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INVASION OF ITALY OPERATION AVALANCHE

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MEDITERRANEAN ALLIED TACTICAL AIR FORCE

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HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
A.P.O. 650, U.S. Army

ACT-ASW/pm

319.1

21 April 1945

SUBJECT: Report on Operation "Avalanche".

TO : Air Ministry, Whitehall, U.K.

Enclosed for your information is the MATAF Report on
Operation "Avalanche".

FOR THE COMMANDING GENERAL:

Edward J. Culleton
EDWARD J. CULLETON,
Major, A.G.D.,
Adjutant General.

1 Incl:
Report on Operation "Avalanche".

Pass. & S. 6.

To: *F.P.S.*

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WITH *2 Reports*

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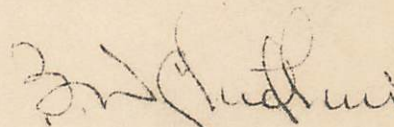
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21 April 1945

One of the outstanding achievements of military activities in the Mediterranean theater has been the succession of amphibious landings in Africa, Sicily, Italy, and France. Each of these operations, of profound strategic significance in the development of the war, has profited from the experience gained in earlier operations of a similar type, and it is important that straightforward records should be available on each one of them.

The following report records the part which the Tactical Air Force (then known under its former designation as Northwest African Tactical Air Force) played in Operation "Avalanche", the invasion of Italy at Salerno. Completion of the report has been delayed due to demands on the time and facilities of this staff which claimed higher priority, but it now appears to take its place among the permanent records of this command.



E. W. CHIDLAW,
Major General U.S. Army
Commanding

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C O N F I D E N T I A L

HEADQUARTERS
MEDITERRANEAN ALLIED TACTICAL AIR FORCE
A.P.O. 650, U.S. Army

R E P O R T O N O P E R A T I O N " A V A L A N C H E "

(31 August - 1 October 1943)

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PART I

OPERATIONSPREPARATION

1. Situation: The capture of SICILY was completed on 17 August 1943, thirty-eight days after the momentous Allied landings there. Preparations were immediately speeded up for the next phase of the war, the attack on the mainland of ITALY. The operations being planned at this stage had to be flexible in order that full advantage could be taken of political developments inside ITALY itself. Mussolini had fallen and Badoglio took over the direction of the Italian government on 25 July; Italian emissaries made their first bid for peace to the Allies in PALERMO on 15 August; final details of the armistice were worked out at SYRACUSE on 31 August; signatures were affixed to the terms of surrender on 3 September, and it was announced five days later on the eve of the actual invasion.

2. The broad plan of the Allies was to effect three separate and distinct landings in rapid succession; one across the Straits of MESSINA from SICILY; another at TARANTO, in the heel of ITALY; and the third and main assault on the west coast, either in the Gulf of GIOIA, or further north in the Gulf of SALERNO. Four plans were therefore prepared at the same time:

- a. Operation "Baytown" involved the despatch of a limited force by the Eighth Army across the Straits of MESSINA to the REGGIO area.
- b. Operation "Gibbon" involved the landing of the V Army Corps at TARANTO.
- c. Operation "Buttress" involved the mounting of an amphibious assault on the Gulf of GIOIA from North AFRICA, also by the Eighth Army, with the object of capturing the toe of ITALY as a base for further operations against the mainland.
- d. Operation "Avalanche" involved an amphibious assault by the Fifth Army, mounted from North AFRICA and SICILY, against the Italian mainland, with the following objectives:
 - i. To establish the air forces on MONTECORVANO and the neighboring airfields.

- ii. To seize the port of NAPLES and develop it as a base from which to conduct operations against the remainder of ITALY.

