured formations sufficiently long to enable the enemy to remount his screen of guns outside the area which had been bombed. In the third attack, the Army Commander agreed that the "carpet" bombing did put his troops through the enemy positions; difficulties which arose in moving the army forces forward as rapidly as was necessary again prevented a complete exploitation. Nevertheless, these heavy attacks did finally succeed in starting off the break-through of the ground forces across the Periers-St. Lo highway, and it was this break-through which eventually determined the battle of Normandy, which liberated France.

283. I have referred to the lessons learned from this series of attacks in close support in Part V of this Despatch. From an air point of view, the attacks definitely proved that saturation bombing by heavy bombers on a narrow front can enable an army to break through, but they also showed the need for the army to exploit, without delay, the favourable situation created. Further, the heartening moral effect of these large scale air support formations on our own forces and the corresponding shattering of the will to resist among the enemy has been stated by Army Commanders to have been of vital consequence. Air and land action must be closely co-ordinated. The land forces must be ready to step off at least immediately the bombing is over, if not just before, accepting some slight risk of casualties from our bombing, and the artillery programme must be directly related to the bombing plan to ensure economy of effort by both arms.

284. *Pre-arranged Close Support by Medium and Fighter Bombers.*—The operation of medium and fighter bombers on pre-arranged support was often in small formations against targets such as gun positions, tank laagers, chateaux suspected of housing headquarters formations, and defended positions. The effectiveness of the support may be judged from the following extract from a captured document:—

> "C.-in-C. West (Von Kluge) in a report to General Warlimont, Hitler's representative, on the position at Avranches says—'Whether the enemy can be stopped at this point is still questionable. The enemy air superiority is terrific, and smothers almost all of our movements. Every movement of the enemy, however, is prepared and protected by its air forces. Losses in men and equipment are extraordinary. The morale of the troops has suffered very heavily under constant murderous enemy fire.'"

285. *Immediate Support.*—The immediate support of the armies was provided by the fighter bombers of the tactical air forces and in this role the fighter bombers have shown their greatest effectiveness. Never before have they been used in such strength and with such decisive results. I have divided my review of their operations in the following paragraphs into four phases of the land battle, as follows:—

(i) The period of static fighting.
(ii) The break-through of the Allied armies.
(iii) The period of encirclement.
(iv) The retreat across Northern France and Belgium.

286. In the early period of the operations of offensive fighter and fighter bomber forces, the co-operation between the Commander of the United States IXth Tactical Air Command, General Quesada, and the Air Officer Commanding No. 83 Group, Royal Air Force, Air Vice-Marshal Broadhurst, C.B., D.S.O., D.F.C., A.F.C., was close and effective. Each gave the other assistance as the occasion arose and whenever a good target presented itself, neither hesitated to call on the other to take advantage of it. The development of common methods of control and target indication and reference greatly assisted this British and United States mutual support.

287. *Period of Static Fighting.*—During this phase of the land battle, the tactical air forces concentrated upon the close support of the armies within the tactical boundary. The technique of this form of support was considerably developed. A system of Visual Control Points was perfected by which an experienced fighter controller rode in one of the leading tanks, equipped with the necessary V.H.F. radio-telephony equipment for the control of fighter aircraft. By these means an extra-

ordinary flexibility of control of the fighter bombers on army co-operation was maintained. Another interesting development in technique was provided by the use of the American M.E.W. mobile Radar station, which, because of its ability to locate low-flying aircraft and of its range of detection, proved of great assistance to the fighter forces covering the battle areas. However, I feel that the chief value of the tactical air forces during this first period lay in their ability to smash up the enemy's attempted concentrations of tanks and vehicles before a counter-attack could be launched.

288. *The Break-through of the Allied Armies.*—When the United States armies achieved their break-through which carried them to the Brittany Peninsula and on into the country north of the Loire, the close support work of the air forces took on a new aspect. Continuous fighter cover was provided to the advancing armoured spearheads. This cover, not only protected them from enemy air attack, but also reached out, destroying enemy tanks, M/T and gun positions that lay in the path and along the flanks of the advancing armies. In this respect the work of the United States Ninth Air Force, particularly of the IXth and XIXth Tactical Air Commands, deserves special mention. Fighter pilots of this force destroyed hundreds of enemy tanks and vehicles. They had developed a technique of attacking tanks from the rear, which experience had shown was most vulnerable to their .50 calibre machine gun bullets.

289. It was to hold up this break-through that the enemy, under personal orders from Hitler, attempted, on 7th August, his really large scale armoured counter-attack, launched against Mortain in an effort to reach the sea at Avranches and split the advancing American armies from their main bases. This concentration of armour gave the tactical squadrons of A.E.A.F. a great chance to inflict a crushing blow on the enemy and prove the superiority of their weapons and training. The opportunity was fully accepted, particularly by the Typhoon squadrons of R.A.F. Second Tactical Air Force.

290. On 7th August there were nineteen squadrons of Typhoons operating from French airfields. These squadrons carried out 59 missions, flying 458 sorties in all during that day. 294 of these sorties were in the Mortain area. No less than 2,088 rocket projectiles were fired, and 80 tons of bombs were dropped; and the pilots claimed very large numbers of tanks, A.F.V., and M.T. destroyed and damaged.

291. This tremendous blow at the Nazi armour was achieved at the cost of 5 aircraft lost and 10 damaged, and was one of the most vital factors in defeating the enemy attacks.

292. The scale of effort of these Typhoon squadrons is indicative of the sustained activity of the tactical air forces. The number of missions flown by Typhoons in the five-day period, 7th-11th August, rose to 298, involving 2,193 sorties. 9,850 rocket projectiles and 398 tons of bombs were aimed at enemy targets, and many more enemy tanks and vehicles were destroyed. These results were achieved at the cost of 13 Typhoons destroyed and 16 damaged.

293. After the Typhoon attacks on the first day, the fighter-bombers of the United States Ninth Air Force took over the responsibility for the Mortain area, and in many attacks accounted for many more of the enemy armoured vehicles. By this effort, the air forces broke up and partly destroyed the enemy concentrations of armour, and although a number of spearheads did penetrate our forward positions, they were effectively dealt with by the ground forces. In this counter-attack Hitler threw away the one force of armour which could have enabled him to extricate his army. As a result, the disaster to the Army was complete. Between 8th and 14th August, the IXth Tactical Air Command flew a total of 4,012 sorties; virtually all of them in co-operation with ground action in the Mortain region. On 12th August 673 sorties were flown and 310.8 tons of bombs dropped.

294. To the outstanding success of these attacks on the enemy armour, the weather effectively contributed, not only because it cleared and remained fine during the critical days from 7th to 11th August, but also because it had been so bad earlier. This bad weather had drastically restricted air operations and, there seems reason to suppose, had lulled the enemy into a sense of false security.

295. It is difficult to find any other reason why he should have abandoned first principles and moved his armour head to tail in long convoys over roads in daylight. These convoys, once the weather cleared, gave the tactical air forces their unique chance of scoring an outstanding success.

296. *The Encirclement.*—During the period in which the German 7th Army was rapidly becoming encircled by the sweep of the American ground forces to Alencon and Argentan and by the pressure of the British and Canadian forces towards Falaise, the German Commander had to decide whether to withdraw before the gap was closed or to stay and fight it out. I feel certain that any such withdrawal in the face of the overwhelming air superiority of the Allied air forces would have been disastrous, and it would appear that the German Commander also had serious misgivings as to the practicability of such a withdrawal. In large part, the enemy army stood to fight. While the front was more or less clearly defined, the air forces were able to inflict destruction on the concentrations of enemy troops. However, when the encirclement became complete, the ground position naturally became confused. In these conditions it was inevitable that our air forces should have once or twice attacked our own troops in error. Such misfortune could not be avoided. As a result, however, the Army Commanders eventually fixed bomb lines which automatically severely restricted attacks in close support of the land forces and thus denied to the fighter bombers many excellent targets. I pressed for revision of these bomb lines to allow more freedom to operate closer to the fighting, but the Army Commanders maintained their caution. I am convinced that, as a result of this action, the reasons for which I fully appreciate, the air forces let through a great deal of enemy material and troops that would otherwise not have escaped.

297. *The Retreat across Northern France and Belgium.*—Once the enemy had begun his retreat to the Seine, the fighter and fighter bomber forces of A.E.A.F. were presented with some first-class targets. Low flying attacks inflicted enormous personnel casualties, while skeletons of burnt-out transport littered every road and track and were ample evidence of the effectiveness of these attacks.

298. During this retreat it was reported more and more frequently that very large columns of ambulances were moving to the German rear. I was almost certain that these ambulances were faked and did, in fact, contain fighting soldiers and equipment. It was a critical decision to take as to whether or not these ambulances should be attacked. You finally decided against attacking them. Although we were thereby likely to miss some targets, it was preferable to win the battle without laying ourselves open to criticism, however unjustified. In a number of cases, however, it was found that ordinary vehicles were intermingled with the ambulances and these were attacked. It was significant that whenever this happened, the doors of the ambulances opened and German soldiers poured out in every direction and made for cover with a speed and agility quite remarkable for wounded men. Occasionally too, fire was opened on our aircraft from these ambulances.

299. At this time, reconnaissances began to show what was in the circumstances, a relatively considerable enemy movement on the railways north-east of the Seine, particularly through Rheims. This rail movement was apparently to carry up reserves to stabilise a line, probably on the Seine or the Marne. I therefore directed a proportion of the fighter bomber effort against these movements. The United States Ninth Air Force fighters, and further east, the United States Eighth Air Force fighters, did extremely well against these targets, and this effort, I believe, virtually broke up the enemy's last chance of bringing up sufficient forces to re-form a line in France.

300. Once the remnants of the enemy divisions had crossed the Seine (and in the crossing they had to run the gauntlet of continuous air attacks on their ferries) they dispersed rapidly into a widening area. In consequence there were fewer and fewer large targets offering themselves for attack. In the main, therefore, fighters and fighter bombers reverted to direct support of the Allied columns and attacked the enemy rearguards just ahead of them.

301. In general, I would like to emphasise again the terrific havoc that was created by the air forces during the enemy's withdrawal to and across the Seine. Thousands of vehicles were destroyed and from this onslaught the enemy succeeded in getting away only small sections of his previously very powerful army.

302. The two outstanding days for the tactical air forces in this period were 18th and 25th August. The R.P. fighters and the fighter bombers of R.A.F. Second Tactical Air Force particularly claimed many victims, and the fighter bombers of the United States Ninth Air Force added their quota. The densest congestion of these enemy concentrations was in the Trun-Vimoutieres area, and the wreckage later found in this area is ample testimony to the effectiveness of these air attacks.

303. On 25th August, the G.A.F. attempted in force to protect the efforts of the German Seventh Army to use the river crossing in the Rouen area. They were met by the fighters of the United States Ninth Air Force. 77 enemy aircraft were destroyed in combat and a further 49 were destroyed on the ground. On this and the subsequent three days, approximately 3,000 vehicles were destroyed and several thousand dead German soldiers were found among the wreckage in the area of the Seine crossings.

Attacks on Coastal Garrisons.

304. During the last week in August and through September, strong bombing forces were used to reduce the enemy garrisons holding on to the Atlantic and Channel ports. The attacks on Brest between 24th August and 6th September were shared by the United States Eighth and Ninth Air Forces and R.A.F. Bomber Command. More than 6,000 tons of bombs were dropped on the garrisons of this city. The attacks on Le Havre, Boulogne and Calais were R.A.F. Bomber Command operations, and provided excellent examples of reduction of a town by air bombing. This was especially so in the case of Le Havre. The Allied casualties in the subsequent assault against a strongly fortified garrison of 11,000 defenders totalled only 400. Between 1st and 12th September, 2,042 sorties were flown against Le Havre alone and 11,000 tons of bombs were dropped, 5,000 tons of this total being aimed in one massive daylight attack on an extremely small area.

305. This bombing was undertaken at the express wish of the Army Commanders and undoubtedly it succeeded in paving the way for and in saving the lives of thousands of our soldiers in the final assault. It must be recorded however, that casualties to French civilians shut up with the German garrisons in these ports were inevitably high, particularly so at Le Havre. I feel, that in the broad view, this bombing effort would have been more profitably directed against targets inside Germany, particularly as the disorganisation of her retreating army was most acute at this time. I should have been happier to see it used against focal points in the communications system behind the enemy frontier, in an effort to delay the movement of reinforcements with which the enemy succeeded, in mid-September, in stabilising a line along the Rhine and the Moselle.

306. It must also be remembered that the bombing had to be laid on to suit the Army plan, and in consequence it was sometimes delayed or postponed because the Army could not always be ready to attack at the agreed time or because of unfavourable weather conditions over the target. Bad weather over the target areas coincided sometimes with good weather over Germany. Because the heavy bombers had been committed to, and were standing by for, attacks on the garrison towns, opportunities for using them in good conditions against vital industrial targets in Germany were lost.

307. The following statistics give the weight of effort against coastal defences and gun positions during the month of September. This

effort was very largely made up of the attacks laid on for the reduction of besieged garrisons.

Attacks on Coastal Garrisons during September, 1944.

Force.	*Sorties.*	*Tons of Bombs.*
A.E.A.F.	5,567	4,406
U.S. Eighth A.F. ...	1,327	4,501
R.A.F. Bomber Command	4,510	25,811
	11,404	34,718

Fighter Cover to the Assault and the Shipping areas.

308. In the foregoing paragraphs I have tried to describe the support both direct and indirect which the air forces gave to ground forces after the assault was launched. I come now to the equally important task undertaken by the air forces, the task, namely of protecting the beach-head area and our shipping from attacks by the G.A.F. I have already explained (see para. 32) my reasons for retaining a large fighter force to ensure that the air superiority we had won was maintained on D-Day and afterwards, and in addition, in para. 201 have briefly mentioned the fighter protection given to the cross channel movement of assault forces. There were, in fact, 171 squadrons of day fighters and fighter bombers available for all the tasks that they were called upon to undertake in support of the invasion. These forces were made up as follows:

	U.S. Ninth A.F.	*U.S. Eighth A.F.*	*2nd T.A.F.*	*85 Group*	*A.D.G.B.*	*Total*	
Day Fighters—							
Mustang III ...	6	12	6	—	—	24	
Thunderbolt ...	39	21	—	—	—	60	
Lightning	9	12	—	—	—	21	
Spitfire	—	—	27	4	15	46	
Tempest	—	—	—	—	2	2	
						—	153
Fighter Bombers—							
Typhoon	—	—	18	—	—	18	
						—	171

309. In addition, A.D.G.B. retained 9 Spitfire, 1 Mustang and 2 Typhoon squadrons for the air defence, by day, of the United Kingdom.

310. The night fighter forces available for the protection by night of the assault area and shipping lanes consisted of 6 Mosquito squadrons. (The defence of the United Kingdom by night was undertaken by A.D.G.B. which had 8 Mosquito and 1 Beaufighter squadrons and a further 2 Mosquito Intruder squadrons.) This force allowed me to operate 30 to 40 night fighters over the assault area and shipping lanes during the night.

311. In order to achieve the most economical and effective use of resources these fighter forces were pooled and placed under the control of a Combined Control Centre. This Control Centre was situated at Uxbridge, where it was able to make full use of the tried and proven static control organisation built-up by No. 11 Group, Royal Air Force, which had previously handled the very large air cover given to the Dieppe operation, in August, 1942. This unified control ensured the necessary flexibility to cover the principal tasks allotted to these day fighter forces. The principal tasks were:—

(*a*) continuous cover of the beach-head areas.

(*b*) continuous cover of the main naval approach.

(*c*) direct air support of the ground forces, including close support.

(*d*) escort to day bomber and troop carrier formations.

(*e*) withdrawal cover for night bombers leaving the assault area after first light.

(*f*) to provide a striking force for employment as the air situation required.

312. Initially, the following allocation of squadrons was made for employment in these specific tasks.

Beach Cover...	54 squadrons
Shipping Cover	15 squadrons
Direct Air Support	36 squadrons
Offensive Fighter and Bomber Support... ...	33 squadrons
Strike Force and Escort to Airborne operations ...	33 squadrons
	171 squadrons

313. These squadrons were prepared to operate up to a maximum of 4 sorties per day on D-Day, 3 sorties per day on D+1, and thereafter 2 sorties per day. In fact, because of the lack of G.A.F. reaction, this scale of effort was not necessary. On D-Day, A.E.A.F. fighter and fighter bomber squadrons, including night fighter squadrons, flew 1.44 sorties per aircraft available and on D+1, 2.28 sorties per aircraft available. Owing to the lack of enemy activity and the serious deterioration of the weather, the average sorties per fighter aircraft available during June fell to 1.00 per day. However, in the first three weeks of the operation, more than 30,000 sorties were flown on beach-head and shipping cover. Detailed figures are set out below.

314. *Scale of Effort of A.E.A.F. Fighters and Fighter Bombers.*

	No. of operational aircraft available	*No. of sorties flown*	*Average No. of sorties per available a/c per day*
2nd T.A.F. :—			
D-Day...	883	1,266	1·43
D+1	843	2,467	2·93
June (average)	840	988	1·18
Ninth A.F. :—			
D-Day...	1,158	2,139	1·84
D+1	1,049	2,804	2·80
June (average)	1,005	1,022	1·02
A.D.G.B. (including 85 Group) :—			
D-Day...	885	811	0·92
D+1	852	984	1·15
June (average)	838	678	0·81
Total :—			
D-Day...	2,926	4,216	1·44
D+1	2,744	6,255	2·28
June (average)	2,683	2,688	1·00

315. Commencing at 0430 hours on D-Day and continued throughout the daylight hours during the assault period, a continuous fighter cover was maintained at nine squadrons strength over the whole assault area. Of this force of nine squadrons, six Spitfire squadrons provided low cover and three Thunderbolt squadrons, high cover. Of the six Spitfire squadrons, one squadron patrolled over each of the two American beaches with a third squadron on the western flank; two more covered the length of the three British beaches with one squadron on the eastern flank. Of the three Thunderbolt squadrons maintaining high cover, one was disposed centrally over the western area, a second over the eastern area, and the third was positioned between the two areas, but some eight to ten miles inland from the beach area itself. In this position it was readily available to reinforce any particular area or to engage enemy aircraft approaching the beach from the south, south-east or south-west.

316. The high and low cover fighters operating over the eastern area were under the control of F.D.T. 217; the fighters over the western area, under the control of F.D.T. 216. The "free" high flying Thunderbolt squadron operating inland, was also controlled by F.D.T. 217 (see para. 322).

317. The scale of the effort described above was maintained, whenever weather permitted, until 13th June, when the force involved was reduced to three low cover and two high cover squadrons. All these squadrons operated from England. In addition, a reserve of two squadrons from those by then operating on the Continent was maintained at readiness for extra low cover if required. This arrangement continued, again whenever weather permitted, until sufficient fighter squadrons had been moved to the Continent to take over the commitment (see para. 329).

318. Four squadrons of Lightnings (each of 16 aircraft strength) maintained throughout the daylight hours a continuous patrol over the assault forces and the shipping lanes leading to the beaches. They operated normally at between three thousand and five thousand feet or just below cloud base, in four distinct areas, and all were under the control of F.D.T. 13 (see para. 322). This cover was maintained for the first three days, but because of the lack of enemy reaction it was then reduced to three squadrons, and finally to two squadrons on 11th June. Additionally, a reserve of not less than six squadrons was also available for reinforcement of any sector requiring it.

319. It was essential to provide adequate fighter cover over the beach-head and shipping lanes during the critical periods of first light and last light. To ensure that sufficient aircraft could be in the area at these times, twelve British and twelve American fighter squadrons were trained to take off and land in darkness. Thus, with the night fighter operations, fighter cover was maintained, whenever weather permitted, continuously throughout the twenty-four hours.

320. *Control of Fighter Forces.*—I have already dealt with the activities of fighter aircraft on offensive patrols and in direct support, and those of the strike force. The arrangement for meeting the calls for air support during the assault were as follows. A Headquarters ship accompanied each Naval Assault Force: this ship carried an Air Staff Officer who was the representative of the Commander, Advanced A.E.A.F. This officer kept the Commander, Advanced A.E.A.F., informed of the Military and Naval Commanders' intentions and requirements through naval channels to Portsmouth and thence to Uxbridge. These Headquarters ships were equipped for the control of direct support aircraft and also to act as stand-by to the Fighter Direction Tenders (referred to below) for the control of fighter cover forces. In neither case did the need for them to exercise direct control of fighters arise. In addition, each Headquarters ship received reports in the clear from reconnaissance aircraft and relayed this information on targets to Uxbridge. They also provided liaison when needed (and it was frequently needed) between the bombarding warships and their spotting aircraft (see paragraph 207).

321. As stated in paragraph 311, the central control of both the night and day fighter squadrons was exercised by the Combined Control Centre, Uxbridge, using the static organisation of A.D.G.B. Three Fighter Direction Tenders operated as forward controls. One of these Fighter Direction Tenders was placed in each of the United States and British sectors and one in the main shipping lane. This ship later

moved to a position off Barfleur, to counter enemy night operations. Detailed arrangements were also made to ensure that the loss of one or all of these ships should not leave us without control of our fighter forces. These arrangements, briefly, provided for a reciprocal stand-by between these F.D.Ts., certain naval vessels, the Headquarters ships, the G.C.I. Stations landed in France, and the control centres in the United Kingdom.

322. *Fighter Direction Tenders.*—Some details of the operations of the Fighter Direction Tenders follow:—

(i) F.D.T. 216 was at first located five to fifteen miles off shore opposite the "Omaha" section of the beach; later it moved closer in to a position off St. Laurent. The tasks allotted to this F.D.T. were to control the day and night fighter cover over the western assault area. Control was effective on the only occasion the enemy attacked beaches in the United States sector in any strength.

(ii) F.D.T. 217 sailed with the Eastern Assault Forces. It was also placed five to fifteen miles off "Sword" beach, but later moved closer in shore. It controlled the day and night cover to the Eastern Assault Area and co-ordinated the cover over the whole area. The control of the night fighter pool was handed over to the far shore G.C.C. on D + 6 and the day fighter cover on D + 8. The ship then moved to a position off St. Laurent to act as stand-by control and continued to control night fighters until D + 17.

(iii) F.D.T. 13 was located forty to fifty miles off the beach-head to control both day and night fighters protecting the shipping lanes. On 12th June, the control of day fighters in these areas was handed back to a fixed station in the United Kingdom and the ship sailed to a position twenty miles east north-east of Barfleur, where from 15th to 27th June it controlled night fighters protecting shipping.

323. The figures below indicate only partially the excellent work of these Fighter Direction Tenders, and when the low scale of enemy effort and the steady and prolonged deterioration of the weather are considered, the number of enemy aircraft claimed destroyed and damaged by the Allied aircraft controlled by these ships, is high. The figures show the number of aircraft controlled by Fighter Direction Tenders at night, and the number of casualties inflicted by day and night by aircraft actually under the control of a Fighter Direction Tender at the time of the combat:—

Operations of Fighter Direction Tenders

Day (6th–13th June inclusive) :—

F.D.T. 216 ... 13 enemy aircraft destroyed.

F.D.T. 217 ... 35 enemy aircraft destroyed, others probably destroyed and damaged.

F.D.T. 13 ... Nil.

Night (6th–13th June inclusive) :—

	N/F controlled	*Contacts*	*Friendly*	*E/A destroyed*
F.D.T. 216 ...	62	49	33	3
F.D.T. 217 ...	275	123	67	10 1 damaged
F.D.T. 13 ...	18	13	10	—

Night (15th–27th June inclusive) :—

F.D.T. 13 ...	64	195	144	12 1 damaged

324. The story of the setting up of Fighter Control units on the Continent is dealt with in Part IV. Here it may be recorded that at 2230 hours on D-Day, the first G.C.I. station on the far shore began controlling night fighters and on D + 6 took over the co-ordination of all night fighters from the F.D.T. previously responsible. On D + 8, this G.C.I. station had expanded into No. 483 Group Control Centre, and control of both day and night fighters over the battle zones passed to this centre.

325. *Allied A.A. Gunfire.* The operation of our fighter aircraft was at times rendered difficult by the actions of our own anti-aircraft guns. In fact, I regret to say that engagements of friendly aircraft did occur with some frequency in the initital stages of the operation. I made representations to the Allied Naval Commander about certain instances of promiscuous and uncontrolled fire and both Naval Task Force Commanders decided to prohibit any A.A. gunfire from merchant vessels unless these ships were being directly and individually attacked. From many reports of observers, it would appear however, that the merchant ships were not alone to blame. This gunfire occurred despite the fact that it had been agreed, during the planning stages, that no A.A. gunners should be permitted to engage aircraft unless they were qualified to recognise by their appearance all aircraft, both friendly and hostile, which were likely to operate in the area concerned. Furthermore, the Naval and Army Commanders were charged with the responsibility of nominating the type of personnel or unit which should be allowed to engage aircraft under this rather general classification.

326. It must, however, be admitted that the weather conditions generally were so indifferent that the aircraft providing fighter cover and close support was often forced to operate below the height which had previously been agreed as a minimum, except in pursuit of the enemy. This factor must have caused complications for the A.A. gunners, especially when there was enemy activity at the same time.

327. A complete solution to the problem of using A.A. guns and defensive aircraft together in any amphibious operation has clearly not yet been found, and I am of the opinion that the whole question should be given considerably more scientific and practical study on an inter-service and inter-Allied basis than has been done in the past. I refer again to this problem in Part V.

328. On a limited number of merchant vessels, Royal Observer Corps personnel were provided, and this arrangement has drawn very favourable comments from all concerned. I have already recommended elsewhere that an extension of this use of specialised aircraft recognition personnel deserves further examination with a view to more general adoption by both the Army and the Navy.

329. *Transfer of Fighter forces to the Continent.* It was appreciated that the effort of the fighters and fighter bombers over the beach-head would inevitably be seriously reduced after three or four days if they had to operate at such distances from their bases in the U.K. In the early planning therefore, a high priority had been arranged for naval lift of the stores and equipment which would be needed to operate the fighters and fighter bomber squadrons planned to be flown into bases on the Continent as soon as possible after D-Day. This precaution was fully warranted. The weather throughout June frequently prevented the operations of squadrons based in the south of England. Had the scheduled squadrons not arrived on the Continent as planned, fighter cover over the beach-head and shipping lanes would at times have been impossible, at times, moreover, when weather would have permitted the G.A.F. to operate against us. Nor would fighter bombers have been available to answer calls by the ground forces for urgent support. Actually, the beach-head and shipping lanes were left without fighter cover only when the weather both in England and the Continent made all operations by Allied Air Forces and the G.A.F. impossible.

330. The operations of these fighter squadrons from bases on the Continent were made possible only by the work of the Airfield Construction engineers, of the maintenance personnel, and of the supply organisation which ensured the provision of the necessary stores and equipment. I refer to the work of these sections in more detail in Part IV.

331. The first British squadrons to land in France since 1940 were Nos. 130 and 303 which put down at 1200 hours on D + 4 on a strip on the "Gold" area. They were quickly followed by No. 144 (R.C.A.F.) Fighter Wing, consisting of Nos. 441, 442 and 443 squadrons, which at 1637 hours that same day, were airborne for a sweep. These were the first Allied squadrons to operate from French soil since the evacuation from Dunkirk.

332. The strength of squadrons based on the Continent was gradually built up in the first fourteen days of the operation; eight Spitfire, three Typhoon and three Auster squadrons moved in to, and were operating from, beach-head airfields by the end of this period.

333. During the following week, United States forces began moving in and nine Thunderbolt and three Mustang squadrons arrived. A further British contingent of one Spitfire, three Typhoon and one Auster squadrons arrived to make a total of thirty-one Allied squadrons operating from beach-head airfields three weeks after D-Day.

Enemy Reaction and Allied Counter-action.

334. I have dealt in para. 156 *et seq.* with the activities of the G.A.F. directed against our preparations for the assault. I now turn to the G.A.F.'s operations after the assault was launched.

335. The strength of that part of the German Air Force likely to be committed against the invasion was estimated at 1,750 front line aircraft. This figure included such aircraft of Reserve Training Units as were expected to be operationally used. The total was made up as follows:—

Long Range Bombers	385
Ground Attack	50
Single-engine Fighters ...	745
Twin-engine Fighters—Day ...	55
—Night ...	395
Long Range Recce.	85
Tactical Recce.	25
Coastal Recce.	10
	1,750

336. The disposition of these forces is shown in the map* facing page 70. The Units based in Southern France (Mediterranean area) and in Denmark and Norway are also shown on this map, although I have not included them in the total given above.

337. The enemy air strength on D-Day was considerably greater than its strength in this area six weeks before. Bomber strength had increased by approximately 200, single-engine fighters by 500 and twin-engine fighters by 125.

338. It was estimated that the serviceability of these forces would be 55 per cent. for long-range bomber types and 60 per cent. for all others. The destruction of facilities at airfields in the rear of the assault area and the continued pounding of the fields themselves had forced the Luftwaffe to make extensive use of satellite landing fields, with the inevitable attendant difficulties of maintaining serviceability.

339. After D-Day, there was some reinforcement of units on the Western Front, though not as great as might have been expected. The reasons probably included the following:—

(i) a decision not to denude the Reich proper of its air protection, even at the expense of leaving the German armies in the field relatively uncovered.

(ii) the destruction of airfield facilities, making it difficult to service and operate from the fields at the enemy's disposal forces any larger than those already there.