3. Operations "Buttress" and "Avalanche" were alternatives, but "Baytown" and "Gibbon" were planned to be co-ordinated with the major assault on the mainland. From the beginning, it was planned to make every effort to launch "Avalanche" in preference to "Buttress", but planning for "Buttress" was continued so that either operation could be mounted at relatively short notice. Owing to the short time elapsing between the close of the Sicilian campaign and the opening of "Avalanche", preparations for the latter were carried to an advanced stage by 4-5 of Northwest African Air Force before Northwest African Tactical Air Force was brought into the picture. This fact, combined with the necessity of preparing the air support for alternative operations, led to certain administrative difficulties, details of which are discussed in Part II of the present report. On 17 August, plans had reached a sufficiently advanced stage for Tactical Air Force to issue directives to the XII Air Support Command, Desert Air Force, and Tactical Bomber Force. On the 19th, "Buttress" was cancelled, and "Avalanche" was given first priority. From this date onwards, daily planning conferences took place at Headquarters, Tactical Air Force, with representatives of the three formations under command.

4. Order of Battle. Northwest African Tactical Air Force, under the command of Air Marshal Sir Arthur Coningham, had advance and rear headquarters at CASSIBILE, SICILY, and LA MARSA (TUNIS). The advanced headquarters was located adjacent to the Headquarters of 15 Army Group. The formations under the control of Tactical Air Force were as follows:

- a. XII Air Support Command, under the command of Major General E.J. House, had its headquarters at LENTINI, and its units dispersed on airfields at MILAZZO, CASSIBILE, and on the CATANIA Plain. On D Day its composition was as follows:

Spitfire	13 Sqnns	USAAF	24 Sqnns
P-38	9 "	RAF	12 "
A-36	7 "		
P-40	4 "		
P-51 T/R	1 "		
Beaufighter	1 "		
Mosquito	1 "		

- b. Desert Air Force, under the command of Air Vice Marshal H. Broadhurst, had its headquarters at LENTINI, with its squadrons, which were located on CATANIA Plain and CASSIBILE, numbering as follows:

P-40	12 Sqdns	RAF	12 Sqdns
Spitfire	9 "	USAAF	6 "
Beaufighter	1 "	SAAF	4 "
Spitfire T/R	1 "		

- c. Tactical Bomber Force, under the command of Air Commodore L. Sinclair, had its headquarters on CATANIA Plain, adjacent to its units, which were all located in the same area:

B-25	8 Sqdns	USAAF	12 Sqdns
A-20	4 "	RAF	7 "
Bostons	4 "		
Baltimores	3 "		

- d. Reserve Units. Tactical Air Force also had in reserve three squadrons of P-40's (USAAF), one squadron of Hurricane bombers (RAF), and one squadron of Spitfires T/R (RAF) in North AFRICA; and one squadron of Hurricane bombers (RAF) in the Middle East. Detailed composition of these formations is recorded on the accompanying three charts.

5. Intentions. The tasks set for the Tactical Air Force in support of the operation were as follows:

- a. Period up to D - 1 Day.

- i. To assist Strategic Air Force to neutralize the enemy air forces located in Southern ITALY.
- ii. To impose the maximum interference on the movement of enemy forces and supplies inside Southern ITALY and towards the assault area.

- b. Period D - 1 Day. As in sub-paragraph a above, and, in addition, to provide Coastal Air Force with such fighter assistance as was required for protection of the "Avalanche" convoys.

- c. Period from First Light D Day and Establishment of Bridgehead.

- i. To provide protection by day and night for the assault beaches and shipping lying off them.
- ii. To prevent the movement of enemy forces and reserves in and to the assault area.
- iii. To provide the assault forces with direct support during their loading and subsequent operations.

XII AIR SUPPORT COMMAND

64th Fighter Wing

1st Provisional Fighter Wing

27th Bomb Group

86th Bomb Group

31st Fighter Group

33rd Fighter Group

A-36

A-36

Spitfire

P-40

P-51

16 17 91

309 310 311 312

307 308 309

58 59 60 99
(Sep)

111

(RAF)

(Detached from NASAF)