(iii) the lack of fuel and lubricant supplies in the area and the difficulty of replacement of consumed stocks, owing to the dislocation of transport facilities.

340. The enemy scale of effort throughout the whole period D-Day to 30th September was considerably lower than was expected. As I have already stated, I had expected at the outset a week of fairly heavy air attacks, after which I felt confident that the enemy air effort would dwindle and require much less attention from our own air forces. In fact no serious air battle took place during this period.

341. *Enemy Air Opposition — June.* Throughout June, the squadrons which showed the most aggressiveness were bomber units which operated by night, principally on sea mining in the shipping lanes but also on

* Maps not reproduced.

bombing operations against shipping in the approach lanes and against the beaches. The fighter units operated mainly in a defensive role against Allied bomber attacks and principally in the Paris area and south of the Seine, where they tried to provide cover to the reinforcement assembly areas and to the main airfields.

342. The scale of effort by a few enemy units was, however, relatively high. On days when flying conditions were good, many aircraft flew more than one sortie and three and four sorties per aircraft were not unusual. The frequent periods of bad weather gave respite from Allied air attack, rested the pilots and allowed ground staffs to keep up serviceability.

343. Except on isolated occasions during this month, the enemy fighter and fighter bomber formations showed a marked disinclination to engage Allied fighters, and they were often deterred, with relative ease, from carrying out their primary tasks. However, the night fighter activity against Allied bombers continued to be fairly heavy and vigorous.

344. On D-Day, the first enemy air reaction to the assault was a reconnaissance of the Channel areas. At approximately 1500 hours, the first enemy fighters and fighter bombers appeared. This was nine hours after the assault began and fifteen hours after the first of very large formations of airborne transports and of the air bombardment squadrons had arrived over enemy territory. The enemy formations consisted of some FW 190s and one formation of 12 Ju 88s; four of this latter force were destroyed.

345. On the night of D/D + 1, approximately 85 enemy aircraft were active over the beach and shipping lanes. Some of the units operating were known to be specialised anti-shipping units. Activity on this scale was maintained on most nights during June.

346. During the morning of D + 1, a total of 59 enemy aircraft were sighted in the battle area. Ju 88s and Ju 188s were routed by low cover patrols and a formation of 16 FW 190s attempting to dive bomb the area north of Caen was forced by a Spitfire Wing to jettison their bombs. In all, fifteen enemy aircraft were claimed as destroyed by Allied fighters over the battle area during that morning.

347. In the afternoon of D + 1, the main enemy effort was defensive patrolling over assembly and rearward areas. Offensive fighter sweeps of Allied aircraft accounted for sixteen aircraft destroyed and five probably destroyed.

348. The principal enemy gains by air action during June were against shipping, and these were mainly as the result of night attacks. On D + 2, however, attacks against shipping off "Sword" beach resulted in a destroyer being sunk. Another destroyer was sunk by day by an aircraft torpedo attack off Portland Bill on 13th June. Sea mines laid in the shipping lanes and approach waters during the month also caused damage and loss to some ships and involved continuous employment of naval minesweepers. Considering the number of ships employed in narrow waters, these enemy gains were remarkably low.

349. *Enemy Air Opposition—July.*—Throughout July, the enemy air effort continued to be sporadic; in the first few days, a scale of effort of up to 450 day sorties was observed, but this quickly fell away and was not again reached until 27th July. Most of the day sorties were directed against Allied positions in the battle area, particularly at the western end of the Allied line.

350. The aggressiveness of the enemy also fluctuated. On some days, attacks were pressed home, on others a marked disinclination to fight was evident. The reaction to our bomber forces also varied; on some days, there was almost no opposition, while on others, determined defensive efforts were put up. The reaction to R.A.F. Bomber Command's night attacks was, however, sustained and on some occasions produced violent activity. Night offensive operations by the G.A.F., principally against shipping targets, were also maintained.

351. *Enemy Air Opposition—August.*—At the beginning of this month, with the break-out of the Allied armies accomplished, the G.A.F. day forces became even more committed to ground support. It was also evident that the enemy could no longer support his ground forces on both the British and American sectors and for a time he left the British sector alone to concentrate on what he considered the more dangerous threat. At about this time, too, the enemy began to use his long-range bombers by night against land targets, with only occasional attacks on shipping. Another feature of his night activity was the use of single-engine day fighters to support twin-engine night fighters.

352. During the second week of August, when the enemy launched his strongest counter-attack in the Mortain area, the German Air Force again rose to an effort of approximately 400 sorties a day. To counter this activity I laid on heavy attacks on the airfields in use by the G.A.F. I refer to these attacks later. The enemy activity declined steeply after the first two days. The decline was due partly to our attacks and partly to the fact that the G.A.F. was compelled to move most of its units to airfields further east with the consequent need of reorganisation; the enemy shortage of fuel and his need of reinforcements for operationally tired units were additional causes.

353. This shortage of fuel was the result, not only of the air attacks on the various oil installations in Germany, but also of the attacks on the enemy's transport system. The G.A.F.'s problem of distribution of supplies to frequently changing bases had become one of extreme complexity.

354. By mid-August, new G.A.F. units began to appear on the Western Front, but although these units pushed up the average daily effort to nearly 300 sorties, the fighting value continued to deteriorate. An effort was, however, made by the G.A.F. throughout the fourth week in August, to assist the land forces trying to scramble back to the Seine by providing cover and relief from air attack at the Seine crossings, but on very few occasions were the attacks pressed home. The enemy losses mounted steadily all the time. On 25th August, United States Ninth Air Force fighters destroyed 77 aircraft in combat and a further 44 on the ground. On 29th August, there was evidence that the enemy units were in flight back to Germany.

355. *Enemy Air Opposition—September.*—Activity in the first ten days of September was not very heavy, the close support units of the

G.A.F. being still very disorganised owing to their moves back to Germany. Later in the month, however, fighter units staged a very spirited revival of effort against strategical bomber attacks. United States Eighth Air Force suffered fairly heavy losses on two days. About this time also, jet-propelled aircraft began to appear in operations.

356. The landing of airborne troops in the Eindhoven-Nijmegen-Arnhem area in mid-September produced a more violent reaction from the G.A.F. than had been encountered for some time in the battle areas although a tactical surprise was gained and the original landings were made without opposition. During the first three days of the operation, many sightings were made and signals intelligence reported many more enemy aircraft airborne, but in spite of favourable weather on the fourth day, this offensive was not sustained. It can only be deduced that the scale of effort of the three previous days had imposed too great a strain upon the G.A.F. organisation and possibly its crews.

357. From the 20th September to the end of the month, close support of the enemy ground forces in the area of the Allied airborne landings was the chief object of the G.A.F. in the battle areas. The scale of effort was fairly low, probably owing to weather, except on 26th September, when a total of over 200 sorties was put up, chiefly ground attacks, by fighter bombers; the pilots showed little inclination to engage in air fighting. Our claims for this day's fighting were 16 enemy aircraft destroyed.

358. The stiffening of German resistance in the air during September, mainly in the Nijmegen area in Holland was, however, accomplished at high cost. There is reliable evidence that the G.A.F. had to scrape up from its training organisation its older and more experienced pilots, a policy not calculated to produce a long term improvement in its condition. However, the G.A.F. is by no means a spent force yet, and recent technical developments, in jet-propelled aircraft, for example, are likely to make it more formidable. It would be folly to regard the G.A.F. as " down and out ". In addition, it is certain that it is working on a policy of conserving effort and building up reserves for the defence of the Reich proper. A reduction in heavy bomber attacks on G.A.F. centres of production after D-Day is a factor to be remembered in this connection. (See para. 401.)

359. *Enemy use of Jet-propelled Aircraft.*—The most important feature of G.A.F. activity during the second half of September was the appearance of jet-propelled aircraft, at first in ones and twos, later in fours and fives. In view of the fact that within the period covered by this Despatch (namely until 30th September) we have had insufficient experience of them to form reliable estimates of their activities or capabilities, I do not propose to comment on them at length. That they are a momentous landmark in the history of the air will not be denied, but final judgment on their value must be reserved for the moment.

360. Within the limits of our present experience, they appear to have been employed chiefly as fighter bombers for ground attack in a close support role, and for tactical reconnaissance. In both these roles their very high speed makes them formidable weapons and presents problems of defence not yet solved. As fighters, they have so far played a less decisive part, though their speed and particularly their rate of climb, would seem to equip them admirably for these duties. From aerial combats that have occurred up to the date of writing between orthodox Allied fighters and these jet-propelled aircraft, it would appear that their lack of manœuvrability puts them under some disadvantage in a " dog fight ", but their qualities of speed and rate of climb make them deadly if they are given the chance to " jump " the opposition.

361. When it is remembered that the G.A.F. so often refused to fight and had to be diligently sought out before it could be attacked, the losses inflicted on it are remarkable. The following figures give the victories gained by Allied pilots in air fighting alone, but do not include the destruction of aircraft on the ground or by the anti-aircraft forces of the British and American armies:—

Enemy Losses on the Western Front—6th June–30th September, 1944

	Destroyed	*Probably Destroyed*	*Damaged*
A.E.A.F....	1,368	187	18
U.S. Eighth A.F.:—			6
VIIIth F.C.	1,325	50	372
VIIIth B.C.	193	108	208
R.A.F. B.C.	240	33	121
	3,126	378	1,319

362. The losses inflicted on the G.A.F. in the heavy and damaging attacks made on its airfields subsequent to D-Day cannot be estimated with sufficient accuracy to warrant the statement of a figure. It is known they were very heavy. The chief difficulty is that photographic reconnaissance never revealed all aircraft destroyed by the Allied air forces' attacks. There is considerable evidence from the airfields now in Allied hands that the G.A.F. continued to use hangars, even after heavy raiding, for the parking and servicing of aircraft, and it was frequently found that even more wrecks of aircraft were under cover than were at dispersal points. This G.A.F. habit made impossible the exact evaluation of the success of our attacks on its airfields.

363. *Attacks on Enemy Airfields.*—Attacks on airfields after D-Day were not made to any set plan, as they had been before the invasion. They were made as a security measure when it was found that enemy air activity was interfering with the success of our land and air operations. Even so, they were laid on only when intelligence indicated concentrations of enemy aircraft in sufficient strength to justify

attacks or revealed that certain airfields were being used for maintenance and servicing purposes. During July and early August, it proved unnecessary to maintain any serious effort against enemy airfields, but from 13th to 16th August, strong forces of heavy bombers operated against several night fighter airfields in Holland and Belgium, from which night fighters, maintaining a high operational effort, were hampering our heavy bombers on night operations. In these attacks, 1,004 aircraft of R.A.F. Bomber Command and 1,743 aircraft of the United States Eighth Air Force dropped over 10,000 tons of bombs in three days. There was an immediate cessation of enemy activity from these airfields.

364. During the enemy withdrawal from France and the Low Countries, an excellent chance was afforded of making profitable attacks on aircraft on a number of airfields. These aircraft were grounded through lack of fuel. Hitherto the heavy concentrations of flak on G.A.F. airfields had make attacks on them costly and had frequently compelled us to use heavy bombers in high level attacks when medium and fighter bombers could have been better spared for this task. During this period of hasty withdrawal however, the enemy flak defences were weakened. In consequence, our losses were reduced and we were allowed much greater freedom in the selection of method of attack.

365. The following statistics show the weight of bombing attacks on airfields in the period D-Day to 30th September. The chief contribution of the aircraft of A.E.A.F. was, however, in low level strafing and destruction of aircraft on the ground.

Total Sorties against Airfields during the period 6th June to 30th September, 1944

Force	*Sorties*	*Tons of Bombs*
A.E.A.F....	310	156·7
U.S. Eighth Air Force ...	11,118	24,747·0
R.A.F. B.C.	2,433	12,283·7
	13,861	37,187·4

Defence against Flying Bombs and Counter-Action against Flying Bomb Installations.

366. In paragraph 169 et seq. I have briefly described air operations prior to D-Day, against the sites the enemy was preparing for the launching of flying bombs and rocket projectiles against the United Kingdom. It was not fully appreciated at the time, that the enemy was also preparing modified and less conspicuous sites. Air operations against "Noball" targets had been suspended before D-Day in order to release the air forces for the major tasks of "Overlord". It was thought that the operations by then carried out had virtually eliminated the menace; in fact, it is known that these operations, coupled with our attacks on his transport system, oil and manufacturing centres had reduced the enemy's potential capacity to launch flying bombs from a probable 6,000 per day to a relatively very small fraction of this number. Nonetheless, his power to hit us with these weapons had not been entirely destroyed.

367. On the night of 12/13th June, the enemy launched his first jet-propelled flying bomb against England and aimed at London. In the first phase between 0405 hours and 0430 hours on 13th June, seven of these flying bombs were observed, one of which reached London. Later, three more operated over Kent.

368. No further flying bombs were reported until the evening of 15th June, when activity began afresh on a fairly large scale. Long-prepared defence plans were immediately put into operation. Direct responsibility for this defence was allotted to Air Marshal Sir Roderic Hill, K.C.B., M.C., A.F.C., the Air Marshal Commanding Air Defence of Great Britain. Additional guns and balloons were deployed to counter these weapons, whilst airborne and fighter patrols were put up both over the Channel and south of London. The United States forces contributed wholeheartedly to this defence with A.A. guns and fighter patrols. Large scale bombing operations were also undertaken against the launching sites and their ancillary installations. The diversion of effort from "Overlord" tasks now assumed larger proportions.

369. From the commencement of flying bomb activity until 30th September, fighter aircraft flew 24,572 sorties on interception patrols. This commitment was almost exclusively met by the aircraft of A.D.G.B. These patrols accounted for 1,915 flying bombs out of a total of 7,503 launched. The following figures give the results of all types of defence against these weapons:—

Period 12/13th June to 2100 hours 30th September, 1944

Despatched	*Made Landfall*	*Reached Greater London*
7,503	5,431	2,421

Flying Bombs Destroyed—period 12/13th June to 30th September, 1944

(*a*) By Fighter Patrols:—

	Day	*Night*	*Total*
Over land	287	388½	675½
Over sea	1,034½	205	1,239½
Total	1,321½	593½	1,915

(*b*) By all causes:—

Fighter Patrols	*A.A.*	*Balloons*	*Other Causes*	*Total*
1,915	1,547	278	33	3,773

370. Our rapid advance through France forced the enemy to abandon his launching sites in the Pas de Calais; in consequence there was no flying bomb activity over the United Kingdom after the 9th September for a period of ten days. When it recommenced, the launching was from carrier aircraft, chiefly Heinkel III, operating over the North Sea. The scale of activity of these air-launched flying bombs was never heavy; nevertheless a fully organised defence scheme, involving nine squadrons of fighters, had to be maintained to combat the menace.

371. The scale of the bombing attacks on the launching and ancillary sites and also on large constructional sites believed to be associated with preparations for launching large rocket projectiles is shown in the figures given below:—

"Crossbow" Operations

Period 14th June to 31st August, 1944

Force	*Aircraft attacking*	*Tons of Bombs*
A.E.A.F.:—		
14th–30th June	1,005	1,335
1st–31st July	246	419
1st–31st August	—	—
	1,251	1,754
R.A.F. B.C.:—		
14th–30th June	4,050	17,773
1st–31st July	5,833	26,487
1st–31st August	4,384	21,385
	14,267	65,645
U.S. Eighth Air Force:—		
14th–30th June	1,835	4,709
1st–31st July	1,401	3,639
1st–31st August	869	2,329
	4,105	10,677

372. It is very difficult to estimate the success of these counter attacks; the number of flying bombs launched per day varied considerably, as also did the number and location of the sites used. It can, however, be stated that these attacks hampered and kept in check the launching rate; the average number launched per day over the period 13th June to 31st August was 95 against the estimated possible number of 6,000 per day, had the German plan not been upset by Allied bombing. It has already been noted that the air bombing in the preparatory period was so successful in countering the enemy's preparations for the use of the flying bomb, that it was no longer a direct threat to the preparations for, or the carrying out of the Allied assault and subsequent land operations. In the event, the flying bomb was launched mainly as a "terror" weapon against the civilian population of Southern England and not as a counter to the plans for the invasion of the Continent. I do not propose, therefore, to make any wider comment beyond emphasising the cost to the invasion operations by virtue of the diversion of available air effort that had to be made in order to secure this degree of immunity. An indication of the scale of this diversion is given by the statistics in the paragraphs above. Another less calculable cost was the fact that a number of Tempest and Mustang fighters—which had been allocated to re-arm squadrons in Second British Tactical Air Force—had to be transferred to A.D.G.B. for duties on flying bomb interception patrols. We thus lost the use of these very valuable and latest type of fighters over the battlefront.

Operation "Market"—First Allied Airborne Army.

373. On 17th September, airborne forces of the First Allied Airborne Army, comprising United States 82nd and 101st Airborne Divisions, 1st British Airborne Division and a Polish Parachute Brigade were dropped and landed in the Eindhoven—Nijmegen—Arnhem areas of Holland. The lift of these airborne forces exceeded that made during the initial landings on the Continent. The operation was designed to facilitate an advance by the northern group of armies up to and over the rivers Waal and Lower Rhine. With this end in view, the chief objectives of the airborne troops were the bridges at Arnhem and Nijmegen.

374. The initial drops were successful, being carried out accurately and with very few casualties. During the subsequent nine days, as weather permitted, reinforcements and supplies were flown in to the airborne troops and to the supporting ground troops which had linked up with them. Despite an heroic struggle by the troops of the 1st British Airborne Division the bridge at Arnhem, although secured initially, could not be retained. The bridge at Nijmegen, however, was secured and the operation paved the way for a subsequent advance up to the river Waal and beyond. It provided many lessons for the future and marked a definite step in the evolution of airborne operations.

375. The planning for and execution of these operations, which were carried out under the code name "Market", was the work of the First Allied Airborne Army, to which the opera-

tional control of the United States and Royal Air Force troop carrier forces, previously under my command, had been transferred in accordance with your direction, in August, 1944. A full report on these operations is being issued by the Commanding General of the First Allied Airborne Army, Lieutenant General Louis Brereton, who had relinquished the command of the United States Ninth Air Force to take over this new appointment.

376. Besides the aircraft of the troop carrier air forces, the aircraft of A.E.A.F., United States Eighth Air Force, R.A.F. Bomber Command and R.A.F. Coastal Command were engaged in support of these operations. The co-ordination of the activities of all the air forces concerned in a supporting role was carried out at my headquarters at meetings with representatives of the interested commands.

377. The chief meeting took place on 12th September, and at this meeting the principal tasks of the air forces were assigned. These tasks were:—

(i) The attacking of airfields and known flak positions by heavy bombers.

(ii) The dive bombing of flak positions which might be developed by the enemy during the operation.

(iii) The provision of top cover along the route to be followed by the airborne trains, and a fighter screen east and north of the dropping and landing areas.

(iv) The provision of night fighter patrols.

(v) The arrangements for dummy drops.

(vi) The arrangements for diversions by R.A.F. Coastal Command.

(vii) The arrangements for re-supply of airborne forces by heavy bombers on D+1.

378. All these operations as planned at this meeting were actually carried out, and in addition, the air forces continued to lend support to the ground operations during the whole period that the intense phase of the operation lasted. I have referred to some of these activities by the air forces at other points in this Despatch, but below is summarised briefly what was actually done.

379. On the night of 16/17th September, R.A.F. Bomber Command attacked with 200 Lancasters and 23 Mosquitoes, four airfields at Leeuwarden, Steewijk-Havelte, Hopsten and Salzbergen. These enemy airfields were those from which fighters could attack the transports and gliders carrying the airborne forces. Nearly 900 tons of bombs were dropped with good to excellent results on these airfields. On the same night, 54 Lancasters and 5 Mosquitoes dropped 294 tons of bombs on flak positions at Moerdijk, also with good results. On the following morning, 85 Lancasters and 15 Mosquitoes dropped 535 tons of bombs on coastal defence batteries in the Walcheren area. For these daylight operations Spitfires of A.D.G.B. provided escort.

380. These operations by R.A.F. Bomber Command were followed up on the morning of D+1 by heavy bombers of the United States Eighth Air Force which attacked 117 flak positions along the routes to be followed and near the dropping and landing zones, just prior to the arrival of the troop carriers. In these attacks, 816 heavy bombers dropped 3,139 tons of bombs with fair to good results in most cases. A further six bombers also attacked the airfield at Eindhoven.

381. During the afternoon of D+1, 18th September, 252 heavy bombers of the United States Eighth Air Force dropped 782 tons of supplies to the ground forces with good to excellent results.

382. The airborne forces were carried in two great trains of troop carrier aircraft and gliders, one following a northerly, the other a southerly route. The plan for the protection of these two trains of troop carriers provided for a high cover of fighters and a force of fighter bombers at low level, ready to dive bomb any flak positions that opened fire. On the northern route, aircraft of A.D.G.B. carried out these two tasks, as far as the turning point near 'sHertogenbosch, employing 371 fighters for this purpose. Fighter aircraft of the United States Eighth Air Force then took over covering the train of troop carriers to the dropping and landing zones. Fighters of this air force also provided top cover to the train approaching over the southern route, and in addition, provided a fighter screen to the east and north of the dropping and landing zones. In these tasks, 548 fighters were employed. In addition, 212 fighters of the United States Ninth Air Force dive bombed flak positions along the southern route between the turning point and the dropping and landing zones.

383. The attacks on the enemy flak positions along the routes were very successful. The great bulk of the land batteries were silenced and in addition, several flak ships and barges off the Dutch Islands were destroyed.

384. The G.A.F. reaction to these very large scale operations was small on D-Day, approximately 30 enemy fighters only being seen, seven of which were shot down. On the second, third and sixth days, however, the German Air Force reacted much more strongly, and up to the end of the operation a total of 159 enemy aircraft were destroyed over the area.

385. Throughout the operations, the Allied air forces continued to cover the airborne forces, to lend direct support to the ground forces and particularly to attack flak positions. In all, the supporting air forces flew over 7,800 sorties in support of Operation "Market". A total of 114 aircraft were lost, in addition to the casualties incurred by the troop carrier forces.

386. The Air/Sea Rescue Service functioned most efficiently during these airborne operations. A string of 17 launches was placed across the North Sea on the northern route and a further string of 10 launches along the southern route. In addition, special reconnaissances were flown, spotting for ditched planes and gliders. Most of the ditching occurred on D+2, when the weather was bad and the towlines of many gliders parted. On this day, one launch picked up all the personnel from five ditched gliders. In all 205 personnel were saved by the Air/Sea Rescue Service during these operations.

Attacks against Enemy Naval Targets.

387. I now turn to the duties of the Air Force in assisting the Allied Navies in dealing with enemy naval units trying to interfere with the landing and the subsequent ferrying of reinforcements and supplies by our ships across the Channel. The following brief review covers these operations from the time of the assault to the end of September, 1944. The main burden was shouldered by R.A.F. Coastal Com-

mand, but R.A.F. Bomber Command continued to implement its extensive sea mining programme (which now embraced " Overlord " requirements) and made heavy attacks, referred to below, on shipping in harbours. Aircraft of A.E.A.F. also made attacks on coastal shipping and on E and R boats. After D-Day, Second British Tactical Air Force took over the commitment previously shouldered by A.D.G.B. to provide " Channel Stop " squadrons. The function of these squadrons was to attack enemy surface vessels attempting to enter the Channel from either end. A.E.A.F. fighters also provided escort for the strike aircraft of R.A.F. Coastal Command. Apart from the sea mining of R.A.F. Bomber Command, all these operations were co-ordinated through my headquarters.

388. *Anti-U-Boat Operations.*—In anticipation of an enemy attempt to move U-boats into the invasion waters, R.A.F. Coastal Command flew anti-submarine patrols from the Scillies to Ushant and from St. Albans Head to Cap de la Hague. Through these barriers the enemy had to try to infiltrate. The first U-boats sighted were approaching from the western entrance to the assault area on the night of D-Day. Six of these U-boats were attacked. During the next day and night, a further ten sightings were made and seven were attacked. Some of these attacks resulted in kills.

389. Because of these continuous patrols, U-boat commanders were forced to remain submerged for very long periods; these tactics restricted their freedom of manoeuvre and from P.O.W. statements, it is obvious they had a most distressing physical effect on the crews. During June, 80 U-boat sightings were made in the approaches to the assault area; 46 were attacked, 3 of these jointly with the Navy, and 18 of the attacks appeared promising. During July, the enemy was forced to continue maximum diving tactics. This made detection and attacks by aircraft more difficult, but at least two U-boats on or near the surface were destroyed. A further 20 conning tower or periscope sightings were made and 13 attacks delivered.

390. With the Allied advance in August, the enemy began to move his U-boats away from the ports of North-Western France to the southern portion of the Bay of Biscay This movement gave the aircraft of R.A.F. Coastal Command a splendid chance to strike. 24 sightings were made in the Bay during August, and 14 attacks resulted; six U-boats were probably sunk, three of these shared with Naval forces, and two more damaged. From D-Day to 30th September, R.A.F. Coastal Command sunk or probably sunk 12 U-boats in the Channel or the Bay of Biscay, shared the destruction of five more with surface forces and damaged a further 12.

391. *Anti-Shipping Operations.* Attacks against enemy surface vessels, including naval vessels, were made by aircraft of A.E.A.F. and by R.A.F. Coastal Command. The first of these actions took place on the 6th June, when the enemy endeavoured to bring into action three heavy destroyers from the west coast of France. These ships were attacked, west of Brest by R.A.F. Coastal Command. Some damage was caused, one was set on fire and the ships were delayed. On 8th June, they again attempted to move into the invasion waters, but were met by Allied destroyers. One was sunk, one driven ashore and the third forced back to Brest.

392. Other attacks were made against smaller enemy naval vessels and merchant shipping and some of these attacks were very successful; details of two are given below. However, not only these missions which saw and attacked enemy vessels should be reckoned as successful. Continuous patrols by fighters of A.E.A.F. and R.A.F. Coastal Command in the Western Approaches and down into the area of the Channel Islands ensured that no enemy surface vessels were able to support the garrisons holding out in coastal areas. These offensive fighter patrols were co-ordinated with the sorties of the reconnaissance aircraft of R.A.F. Coastal Command.

393. On the night of 7th June, Beaufighters and Albacores attacked a formation of E-boats in the Channel; two E-boats were sunk and a further three damaged. In the early morning of 15th June, a force of ·42 Beaufighters, escorted by 10 Mustangs of A.D.G.B. attacked a north-bound convoy consisting of a merchant vessel of 8,000 tons, a naval auxiliary of 4,000 tons and seventeen escort ships off the Frisian Islands. The large merchant vessel and the auxiliary were torpedoed and sank, one minesweeper blew up and sank, another was hit by a torpedo and probably sank, while five more minesweepers were seen on fire and four other escorts were damaged by cannon fire.

394*. A brief summary of the work of R.A.F. Coastal Command shows that over 200 sorties were flown in attacks on surface craft during the month of June in the invasion area and its approaches. In July more than 500 aircraft made anti-shipping attacks in the Channel area, off the Dutch and Belgian Coasts, in the Bay of Biscay and off the Coast of Norway. In July, six merchant ships, 10 escort vessels and five E/R boats were sunk, one merchant ship, 11 escort vessels and two E/R boats were seriously damaged, and a further seven merchant ships, nineteen escort vessels and 6 E/R boats were damaged. August saw an even higher scale of shipping effort. Nightly attacks on E/R boats operating in the Channel, five large scale attacks off the Dutch and Norwegian coasts and numerous attacks on the enemy in the Bay of Biscay produced excellent results. Nine merchant ships plus one shared, seventeen escort vessels, 2 destroyers, and 1 E/R boat were sunk. Eleven escort vessels and 1 E/R boat seriously damaged and a further four merchant ships, 1 destroyer, 4 E/R boats and twenty-eight escort vessels were damaged.

395. These air operations directed against enemy surface forces, including the protective mine-laying by R.A.F. Bomber Command, not only assisted the safe-guarding of the Allied merchant fleets from surface attacks, but also prevented any German attempt to evacuate by sea his beleaguered coastal garrisons.

396. *Attacks on Shipping in Ports.*—The majority of the E and R boats operating against the Allied cross-channel shipping in the early

* These figures may be liable to review when enemy documents have been subjected to research.

days of the assault were using the ports of Le Havre and Boulogne. The boats were well protected by large shelter pens. However, R.A.F. Bomber Command, in two attacks, inflicted great damage on the enemy's fleet of small ships.

397. On the evening of 14th June, a force of 335 Lancasters and 18 Mosquitoes attacked the port area of Le Havre, dropping 1,026 tons of bombs. This tonnage included 22 × 12,000 lb. special bombs. On the next evening, the same tactics were used in an attack on the port of Boulogne when 285 heavy bombers and 12 Mosquitoes dropped 1,463 tons of bombs in a concentrated attack.

398. Very great damage was caused to the ports and the pens in these attacks, and in addition, the heavy bombs, bursting in the water, created huge waves which flung the small craft against the quays and the concrete sides of the pens. Photographs revealed twenty-five of these enemy naval vessels destroyed in Boulogne, and this number was exceeded at Le Havre.

399. Other air operations which were of direct assistance to Allied naval activity were the attacks on coastal defences (reviewed in Part III (*b*) dealing with preparatory operations), and also the co-ordination of fighter bomber attacks on Radar stations to upset the enemy warning system when Allied light surface forces operated against E and R boats.

Strategical Bombing—" Pointblank "

400. In addition to their priority operations, already described, against targets in the tactical area and against flying bomb installations, the United States and British strategical air forces maintained a considerable effort against targets within Germany after D-Day. As these operations were not directed by me, I mention them very briefly and in order simply, to round off the story of the Allied air effort.