322 Wing

324 Wing

1st Fighter Gp

14th Fighter Gp

82nd Fighter Gp

Spitfire

Spitfire

Mosq

Beau

P-38

P-38

P-38

81 152 154 232 242

43 72 93 111 243

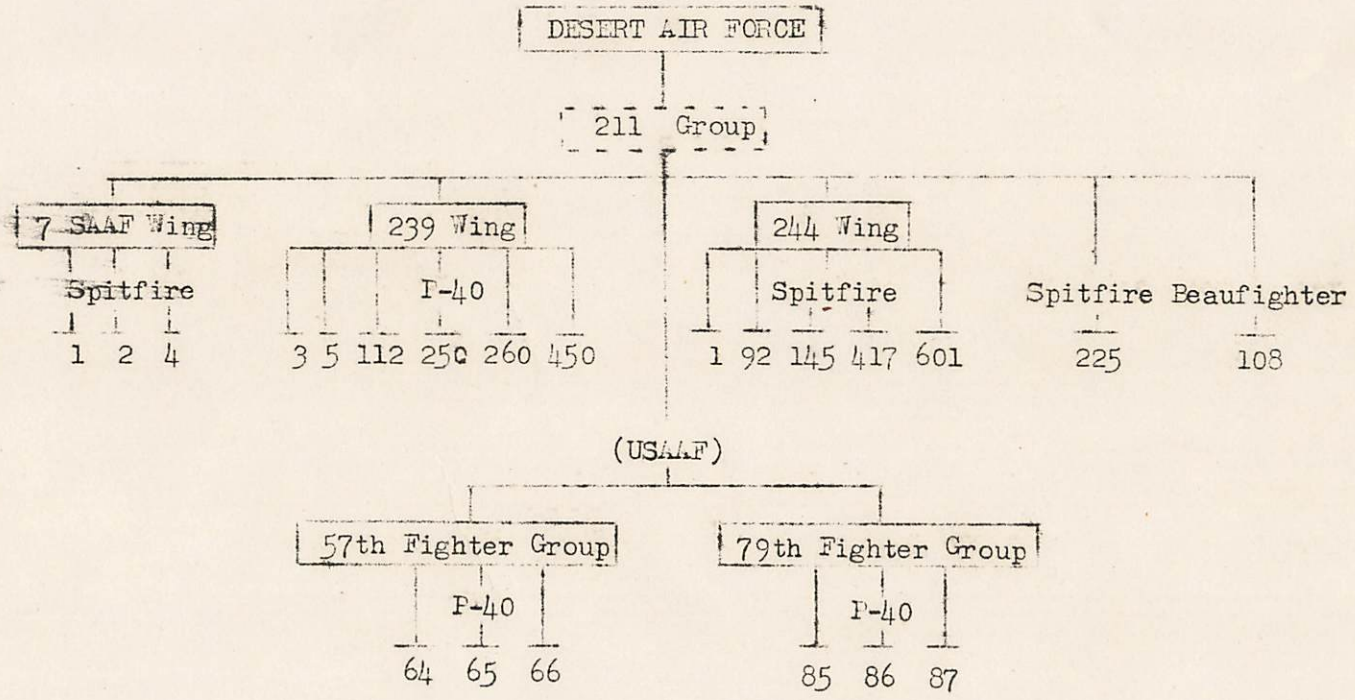
23

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27 71 94

37 48 49

95 96 97



TACTICAL BOMBER FORCE

(Under operational control of XII ASC)

(Under operational control of DAF)

12th Bomb Group

B-25

81 82 83 434

340th Bomb Group

B-25

486 487 488 489

47th Bomb Group

A-20

84 85 86 97

232 Wing

Baltimore

55 223

3 SAAF Wing

Bost Belt Bost

12 21 24

326 Wing

Boston

18 114

6. Specific tasks were allocated to the subordinate formations of Tactical Air Force as follows:

a. XII Air Support Command.

- i. XII ASC was responsible for the operational control of all fighters and fighter-bombers from D - 7 onwards. It was planned for XII ASC to retain control until the area of operation was so increased in size that a second control would become necessary.
- ii. XII ASC was responsible for the protection of follow-up convoys within 40 miles of ITALY.
- iii. TAF was responsible for the protection of the assault convoys from first light on D Day. This responsibility was delegated to XII ASC which organized the fighter forces employed in protecting these convoys. For this purpose, use was made of the three P-38 and two A-36 Groups which were available, and also of Spitfires fitted with 90 gallon tanks to provide top cover.
- iv. The scale of fighter protection to be provided over the beaches was determined by XII ASC. The plan was so regulated that maximum cover was provided until such time as fighters could be established ashore. In this connection, the air situation was watched carefully, in order that the number of aircraft detailed for this defensive role could be reduced as early as possible, and the effort diverted to offensive tasks.
- v. The decision to despatch units to operate in ITALY was made by XII ASC as airfields became available. Before making these decisions, XII ASC was satisfied that the Army was sufficiently firmly established to ensure reasonable security.

b. Desert Air Force.