401. The chief limitation on their effort was the weather which frequently made it necessary to cancel projected attacks. The main weight of this offensive from June to September was directed against the enemy's oil supplies and oil production centres. These targets were given priority over aircraft production and assembly plants (although attacks on these latter were not entirely suspended) and other industrial objectives as being, at this time, of more critical importance to the enemy. The G.A.F. had, by D-Day, been very seriously weakened by the efforts already directed against it, although the deep penetration daylight raids of the United States Eighth Air Force still provoked violent enemy air reaction on most occasions. In consequence, there was a steady attrition of the G.A.F. in aerial combat as well as a depletion of Germany's oil resources. Heavy and concentrated attacks on these targets have produced an oil situation which, taken with the loss of Roumanian supplies, must be seriously worrying the German High Command. The influence of this situation is already being, and will be increasingly, felt on the battlefield.

402. Other operations against " Pointblank " targets included attacks on aircraft and motor transport manufacturing centres, on several important communication centres and on German cities.

Brief Summary of Air Effort for the period D-Day to 30th September, 1944

403. At 30th September, the Allied armies stood on and in some places, over the borders of the Reich proper. In 117 days since the assault began, France, Belgium, Luxembourg and a large part of Holland had been liberated. These 117 days had also been unprecedented in the scale of air effort employed. The aircraft of A.E.A.F. alone had flown 316,248 sorties, an average of 2,703 per day. The effort of the strategical air forces based in the United Kingdom raised this total to 552,197 sorties, an average of 4,719 per day.

404. The remarkable achievement of such a high rate of effort is due, in no small measure, both to the detailed administrative plans which facilitated the transfer of forces to Continental airfields without interruption to the current operations, and to the work of the ground staffs who supplied, serviced and armed the aircraft and provided the ancillary services.

405. *Weather.*—The weather throughout the whole period was frequently unfavourable for air operations, and on many occasions interfered greatly with my plans. This was especially so in the first days of the assault. Before D-Day it was known that unsettled weather was approaching and there was a distinct possibility that the unsettled period might be prolonged and severe. I was, however, confident of the ability of the air forces to carry out their allotted tasks, and in particular to deal with the German Air Force, despite the weather handicap. In the event, just after D-Day, the weather was nearly as bad as it possibly could be.

406. In making the Assault, despite the bad weather, there is no doubt that the invasion forces won an increased chance of tactical surprise. There is the evidence of a captured senior German meteorological officer that the Germans were in fact off their guard; he has stated that he advised the German Command that owing to the approach of unsettled conditions, no assault would be attempted.

407. The following figures show the effect of the weather on air operations during the period. The A.E.A.F. total of aircraft sorties on D-Day was 7,672, on D + 1 8,283 and D + 2, when the weather began to deteriorate, 5,073 and on D + 3 the total reached 662 only. On one other day in June the total was less than 1,000 and on two further days it was under 2,000 sorties; however, despite this handicap, the average number of sorties per day for A.E.A.F. aircraft throughout the month of June was almost 4,000. Weather also affected the planning and carrying out of bomber operations between D-Day and September 30th. In fact, the lack of weather good enough to permit of high altitude precision and, above all, visual, bombing was one of the chief reasons why the start of the attacks on the enemy's transportation and communications system was planned so early.

408. *Personnel Casualties.* The following statistics of personnel casualties cover the period from 1st April to 30th September, 1944. These figures reveal a grievous loss of highly trained men. Reference, however, to the statistics in paragraph 183, dealing with the

preparatory period and paragraph 403, covering the period from D-Day to 30th September, will show that the overall losses per sorties flown are reasonably low.

Personnel Casualties of Allied Air Forces Operating in Western Europe
Period 1st April–30th September, 1944

	Killed in Action or Died of Wounds	*Missing and P.O.W.*	*Wounded*
A.E.A.F. :—			
U.S. Personnel	216	1,839	660
British Personnel	694	1,361	864
R.A.F. Bomber Command ...	2,318	9,265	1,109
U.S. Eighth Air Force :—			
Bomber	931	15,057	1,716
Fighter	49	959	77
R.A.F. Coastal Command ...	352	597	239
	4,560	29,078	4,665

PART IV—SPECIAL FEATURES

409. The mounting of air operations of the complexity and scale recorded in this Despatch was only made possible by an adequate ground organisation. I wish, therefore, in this Section to pay some tribute to the background work against which these operations were carried out, and upon which they depended for success.

410. For convenience, comments on some of the special features have been arranged under the following headings:—

(i) Administration.
(ii) Airfield Construction.
(iii) Air/Sea Rescue.
(iv) Air Transport and Evacuation of Casualties.
(v) Employment of Balloons.
(vi) Provision of Maps.
(vii) Signal Communications and Radar Cover.

Administration

411. Although I did not have administrative control of the United States Ninth Air Force, there were many and varied administrative matters affecting all forces in the Allied Expeditionary Air Force which set difficult problems to be solved. Administration, maintenance and the provision of equipment, fuel and ammunition to keep modern air forces fighting all had their peculiar complications.

412. An idea of some of the special problems met and overcome by the administrative and other ground staffs is given in the following paragraphs.

413. On 16th November, 1943, the British forces, Second Tactical Air Force and Nos. 38 and 85 Groups had been built up to about 35 per cent. only of their final strength. The United States Ninth Air Force at this time was only approximately 25 per cent. of its final strength. To develop these forces in the winter and following spring, and to have them suitably deployed in readiness for the opening of the campaign was a race against time which involved, inter alia:—

(i) A comprehensive plan whereby aerodromes and landing grounds in the south of England were progressively evacuated by units not participating directly in "Overlord", and occupied by "Overlord" forces as the U.S.A.A.F. arrived from overseas and by the British forces as they were augmented.

(ii) Providing Second Tactical Air Force with a fully mobile organisation for repair, and for the supply of Royal Air Force equipment, in substitution for the service normally provided by the Royal Air Force Maintenance Command in the United Kingdom.

(iii) Integrating the U.S.A.A.F. and R.A.F. administrative services where necessary.

(iv) Re-equipping 110 Royal Air Force squadrons with the most up-to-date types of aircraft.

(v) Changing Second Tactical Air Force from the home system of personnel administration and accounting, to the overseas systems, including the establishment of a Base Personnel Staff Office and a Base Accounts Office.

(vi) On D-Day the British totalled approximately 232,000 personnel and the Americans 181,000. The organisation of the British part of the force alone involved the formulation and issue of some 250 new type establishments.

414. After D-Day, the principal administrative tasks to be executed, and for which full preparations had been made were:—

(i) By means of the inter-Allied and inter-Service machinery known as BUCO and MOVCO to control the transfer of Air Forces to the Continent, together with the stores for immediate use, and to build up reserves.

(ii) Special arrangements to ensure that squadrons could operate at full effort, whether from the United Kingdom or the Continent, even though their normal maintenance organisation was in process of transfer.

(iii) Arrangements by which United States air forces could re-arm and re-fuel at British air strips and vice versa.

(iv) Rapid replacement of personnel casualties, aircraft and equipment.

(v) The institution, quite early in the operations, of arrangements for salvaging aircraft carcasses and certain other equipment, and for returning this material quickly to the United Kingdom by L.C.T. for use by the production organisation there.

(vi) Finally, maintaining a high state of mobility for the Tactical Air Forces which were taxed to the limit to keep up with the advance.

415. There were over 6,600 operational aircraft in A.E.A.F. at D-Day. These aircraft were composed of ten basic types with a large number of varying marks, each with its own problems in servicing. That the maintenance personnel managed to keep the operational serviceability to the high levels stated below is a remarkable achievement. When it is remembered that throughout June and July most of the squadrons operated from new-made landing strips only a few miles from the front line, and that the dust on these Normandy airfields was, in the opinion of many experienced campaigners, worse than that in the North African desert campaigns, then the efforts of the maintenance personnel become even more outstanding.

416. *Average Strength and Serviceability of Aircraft in A.E.A.F.*

	Fighters		Percentage	Bombers		Percentage
	Average Strength	Average Serviceability		Average Strength	Average Serviceability	
Ninth Air Force :—						
June	1,239	1,010	81·7	717	626	87·4
July	1,341	1,063	79·4	721	631	87·5
August	1,344	1,058	78·7	737	658	89·3
September	1,393	1,120	80·3	753	663	88·0
Second T.A.F. :—						
June	1,156	954	82·5	272	231	85·0
July	1,058	946	89·5	265	232	87·5
August	1,077	930	86·4	277	240	86·7
September	1,250	1,093	87·5	253	214	84·6
A.D.G.B. :—						
June	1,207	957	79·3	—	—	—
July	1,281	1,007	78·5	—	—	—
August	1,335	1,060	79·4	—	—	—
September	1,131	926	82·0	—	—	—

417. The maintenance of operational strength was also the result of a carefully prepared plan for replacement of aircraft. In this connection, it is interesting to note that the forecasting of wastage and casualties by the planning staff was sound, and since the losses were somewhat below those planned, there were never any serious difficulties of supply. The replacement pool and recovery organisation both worked extremely well.

418. The statistics of the average daily consumption and wastage of P.O.L. and ammunition also reveal something of the achievement of the supply organisation. During July, A.E.A.F. expended daily 750 tons of bombs and more than 200,000 rounds of ammunition. The fuel consumption of A.E.A.F. in July reached approximately 30,000,000 gallons of petrol, almost 1,000,000 gallons per day. A large part of this fuel and ammunition had to be transported into the beach-head and up to forward airfields. In this connection the work of Air Force beach squadrons deserves special mention. These parties went in with the follow-up troops on D-Day and due in no small measure to their efforts, the first airfields were stocked ready for operations in the beach-head on D+3.

419. The following story reveals some of the difficulties encountered and overcome in supplying an air force of the magnitude of A.E.A.F. Supreme Headquarters Allied Expeditionary Force Operational Memoranda called for special markings on aircraft in order that they might be clearly distinguished on D-Day. To achieve success the markings had to be applied on D − 1 so that all aircraft should have broad black and white bands painted on them on D-Day, but not before. The total requirements of distemper for this purpose to mark approximately 10,000 aircraft and gliders was 100,000 gallons or 1,500 tons. There was no such amount immediately available in the United Kingdom. Supply action on a high priority was necessary. Supply to civilians was stopped, overtime was worked in pits and factories, Whitsun week-end holidays were forgotten and by Y-Day all was ready; the distemper and 20,000 brushes to apply it were on hand.

Airfield Construction.

420. In combined operations it is obviously advantageous that fighters, fighter bombers and reconnaissance aircraft of the Tactical Air Forces should be able to work from bases in the operational theatre as early as possible, and therefore airfield accommodation is of paramount importance.

421. The extent to which airfield requirements could be met in this operation depended, in the main, on the ability of the field engineers to locate and develop suitable sites. These sites had been previously chosen by experts after a detailed study of the coverage provided by photographic reconnaissance aircraft and available maps. It also depended upon having a sufficiently high priority within the available shipping space for the movement of equipment and material. Naturally these claims must be balanced with others of operational urgency.

422. In the initial stages, the terrain in the British sector was generally more favourable

than that in the American. However, the airfield engineers achieved very fine results in both sectors. The position in the British sector deteriorated because the good area to the east and south-east around Caen was not secured as rapidly as had been planned. Neither did the situation in the American sector greatly improve until the advance had progressed to Le Mans and beyond.

423. The minimum programme for airfields to accommodate the forces allocated was as follows:—

3 E.L.S. (2 American and 1 British) by D-Day.

4 R. and Rs. (2 American and 2 British) by the evening of D + 3 and not later than D + 4.

10 A.L.Gs. (5 American and 5 British) by D + 8 (these A.L.Gs. included 4 of the R. and Rs.).

18 Airfields (8 American and 10 British) by D + 14.

27 Airfields (12 American and 15 British) by D + 24.

43 Airfields (18 American and 25 British) by D + 40.

93 Airfields (48 American and 45 British) by D + 90.

424. Definitions of the terms used above and descriptions of the different types of airfields are given below:—

E.L.S.—Emergency Landing Strip.—A strip having sufficient length of level surface to enable pilots in distress to make a landing. These strips have a minimum length of 600 yards and are not fit for the operation of aircraft, but are of inestimable value when operations are conducted a long way from bases especially when a long sea crossing on the way home is involved.

R. & R.—Refuelling and Re-arming Strip.—A strip possessing sufficient length of level compact surface for landing and taking off, adequate marshalling areas for the rapid turn-round of aircraft and adequate tracking to ensure operation under all normal summer and autumn conditions. These strips have a minimum length of 1,200 yards with the marshalling areas of 100 × 50 yards at each end.

A.L.G.—Advanced Landing Ground.—A landing ground possessing the same facilities as an R. and R. to be brought up to A.L.G. standard by the addition of dispersal facilities and capable of use to capacity by adopting the " Roulement " system.

Airfield.—A field with the same facilities as an A.L.G. but with improved dispersal facilities and on which squadrons are established and not operated on the " Roulement " system, as on an A.L.G.

The minimum lengths for both A.L.Gs. and airfields are 1,200 yards for fighters, with dispersal facilities for 54 aircraft, and 1,650 yards for fighter bombers, with the same dispersal facilities.

All-Weather Airfield.—The same requirements as for an airfield but possessing hard-surfaced runways and fit for operation throughout all seasons and all conditions of weather for the appropriate type of aircraft. Within the limits of operational requirements, it was planned that all enemy airfields with hard-surfaced runways would be reinstated, as and when they were captured, if in the opinion of the airfield engineers, reinstatement could be effected without excessive labour and/or material.

" Roulement " System.—A means of using landing ground facilities to the maximum capacity by flying in squadrons to replace others as they complete their scale of effort appropriate to the period.

425. The priorities fixed for the construction of these airfields were as follows:—

Priority I—E.L.Ss. for emergency landing of aircraft.

Priority II—R. and R. strips for re-fuelling and re-arming fighter aircraft.

Priority III—A.L.Gs. to become airfields later.

426. The following construction units were available for allocation as required in the beach-head:—

American—16 Aviation Engineering Battalions.
2 Airborne Aviation Engineering Battalions.

British—5 Airfield Construction Groups.
1 Field Force Basis Construction Wing.

427. Because we failed in the initial phases to gain the ground agreed in the optimum plan which was needed in the vicinity of Caen, the development of all of the pre-selected sites could not be started. This naturally caused some delay and made necessary a re-allotment of sites in the beach-head area. As a very high proportion of potential sites selected from air photographs proved to be suitable for rapid construction, the intensive preparation of the beach-head area permitted the leeway to be made up and the Air Staff requirements to be met.

428. Later, when the Allied advance became rapid, the problem of finding space to prepare airfields was eased. It became more a problem of getting the airfields constructed rapidly in the now adequate space available. The system adopted for constructing airfields near the front line was to prepare dirt strips 15-20 miles to the rear of the ground forces. These strips were then visited by transport aircraft, which dumped stores and tools there. As a general rule, fighter strips were 50-70 miles behind the front line, and bomber strips 100-120 miles behind. As the ground forces moved forward, so the dirt strips previously prepared were constructed as airfields and became bases for fighters and later for bombers.

429. The position at the end of June (D + 24) was as follows:—

(i) *In the British Sector.*—10 airfields completed at Bazenville, St. Croix sur Mer, Beny sur Mer, Camilly, Coulombs, Martragny, Sommervieu, Lantheuil, Plumetot, Longues. 1 airfield was under construction at Ellon.

(ii) *In the American Sector.*—7 airfields completed at St. Pierre du Mont, Criqueville, Cordonville, Deux Jamaux, Benzeville, Axeville and Carentan. 4 under construction and 75 per cent. completed at Chippelle, Picauville, Le Moly and Creteville.

430. The position at D + 90 (the end of the planned period) was:—

Type of Field	American Sector		U.S. Total	British Sector.		British Total	Grand Total
	Operational	Under construction		Operational	Under construction		
Fighter ALG	24	8	32	23	5	28	60
Medium Bomber ...	5	1	6	1	—	1	7
Transport	9	1	10	2	—	2	12
Tactical Aerodrome ...	1	—	1	—	—	—	1
Liaison Strip	1	—	1	—	—	—	1
	40	10	50	26	5	31	81

431. In addition to these airfields, which were in use at D + 90, five fields in the American sector and three in the British sector had been abandoned, as being too far from the scene of ground operations. These make the number of airfields actually completed by D + 90, 55 in the American sector and 34 in the British sector, a total of 89, as against the planned total of 93. The IX Engineer Command proved very effective and I feel that the Royal Air Force could well consider the adoption of a comparable organisation to ensure immediate operational facilities in overseas theatres. In particular, I feel that more heavy earth-moving equipment should be provided for British units and that the organisation should be reviewed to allow smaller and more flexible companies than the present Wings. These companies should be under the direct control of the air commander in the theatre and not under a ground commander.

432. The fact that airfield construction was still a little behind schedule at the end of the planned period, was due mainly to tactical reasons in the assault phase and to the consequent lack of adequate and suitable ground area, and to some delay in shipping sufficient material. The men of the American Aviation Engineer Battalions of the IX Engineer Command and of the British Airfield Construction units worked exceptionally well, as was proved by the setting-up of the first three Emergency Landing Strips at Pouppeville, St. Laurent sur Mer and Asnelles by D + 1. These men worked right in the battle area, through shelling and bombing, and as well as constructing the airfields often had to lay down their tools to deal with stray snipers in the area around the airfield strip.

Air/Sea Rescue.

433. Air Defence of Great Britain and Royal Air Force Coastal Command provided the aircraft for searches in the battle area and for the forces engaged in Operation "Neptune".

434. These Air/Sea Rescue forces had been working hard prior to D-Day and had effected many fine rescues of bomber and fighter crews. Their effort was, naturally, intensified from D-Day onwards especially during the early phases before landing fields were available on the French side of the Channel. Constant standing patrols were flown so that immediately a "Mayday" call was received, rescue aircraft could be vectored onto the position. Both Warwick and Spitfire aircraft were used for these standing patrols.

435. The weather was unfortunately extremely difficult for Air/Sea Rescue operations during almost the whole of June and when Walruses were employed on searches, it was frequently impracticable for them to make landings on the water. This laid a greater burden on the high speed launches and other surface craft which, operating in all conditions, did very effective work. Two high speed launches were attached to each of the Fighter Direction Tenders located off the beach-head and achieved a number of rescues which would have been extremely difficult and lengthy for home-based craft.

436. During the first forty-eight hours of the invasion, airborne operations led to many incidents and during this period, Air-Sea Rescue squadrons were either directly or indirectly responsible for rescuing 117 paratroopers, all of whom had been previously trained in the essentials of Air-Sea Rescue. Details of the total numbers of aircrew, paratroopers and others rescued are set out in the statistics at the end of this account. These rescues were, however, not effected without some of the inevitable hazards of war. The following three incidents are typical and illustrate the nature of the work.

437. Two Walruses of No. 275 Squadron were ordered to search for a pilot known to have gone into the sea just north of Cherbourg. On arrival at the scene, they found the pilot, who had not been able to get into his dinghy, floating alive in his Mae West. He was, however, not more than two miles from the Cherbourg coast. In spite of the fire from coastal batteries, the two Walruses landed and the pilot was picked up. When they came to take off, they found they had been hit and therefore set out to taxi back across the Channel; both aircraft subsequently sank when taken in tow, but the rescue was made and no one was hurt.

438. On another occasion, two high speed launches from Portsmouth were ordered to search in the same area for an American pilot. These launches faced concentrated fire from the shore batteries and came away unscathed.

439. The third rescue displays the resource and efficiency of the personnel engaged in Air/Sea Rescue work. Two high speed launches were returning after making a successful rescue of an American crew over 70 miles out to sea. A message was sent by one of the launches that some of the rescued aircrew and some of the boat's crew were seriously injured as a result of an attack by FW 190s further

out. It was decided that medical aid should be flown to these injured personnel. A Walrus of No. 289 Squadron took off with two American Medical Officers, made rendezvous with the high speed launches out at sea and in this way, medical aid was brought to the wounded men three hours earlier than would otherwise have been possible. As a result, at least two lives were saved.

440. *Statistics of Personnel Rescued.*—The following figures show the totals of personnel rescued by the Air/Sea Rescue Services of A.D.G.B. and R.A.F. Coastal Command for the period 6th June to 30th September, 1944:—

Month.	*Personnel Rescued.*
June	685
July	313
August	247
September	600
	1,845

441. It will be seen from the above data that the Air/Sea Rescue services succeeded in rescuing many hundreds of valuable personnel, including aircrew and airborne troops. Without this organisation, the great majority, if not all of these airmen and soldiers, would have perished. Even more important, perhaps, than this direct saving of life has been the moral effect which the existence and known successes of the Air/Sea Rescue Service has had, particularly on aircrews. The value of such effect in air operations is obviously incalculable, but that it is of the greatest significance there can be no doubt.

Air Transport and Evacuation of Casualties.

442. In addition to the operational flying to carry airborne troops and supplies to their dropping and landing zones, the aircraft of the transport forces have flown many thousands of sorties on supply and evacuation missions.

443. The control of all scheduled and emergency airlift by Allied troop carrier and transport aircraft, other than those for airborne forces, was vested in CATOR (Combined Air Transport Operations Room), which was set up at my Headquarters at Stanmore. The operations section of CATOR allocated aircraft between operational tasks, scheduled and emergency demands, in conformity with the policy I laid down on your behalf. The supply section of this formation arranged for the supply and movement to the loading base airfields of the loads which were demanded.

444. The variety of equipment carried in these operations was extremely wide. It included jeeps, trailers, Radar equipment, picks and shovels, propellers and shafts, explosives, mines, petrol, containers, barbed wire, magazines, books, comforts and medical stores including blood plasma and penicillin.

445. Transport aircraft returning from the Continent were utilised to the fullest extent for the evacuation of the sick and wounded. This was in accordance with my policy that although no additional special ambulance squadrons should be formed, or aircraft specially tied up for air ambulance work, the maximum use should be made of all aircraft returning to the United Kingdom after delivering supplies. This policy was naturally not always popular with the medical authorities, but no relaxation of it was found to be necessary save in conditions of extreme urgency. This policy was fully supported by you. In all, during the period from D-Day to 30th September, 107,115 medical cases were evacuated by air from forward positions.

446. The evacuation of sick and wounded in the aforementioned manner has been a great boon to the medical services and of inestimable value in securing adequate and early treatment for the seriously injured. The following is a good example—a tank trooper who was suffering from severe burns was evacuated from a landing strip on the Continent to R.A.F. Station, Broadwell, at 1815 hours, landing at base at 1945 hours. From Broadwell he was flown to R.A.F. Station, Odiham, and was admitted to the Special Burns Centre, Basingstoke, at 2100 hours, less than three hours after he had left Normandy.

447. The success of this work reflects great credit on all concerned—the doctors, nurses, nursing orderlies, stretcher bearers, aircrew and ambulance drivers. In view of the fact that the aircraft often operated from airfields within range of enemy shell fire, it is a remarkable fact that every evacuation from the Continent by air during the period covered by this Despatch, was carried out without mishap either to aircraft, aircrew or wounded.

448. When the advance of the Allied armies began to outrun the normal supply arrangements, special air supply services had to be instituted. In the critical 25-day period from 9th August to 3rd September, no less than 13,000 tons of supplies were flown to forward positions. Furthermore, during the full month of September, more than 10,000 sorties were flown and a total of nearly 30,000 tons of supplies carried. These supplies comprised principally petrol, ammunition and rations and occupied all and more than all of the available lift of the transport groups.

449. It was decided, therefore, to allocate special forces of heavy bombers, both of the United States Eighth Air Force and R.A.F. Bomber Command, to provide additional lift. This increased lift enabled enough fuel to be taken forward to keep the Armies moving.

450. I feel that in certain cases, air supply is an overriding consideration. This was an appropriate instance. However, the diversion of valuable specialised aircraft and crews from their proper operational tasks needs very grave justification and only vital emergencies such as had occurred at this time can warrant this action.

451. The principal lesson so far learnt from the campaign is that the tactical use of air transport to supply a rapidly advancing army can be of decisive importance, and that the limiting factor in its employment is not so much the availability of suitable aircraft as the availability of sufficient landing strips in the forward area and adequate loading and re-loading arrangements at the terminus. These forward strips are primarily constructed and earmarked for the fighter squadrons operating in support of the ground forces, and their use by transport

aircraft is inevitably detrimental to these operations. I therefore consider that in any future campaign the airfield construction programme should envisage the immediate provision of at least one air transport landing strip per army and that these landing strips should be constructed so as to be capable of handling a minimum of 50-60 aircraft per hour.

452. In order to minimise the influence of the weather factor, consideration should also be given to the launching of air supply missions from forward airfields in close liaison with and, where necessary, under the local tactical air command.

Employment of Balloons in the Assault Phase.

453. I have already referred to the reasons for using balloons for protection of the beaches during the assault phase and to the results achieved by their use. Here I think it proper to mention the reasons for the final choice of the Mk. VI (V.L.A.) balloon and also some of the difficulties experienced during the planning stages.

454. Mk. VI (V.L.A.) balloons flying normally at an operational height of 2,000 feet, were chosen for this work for the following reasons:—

(i) The extreme lightness of the ancillary equipment and the practicability of using a light hand winch which could be carried ashore by crews.

(ii) The economy in operating personnel—only two airmen were required for each balloon.

(iii) No extra initial lift was required as the balloons were transported flying.

(iv) The possibility of transporting replacement balloons unmanned flying from L.C.T. and L.S.T.

(v) The comparatively small hydrogen requirements for maintenance and re-inflation.

455. During the planning stage it was realised there would be some difficulty in the employment of the balloons during the passage of the original assault forces. It was essential that balloons should not be brought in so early or at such a height as to give any premature warning on the enemy's Radar system. Inter-Service agreement was made, permitting balloons to go into the beach-head flying at 100 feet, not less than seven miles behind the assault. This height is the worst possible at which to fly a balloon owing to its inclination to dive on encountering erratic air currents near the ground. It was decided, however, after experiments on exercises that this restriction was acceptable, and in the event, no undue casualties resulted.

456. A further problem solved in the preparatory phase was the manner of transportation of the planned number of 240 balloons for the British area and 145 for the American area. As the Navy proposed to carry balloons for their own protection on one-third of the L.C.T. and all of the L.S.T., it was necessary to devise a method of flying two balloons from each L.S.T. in order to have available the planned number in the beach-heads. After several experiments, this was accomplished.

457. To provide the necessary number of inflated balloons for each craft, to maintain them during the marshalling period and during any possible period of postponement, and to replace casualties during that time, required a large number of small vessels and extensive shore servicing and hydrogen organisations at all appropriate ports. These were comparatively easily provided in England from the resources of R.A.F. Balloon Command and the Admiralty Shore Servicing Section, but it should be remembered that such facilities, if not fortuitously available as in this case, have to be arranged.

Provision of Maps.

458. The design, production and supply of maps for use by the air forces under my Command was the responsibility jointly of the War Department, Washington, and the War Office, London. Shortly after the outbreak of hostilities, the Geographical Section, General Staff, (later the Directorate of Military Survey). War Office, attached an officer to each of the principal Royal Air Force Commands, to study their requirements and to ensure adequate production and distribution of air maps. This practice was adopted for the Allied Expeditionary Air Force, a Deputy Assistant Director of Survey (British) being appointed as Chief Map Officer. Later, an officer of the Corps of Engineers, United States Army was also assigned to the Map Section.

459. Upwards of 120,000,000 maps were prepared for Operation " Neptune ", of which a large proportion was used by the air forces. They embraced small and medium scale " Air " maps, maps for use in co-operation with ground forces, and an astonishing number of special maps for planning purposes, which were widely distributed to Staff Officers, mainly of the Operations and Intelligence Branches. Equally important for successful planning was the knowledge that special maps would be available for particular operations, e.g., topographical lattice maps for use in craft fitted with special Radar navigational devices and dropping zone maps for use by pilots towing gliders.

460. Headquarters, A.E.A.F. had its own drafting section and reproduction facilities were readily accorded to it by both United States and British armies. Thus, special maps required to illustrate plans, Operation Orders and Staff Memoranda could be made available, often in a matter of hours.

461. When all the Allied Air Forces were based in the United Kingdom, the normal British channels of supply were used, but once overseas, other methods had necessarily to be devised, and the supply of maps to Commands and sub-formations differed slightly as between United States and British forces.

462. Arrangements were made whereby Royal Air Force Commands should draw maps from the British armies to which they were affiliated, and in accordance with normal United States practice, formations of the Ninth U.S.A.A.F. obtained their maps under arrangements made by the Office of the Chief Engineer, ETOUSA. This provided for the establishment of a Ninth U.S.A.A.F. Map Depot, with an Assistant Deputy Engineer in charge, whose duty it was to supply all elements of that force. Events were to prove that although both systems worked well, modifications to improve the service were necessary from time to time, and on this matter I have made comments in later paragraphs.

463. During the initial phase of operations on the Continent, the Director of Survey, 21 Army

Group, established his Base Map Depot close to Bayeux, and the Chief Engineer, Communications Zone, a depot not far from the two landing beaches " Utah " and " Omaha ". The Assistant Deputy Engineer, Ninth U.S.A.A.F. placed his depot first at Carentan and later at Rennes, in order to be close to the main American Base Map Depot. These depots formed the normal source of supply for the allied air formations then gathering on the Continent. Some loss of maps by enemy action occurred during the stocking of depots, but this loss was made good from reserves held in the United Kingdom.

464. Squadrons of both air forces had carried with them overseas sufficient maps to cover any operations they might undertake during the fortnight after their landing, and ground personnel were similarly equipped. It was expected that the depots would, by that time, be able to meet any demands made upon them. Both British and American systems of map supply had been well practised in the United Kingdom and there was no reason to suppose that they would not work successfully overseas; yet late in August, Headquarters, British Second Tactical Air Force complained of delays in filling their demands, and the map depot of the Ninth U.S.A.A.F. was also unable to obtain all it required from Communications Zone base depots. In both cases the difficulty had to be overcome by flying supplies from the United Kingdom.

465. The rapid advance of the Allied armies through France and Belgium during August and the beginning of September created an embarrassing situation in regard to the supply of maps. In the planning stage, it was not expected that by D+90, the Allied Armies would have passed beyond the River Seine. By that date they were, in fact, virtually along the line of the River Scheldt. Thus there arose, long before the forecast planning date, an immediate demand for maps of all kinds and scales covering Belgium, Holland and Germany, most of which were then either concentrated in the base depots, in the United Kingdom or in transit from America.

466. The problem was acute. To move stocks already in the base depots would have taken too long. To print in the field the full quantity required was not practicable except for certain large-scale topographic maps produced on mobile presses. There was, therefore, no alternative but to draw upon reserve stocks in the United Kingdom and fly them as rapidly as possible to where they were most urgently needed.

467. Moreover, the rapidity of the advance had deprived the printing agencies of three valuable months. Reserve stocks of certain sheets, notably those of Germany on a scale of 1/100,000 were extremely low and since they were being demanded in quantity by armies no less than by air force, new stocks of these sheets most urgently required had to be printed as rapidly as possible in the United Kingdom by as many reproduction agencies as could be pressed into service.

468. The air lift for these maps was arranged by CATOR and the maps were flown to airfields close to Paris and Brussels where they were distributed direct to air formations, often within a few hours of their having been printed, and almost before the ink was dry upon them.

469. Although the crisis was surmounted satisfactorily, I have little doubt that a serious hitch might have occurred, and I feel that very careful consideration should be given to the question of whether some modifications in the map supply organisation should not be made (see paragraph 473 et seq.).

470. By an arrangement between the United States and British forces, the " lion's share " of the design, production and supply of general and special maps for use by the air forces under my command fell to the Directorate of Military Survey, War Office and the various Survey Directorates working in conjunction with that office. Their indefatigable co-operation, and also that of the reproduction agencies of both countries was of the utmost assistance. British resources were augmented in the United Kingdom by those of the 660th Engineer Topo (Avn) Battalion, United States Army and the 942nd Engineer Topo (Avn) Battalion, forming part of the Eighth United States Army Air Force, which produced special maps for all commands within the Allied Expeditionary Air Force.

471. The Map and Survey Section of the G-3 Division of your Headquarters also extended their help to me, and on one occasion supplied additional staff from No. 13 Map Reproduction Section of the packing and distribution of " Top Secret " maps.

472. The theatre policy for the supply of maps to a United States Army Air Force is described in Appendix VIII of the Survey Staff Manual, issued by the Chief of Engineers, United States Army, Washington, dated 1st June, 1944. It stipulates as a requirement, in amplification of United States Army regulations, 300-15, a map depot for an air force, such as the Ninth United States Army Air Force, which would draw its maps in bulk from the Engineer, Communications Zone.

473. In the light of experience it is clear that this depot should have been stocked, before leaving the United Kingdom, with sufficient maps to last for a much longer period of the campaign than its initial phases. It would then have been less dependent upon the ability of the Engineer, Communications Zone, to meet immediately such demands as were made upon him. Alternatively, had some of the bulk stocks held by the Engineer, Communications Zone, been marked before shipment for immediate delivery to the Ninth United States Army Air Force Base Depot, the storage would not have been so great.

474. The British Second Tactical Air Force was dependent for its map supply on the Map Depots controlled by the Director of Survey, 21 Army Group. In particular, Nos. 83 and 84 Groups, Royal Air Force, drew their map stocks from the map depots of the British and Canadian Armies to which they were respectively affiliated. By the middle of August, the Air Officer Commanding British Second Tactical Air Force had decided to form a map depot at his headquarters from which these groups, in an emergency, drew those maps they required, which could not be supplied by the armies. In October, the Director of Survey, 21 Army Group, in conference with all concerned, supported this change of policy, and recommended also that the Groups, too, should

materially improve until my Headquarters set up again at Versailles, by which time an almost static situation had again developed.

489. Signals facilities just adequate to service a static headquarters and provide links with its more stationary units cannot be adequate when that headquarters and its units begin to move. Because these moves must be carried out by splitting into two parties, the facilities required will be almost double those needed before. In other words, equipment and operators will be needed at two places instead of at one only.

490. This factor, which raises difficult problems of supply, training and administration for the signals service, has none the less to be reckoned with, and the problem it represents solved, if proper direction of operations is to be maintained in conditions of highly mobile warfare.

491. Some mitigation of the task of signals personnel in tackling these problems would result if the moves of main headquarters particularly were delayed longer than has been the practice in these operations, and certainly not made until the communications are suitable for operational needs. While it is important to keep operational headquarters close to the forward units, this factor must be more carefully related to the practicability of providing adequate signals facilities at the new location of the headquarters. Continuity of service is of overriding importance in air and combined operations.

PART V.—SOME BRIEF REFLECTIONS ON THE CAMPAIGN

492. The extensive air operations which are the subject of this Despatch cannot be summed up in a few paragraphs, nor, without entering fields of controversy, is it possible to discuss all the air lessons which have emerged during the campaign. What can be done, however, is to state, and where useful, to discuss briefly, certain of the more prominent issues which can be discerned in the pattern of air operations seen as a whole. Experience gained in subsequent operations in this and in other theatres may confirm these impressions, or, on the other hand, make their revision necessary.

Preparatory Air Operations

493. Events thoroughly justified our strategic bombing policy and your insistence upon an adequate preparatory period of air operations for Operation "Neptune." As it turned out, weather conditions allowed only a partial use of our air forces in the weeks following the assault, and had these preliminary operations not been started before D-Day the task of the air forces of interfering effectively with the enemy's movement within and to the battle area could not have been achieved in time to have directly influenced the land operations in the initial phases. As it was, and in accordance with the plan, the air had, by the day of the assault, completely disorganised the enemy's dense and complex network of rail lines of communications within France and Belgium. This having virtually been accomplished by D-Day, it was soon possible to seal off the battle area through air action, and in this way the area was prepared for the employment of ground forces, with the enemy at a critical disadvantage.

494. During the initial planning and preliminary operations some doubt—based on experience in other theatres—was expressed as to the efficacy of air action on bridges. Results of the initial attacks in France soon proved that given suitable technique, types of aircraft, and weapons, bridges can successfully be destroyed or rendered impassable, although the cost may be a heavy one in aircraft and personnel due to flak, and also in bombs expended. Weather may, however, frequently preclude attacks as and when planned. To have relied entirely upon the destruction of bridges as the main method of achieving the disorganisation of the enemy's communications system at the appropriate moment in Operation "Overlord," would again have proved unsound in the given conditions. The attacks on bridges formed but an integral part, albeit an important one, of the whole plan of action against the movement organisation of the enemy.

Diversionary Operations

495. Our efforts to mislead the enemy proved most effective, but their implementation, though they provided excellent operational training for crews, placed a great strain upon our air resources. In general, for every target attacked in the assault area, two had to be taken on outside that zone. Although "Crossbow" operations were taken into account in the framing of the programme, the diversion of effort from "Pointblank," communication targets, and other objectives of strategic importance, was very considerable. On the other hand, despite the fact that this great effort was directed against targets having little direct material effect on the achievement of the military object of securing the initial bridgehead, it is reasonable to deduce that these operations must at least have been a factor influencing the German High Command to dispose their reserves in the Pas de Calais area as a central position against possible landings in that area and/or any part of the long coastline from Denmark to Brest. This was obviously most advantageous to ourselves especially as our air offensive against his communications rendered movement of these reserves a lengthy and hazardous operation, particularly over considerable distances.

496. A high cost may have to be paid for diversionary activities of this kind, if they are to be realistic, and this fact must always be borne in mind when estimating the strength of the air forces required for combined operations.

Inter-Service Fire Plan

497. The drawing up of the fire plan for the assault phase was rightly regarded as an inter-Service and inter-Allied responsibility. Throughout such planning care must be taken to ensure flexibility, and it must be accepted by the Air Forces that it may not be possible finally to fix the air tasks until a very short time before D-Day—owing to such factors as changes in information, changes in weather conditions (including likely height of cloud bases), the development of enemy beach defences and gun positions and changes in conditions of light for air and naval bombardment and for fire by assault craft of various types. Moreover, an alternative Fire Plan is essential. There is a tendency on the part of the other Services to expect too much of the

air forces from the point of view of the destruction of prepared gun emplacements, especially when completely concreted; their neutralisation for a critical and limited time is, of course, another matter. At the same time there is a strong inclination among airmen to look more upon the material rather than the morale side of such bombing. The demoralisation of the gun crews through the psychological reaction to bombing contributes as much towards the neutralisation of gun defences as does damage by actual hits or by shock effects.

Spotting for Naval Bombardment

498. The Fleet Air Arm was unable to accept the full responsibility of spotting for naval bombardment either for the assault or for subsidiary operations and in the main, this task fell to Royal Air Force fighter reconnaissance squadrons. The pilots of these squadrons had necessarily to undergo a special course of training in naval procedure. The conversion presented no real difficulty but the prolonged diversion of these units from their normal tasks caused some anxiety as our total resources were limited. In the end, all our reconnaissance commitments were fairly adequately met.

499. There are obvious advantages in training some Royal Air Force reconnaissance units for the dual role of co-operation with both ground and naval forces.

Anti-Aircraft Defences

500. On a number of occasions, our own anti-aircraft guns, both naval and military, shot down friendly aircraft. The claims of fighter aircraft and A.A. guns in air defence have always conflicted because the ideal for the fighter is a field clear of any restrictions, and for A.A. gunfire a sky free of friendly aircraft.

501. In comparatively static conditions, such as the Battle of Britain, it has generally been accepted that the merits of these two claims could best be resolved by an Air Defence Commander (who in the case of the United Kingdom was the Senior Defensive Air Force Commander). It is relevant to note that after much experience the same principle was adopted in the Mediterranean..

502. For Operation " Neptune ", however, no one officer was made specifically responsible for Air Defence as such, primarily because in the initial stages it was held that the Army Group Commanders themselves should decide the precise allocation of their resources to the limited number of landing craft allowed them. Also, it was considered that in forward areas the only effective control which could be exercised over A.A. weapons would be by the imposition of standing instructions.

503. From the Air Force point of view, it became clear shortly after the operation had been satisfactorily launched that this policy should be revised in favour of unified control. My request on these lines was not accepted by your Headquarters in August on the grounds that the time was not opportune for a change in this particular policy.

504. I cannot help feeling, however, that if the scale of enemy air attack had in fact been heavier such a change would have been essential in order to bring about a satisfactory degree of security when and where it was really needed. Moreover, I am of the opinion that the knowledge that a well co-ordinated air defence system exists will of itself produce a deterrent effect upon the enemy.

505.* In the absence of serious air attack, the claims of A.A. guns were at times pressed, to my mind, without full regard to the air situation of the moment. Army Commanders declared a considerable area around the majority of river crossings or similar places of importance a " prohibited " area for the operation of friendly aircraft by night. The Tactical Air Force Commanders concerned were approached by the appropriate Army Commander for acceptance of these I.A.Z's and, although they could speak for their own night operations, which were primarily of a local nature, they were in no position to answer for the requirements of the Commanders of the Strategic Bomber Forces or for the needs of S.O.E. operations.

506. The patchwork of these restricted flying areas thereby created imposed upon both Royal Air Force Bomber Command and No. 38 Group tremendous operational difficulties and handicaps which were surmounted mainly by the navigational ability of the crews concerned. These I.A.Z's constituted an unnecessary complication of an air situation already made difficult by the restrictions which had to be imposed on the use of I.F.F.

507. I feel most strongly that the establishment of restricted areas for flying, when part of the Air Defence arrangements, is primarily an air problem and should be solved by the Air Commander, naturally after the necessary consultations with the ground and naval commanders. The issues which are involved have never been faced up to because the scale of enemy air attack has been of such a low order, but it has been our own air forces which have had to suffer unnecessary inconveniences, and at times danger, and the A.A. guns have enjoyed a freedom of action which has been out of proportion to the real defensive requirements.

Aircraft Identification.

508. It was realised for some time before Operation " Neptune " was launched that our mechanical means of identifying aircraft, namely I.F.F., was not a satisfactory type of equipment for aircraft which operate in any numbers. In fact, owing to mutual interference and the probability that no value at all could be gained by the general application of this equipment, it was decided, after consultation with all United States and British services and technical authorities concerned, to limit the use of I.F.F. to a few special types of aircraft in order that these aircraft at least could be adequately tracked.

509. This decision meant that the only remaining means of identifying aircraft was the careful passing of aircraft movements and by

* Apart from the operational factors referred to in paragraphs 505, 506 and 507, it is appreciated that there is a " morale " side to this question. On the one hand there are the fighting troops who may be kept awake by the effects of minor air action to which they cannot retaliate, and, on the other, the tired crews returning from missions, whose aircraft cannot avoid the prohibited areas, either because of shortage of petrol or because they have been already badly damaged, and who find themselves fired upon and possibly shot down by friendly A.A. defences.

relating aircraft tracks to notifications of flights previously given. This was clearly an unsatisfactory situation but one which had to be accepted in the circumstances. There is no doubt that every step should be taken to hasten the production of a really effective mechanical method of indicating friendly aircraft, and I consider that a great deal more scientific study should be devoted to this subject in the future.

Balloon Defence.

510. In any future amphibious operation similar to Operation " Neptune " which is mounted from a country in which exists a balloon defence with all its attendant facilities, the cheapness and comparative ease of providing balloon protection unquestionably makes Balloon Defence profitable if there be any likelihood of low-level attacks by enemy aircraft. For an operation despatched from an area in which no such facilities exist, the necessary lift in hydrogen, packed balloons, and ancillary equipment to provide for initial inflation and to meet a high casualty rate would, I consider, be justified only if the enemy air effort was expected to be unusually strong and determined.

Operational Items.

511. The enemy air effort, taken as a whole, was mediocre throughout. The lack of efficiency and the low operational effort of the G.A.F., especially during the critical assault stage, were largely the result of previous attention paid to the G.A.F., his loss of Radar coverage, and of attacks on its bases and installations, which constantly compelled him to change his operational aerodromes and A.L.G.'s and to operate his fighters outside effective range of the assault area and shipping lanes.

512. As was forecasted in our early planning, marked Allied air superiority made it possible to use heavy night bombers by day with outstanding success, and relatively slight losses, since, if necessary, they could be escorted by our fighters.

513. The fighter bomber proved to be a battle-winning weapon. It showed tremendous power in breaking up and destroying enemy concentrations, especially of armour, and contributed greatly to the paralysis of enemy road and rail movement.

514. Heavy bombers can be employed to decisive effect in a tactical role. A special treatise on the principles of their employment in support of the land operations has been issued jointly by 21 Army Group and A.E.A.F., with the blessing of Supreme Headquarters, Allied Expeditionary Force, and is now being considered by the U.S. Army and Air Force Commanders.

515. The enemy's Radar cover was effectively disrupted and neutralised by air attacks, and in consequence the enemy was virtually " blinded " at the time of the assault.

516. Because of the possible risk of bombing our own land forces, Army Commanders in some instances insisted on the bomb line being pushed too far ahead of the line of our forward troops. This often proved a handicap to the effective use of tactical support aircraft. The land forces should accept a bomb line as close as possible to our front line, and be prepared to run some small risk of casualties in order to enable the air to give them the maximum close support. The fixing of the bomb line for predetermined direct support when heavy bombers are participating in a co-ordinated land/air operation is, of course, a separate issue.

517. Armed reconnaissance of roads, rail lines and the Seine crossing by Mosquitoes of British Second Tactical Air Force during the hours of darkness proved extremely effective and disconcerting to the enemy. Intruder action of this kind could have been most effectively extended had more forces been available.

518. The value of good photographic reconnaissance cannot be overstated. Our resources in normal high altitude photographic reconnaissance were on the whole adequate, but here too the weather adversely affected the fulfilment of the reconnaissance programme after D-Day. There were long periods of inactivity when lack of strategic intelligence relating in particular to movements in rearward areas and to damage inflicted by our bombing, had serious consequences and sometimes even frustrated our plans.

519. The absence of an intermediate and low altitude photographic reconnaissance aircraft became apparent very early on, and a few armed Mustang III had to be converted at R.A.F. Station Benson for this special type of photography. There should be one medium altitude and one high flying flight in each photographic reconnaissance unit.

520. It also clearly emerged that the control of photographic reconnaissance of all types for commitments outside the allotted tactical area must be centralised in one authority. The formation of the Combined Reconnaissance Committee at Uxbridge, which filtered and took action on demands for reconnaissance from all quarters satisfied this requirement.

521. The need for a highly efficient mapping and target section which could turn out the necessary material at the shortest notice was fully appreciated before " Neptune " was launched. Experience proved that the personnel and the facilities at the disposal of the Section were not adequate for the multiple tasks by which it was faced. It is impossible to prepare in advance dossiers of every possible target which the air forces may have to hit. The only solution is to have available as large an organisation as may possibly be necessary for the task of turning out with a minimum of delay the material that might be demanded of it.

522. Modifications to the system of supply of maps were found to be necessary during the campaign. The changes made, as described earlier in this Despatch, indicate the lines along which I feel future plans for map supply should be made.

523. Unless signal facilities are much increased and well planned in advance, and staffs given ample time to develop them, major operational and administrative headquarters, when they move, are likely to get out of touch with each other and with forward headquarters and sources of intelligence. The direction of air operations would at times have been more easily and effectively achieved if the moving of headquarters had been postponed until adequate communications between the Continent and the United Kingdom had been established.

524. Signals security is also all-important. It is of little use having scramblers or other devices unless they work efficiently over considerable distances.

525. The value of scientific research into current operations may also be mentioned here since quite apart from its application to day-to-day technical problems, the information which it provides is of great use in the field of planning. An up-to-date check of bombing accuracy and the effectiveness of the weapons used makes it possible to predict within reasonably accurate limits the amount of effort which is required for particular tasks, and thus one aspect of economies of alternative operations can be assessed in advance. In this way, the cost of the major air operations in "Neptune" was assessed with a relatively high degree of accuracy. At the same time, such studies, once again, demonstrated that too great a value cannot be placed on training, and on the improvement of bombing accuracy. As the latter improves, the potential power of a bomber force also increases, but at a far greater rate.

Relationship of Strategical to Tactical Bomber Operations

526. The concept of strategical and tactical air forces as separate entities frequently breaks down in operations in which the activities of the air are interwoven with those of the ground forces. Phased operations by strategical and tactical air forces are sometimes different and at other times the same points within the same target system and within the same general time limits means that there is an inter-relation of effects throughout the whole period the target system is under fire.

527. The inter-relation of effects becomes evident when one considers the premier part played by the strategical air forces in setting the state for "Neptune", not only for subsequent operations of a tactical nature by the tactical air forces, but also for the ground battle. As we have already seen, this preparatory phase occupied the three months preceding D-Day by which time heavy bomber, and to a lesser extent, medium bomber attacks on rail centres achieved their full purpose of causing a catastrophic decline in the potential of the railways. The ensuing chaos, which is difficult to describe, was accentuated by the subsequent fighter and medium bomber attacks on bridges, on trains, and on open lines. If they had not been aided by the heavy blows which had already been delivered by heavy bombers on the key points of the railway systems, the tactical air forces could hardly have played the successful part they did in bringing organised rail movement to a virtual standstill; nor could the isolation of the battle-field have been subsequently achieved as rapidly as it was. Further, the preparatory bombing of the railway system by the strategical forces at the same time drove the enemy increasingly to the roads in spite of his precarious M.T. and fuel situation, and so fighter bombers and fighters were presented with road targets, which, as the record shows, they were able to exploit to the full. In fact, as we now know, road and rail movement became so hazardous an undertaking that the enemy's forward troops were as frequently as not starved of the means with which to continue the fight. These integrated and phased operations against the enemy's lines of communication were a decisive factor both in the success of our initial landings, in that they slowed down considerably the enemy's build-up and concentration of reinforcement, and in the successful outcome of the whole battle in France.

528. Again, in the sphere of direct Army support, whilst it was the fighter bomber which in general had the last word so far as the Air Forces were concerned in the tactical defeat of the enemy in France and Belgium, it was the heavy bomber and medium bomber which, two months before D-Day, began the attack on the enemy's defences. Thus, although the pre D-Day attacks on coastal batteries were unsuccessful in destroying guns under thick concrete cover, they not only stopped constructional work in half finished batteries, but also caused sufficient general damage to reduce critically by D-Day the efficiency of those which had been completed. In fact, opposition offered by the coastal defences was relatively so slight that there was virtually little opportunity for the employment of the fighter bomber against enemy forces in the landing areas.

529. Moreover, the operations in Normandy again made it clear that heavy bombers when used in support of a land battle can, in addition to their direct assistance to the land forces in the attack, open up to the tactical air forces a wealth of targets normally otherwise denied them when the static battle in consequence of the bombing became a war of movement. Major retreats, or the marshalling of forces for a counter-attack, could be carried out only in the open, and once the enemy was exposed the result of the fighter bomber attacks was a foregone conclusion.

530. In a sense, this fusing of the operation of different components of the air forces is merely an extension of a principle which has already been recognised in attacks on the G.A.F. The destruction by our strategical air forces of the enemy's aircraft factories and of his fuel industry represents only one part of a single comprehensive plan. Apart from the attrition as a result of air fighting, there was also the complementary action—the exploitation in "Neptune" of the bombing of airfields. The latter operations achieved their purpose, in particular by still further reducing the resources the enemy enjoyed in France, both in aircraft and crews, in airfields, and in aircraft maintenance factories.

Unified Control of Air Effort

531. Because of the foregoing considerations, and if the best results are to be achieved in the most economic manner, it is essential that the direction of air operations which call for the employment of air forces from various countries and commands should be placed in the hands of one airman to ensure the necessary unity of command and planning. The need for this is equally apparent when one views the inter-relation of the ground and air forces in operations in which heavy bombers are used in a tactical role.

532. The latter operations are in every sense of the term "Inter-Service Operations". The danger of treating the bomber as merely a component part of a Corps artillery, thrown in merely to add some fire support, can at

present be obviated only by co-ordinated planning between the air and land forces. If this principle were lost sight of, there would be a serious risk of the misuse of heavy bombers in a tactical role, and bombing on a large scale might be expended in profitless destruction which would add little, if anything, to the progress of a land battle. From the operational point of view, the need for unified planning stands out all the more prominently when it is realised that the strategical forces which contributed so much and so directly to the land battle in France were in themselves equivalent in fire power to vast ground forces. It is only through integrated ground and air planning that the air forces can serve usefully in a tactical role.

533. Although the tactical operations in which heavy bombers were used in Normandy were initiated by the ground force commander, there may also be times when the air force commander with his better appreciation of the effects which air effort can achieve, might in future suggest to the Army rich opportunities for a combined air and land operation.

Command and Control.

534. The relationship of Air Forces to the Army and Naval Forces and to the Supreme Command from the point of view of Command and Control is well worth touching upon in view of the great importance of this question in future Combined Operations of the scope of " Overlord ". It raises interesting though naturally somewhat controversial problems.

535. In the early days of planning and preparation for Operation " Overlord " there was a Commander-in-Chief of all Air Forces and a Commander-in-Chief of all Naval Forces each having the necessary integrated operational staffs and Headquarters but separate from those of the allied operational forces. The Commanders-in-Chief and their staffs were also service advisers to COSSAC and later to yourself as Supreme Commander. The organisation was, however, different in respect of the land forces, the direction and control of these operations in the field being undertaken by the Army staff of COSSAC itself.

536. In February, 1944, you appointed the Commander-in-Chief, 21st Army Group to co-ordinate the planning and execution for the assault for both the United States and British Army Groups and thereby raised the Commander-in-Chief, 21st Army Group to the level of Commander-in-Chief of the Land Forces. He naturally used his own staff for both these functions but the Army staff of Supreme Headquarters Allied Expeditionary Force still continued to exercise direction of the land operations from the point of view of general policy and to co-ordinate the activities of all three Services on the high level.

537. The Air Commander-in-Chief and the staff of Allied Expeditionary Air Force were, in consequence, required to work on two levels with two large Army staffs. On the one hand, they had, as your Air advisers, to contribute to the directives and numerous operational and administrative memoranda produced by Supreme Headquarters Allied Expeditionary Force and on the other, and this time on the Commanders-in-Chief operational level to plan, prepare for and execute the assault in co-ordination with 21st Army Group. Further, it was inevitable in these circumstances that the closest contact had also to be maintained with the Commanding General of the American land forces.

538. This arrangement severely taxed the staffs of Allied Expeditionary Air Force and inevitably led to overlapping and complications and at times interference with the planning of the tactical air forces and their opposite Army and Navy formations. The two staffs were, in fact, the same as those with which Allied Expeditionary Air Force itself was, at the same time, planning on a high level.

539. In the post assault period when 21st Army Group reverted to its normal position the situation was greatly eased but certain difficulties still remained in that the Army staff at Supreme Headquarters Allied Expeditionary Force retained a dual function in certain respects.

540. In spite of its inherent difficulties the organisation of Command and Control as developed through the various phases, undoubtedly worked, but I suggest that the creation of a separate Commander-in-Chief of all Allied Land Forces on the level with, and having similar functions to, the Air and Naval Commanders-in-Chief would have facilitated the execution of the responsibilities of the Air Commander-in-Chief and the Allied Air Force commanders, and no doubt also of the other service Commanders-in-Chief and staffs.

541. The geographical relationship of the Commanders-in-Chief and staffs of the Air, Army and Naval forces and the Supreme Commander and his Headquarters also has a direct bearing on the question of Command and Control.

542. In the first period of planning the Commanders-in-Chief and appropriate portions of their staffs, were housed mainly in one building in London and this arrangement naturally worked excellently.

543. Shortly after the formation of Supreme Headquarters Allied Expeditionary Force itself, part of its general staff moved out of London to Bushy Park. This inevitably led to a splitting and to some extent further duplication of my staff, part of which had to move to Bushy Park, part had to remain at Norfolk House to plan with ANCXF and the remainder of SHAEF, and part had to remain at Stanmore for the planning and control of preliminary air operations for " Neptune "—the latter being a function and responsibility which the Army and Naval Commanders-in-Chief had not to undertake prior to the assault. I was forced to keep my main staff at Stanmore if only because of communication facilities which were adequate for the control of air operations at no other Headquarters or centre.

544. A further dispersal of the Combined and Joint Planners of the operational staff resulted from the necessity to work with the Headquarters staff of 21st Army Group, whose location was at St. Pauls School, for the detailed planning of the assault.

545. The situation became even more complicated from the air point of view when, for the execution of the initial stages of the invasion, 21st Army Group and ANCXF, with a

SHAEF Command Post, moved to the Portsmouth area. The operations staff at AEAF had still perforce, to remain at Stanmore and Supreme Headquarters Allied Expeditionary Force Main together with AEAF planners, who formed part of the combined planning staff of Supreme Headquarters, continued to work at Bushy Park. Later, a further echelon of Supreme Headquarters Allied Expeditionary Force Main, i.e., Forward SHAEF, which included the operations staff and planners of Supreme Headquarters with its AEAF complement moved also to the Portsmouth area. This arrangement obviously simplified the co-ordination of Army and Naval operations and plans at the Commanders-in-Chief level, but my own difficulties were proportionally aggravated as a result of these moves of Main Headquarters.

546. Only when the various Headquarters were set up at Julouville in Normandy, did the co-ordination of operations and planning become smooth and easy, although the value derived from all the principals being so closely related geographically was unfortunately to some extent negatived by lack of adequate communications between Main Headquarters and Operational Commands.

547. In my view one of the major lessons learned from " Overlord " is that the staffs of the Supreme Commander and of the Air, Naval and Land Commanders-in-Chief if created, should be located very close together during both the planning and the execution stages, and this principle should be held to be inviolate; in order to achieve this the Services must be prepared to make sacrifices.

548. The communication aspect is all important and particularly must communication facilities be adequate for the conduct of air operations which will almost invariably have to commence weeks and possibly months before those of Land and possibly Naval operations. The latter factor is, I suggest, one which must have the fullest possible consideration when determining the location of the Headquarters of the Commanders-in-Chief. Even at the lower Staff levels it is essential for sound planning and development of operations that the staffs of the three Services should be within easy transportation distance of each other, and I will go so far as to recommend within walking distance of each other.

549. Finally, on the more tactical plane, it is essential to have in the field an operational co-ordinating organisation, similar to A.E.A.F. Advanced Headquarters (which was fully mobile), which can keep in touch at one end and at the same time with army headquarters and headquarters of air formations in the forward areas and with the main operational air headquarters in rear. Particularly is this required for the planning of operations in which heavy bombers are used in a tactical role. Only in this way can the bomber forces involved be adjusted smoothly to such alterations in the plan as may be dictated, often at very short notice, by changes in weather and/or in the ground situation.

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