- i. DAF was responsible for the air effort in Operation "Baytown".
- ii. DAF exercised operational control over Tactical Bomber Force under direction of Tactical Air Force up to D Day. After D Day, the greater part of TBF was turned over to XII ASC. Operational control of No. 232 Wing and the 47th Bombardment Group was retained by DAF.

iii. DAF and 4q. MALTA were responsible for the protection of convoys during "Avalanche" on the south and east coasts of SICILY.

c. Tactical Bomber Force.

i. TEF was allocated to the operational control of DAF from D - 8. Prior to D Day, TEF's bombing program was co-ordinated with Strategic Air Force. During this period, therefore, TEF remained under one centralized control which was exercised by TAF through DAF and worked in the same way as during the last stages of "Husky".

ii. Once the assault was launched, TBF shifted from strategic to tactical targets. Consequently, a part of TBF was allocated to XII ASC and a part to DAF as follows:

<u>XII Air Support Command</u>	<u>Desert Air Force</u>
326 Wing	232 Wing
3 SAAF Wing	47th Bomb Group
12th Bomb Group	
340th Bomb Group	

- iii. Despite this division, the units still remained under the general control of TEF. It was consequently necessary for TBF to establish a small Advanced Headquarters alongside both Advanced XII ASC and Advanced DAF.
- iv. In view of the difficulty of providing fighter escort particularly for attacks in the "Avalanche" area, TEF was prepared to operate its force extensively at night.
- v. Prior to D Day, fighter escorts for bombers operating against Southern ITALY were drawn from both DAF and XII ASC, the over-all requirements being co-ordinated by DAF through No. 1 MORU.
- vi. On the successful conclusion of the assault stage, light bomber effort by day was required for the support of our land forces. Requests for bomber support were initiated by XII ASC and DAF. The Advanced Headquarters of TEF handled these requests and arranged the fighter escort requirements. The Advanced Headquarters of TEF, DAF, and XII ASC required direct W/T communication with TEF Main and the bomber units controlled by them.
- vii. TBF discussed the means to be employed to assist the

recognition of our ground forces with the Fifth and Eighth Armies to ensure that all visual signals were known to the flying crews of TBF.

7. Control of Fighters. Previous to the execution of the operation, the following general procedures were decided upon in the field of fighter control:
- a. It was decided that up to D Day, all fighters in northeastern SICILY would be controlled through one central operations room. This was to be exercised by DAF through No. 1 MORU, but in order to assist No. 1 MORU to control fighters and fighter-bombers belonging to XII ASC, 64th Fighter Wing would detach two controllers to work alongside them. DAF would also provide sufficient R/T channels to enable these controllers to direct their own aircraft.
 - b. On and after D Day it would not be practicable to control fighters operating over the "Avalanche" area from SICILY. XII ASC, however, would establish a dispatching agency to ensure that adequate fighters and fighter-bombers were detailed to cover the assault area. From and including D Day onwards, therefore, DAF (through No. 1 MORU) would not exercise any control over the XII ASC fighters.
 - c. On arrival in the assault area, these fighters would come under the control of a Headquarters ship, until such time as the 64th Fighter Wing Forward Control was established ashore and capable of taking over this commitment. To assist this Forward Fighter Control to control the RAF Wings operating under XII ASC, DAF would attach two controllers to the 64th Fighter Wing and provide sufficient R/T equipment to enable them to exercise control over the RAF units.
 - d. In order to ensure continuity of control, the Senior Controller of the Forward Fighter Control and one of the two DAF controllers would be carried in the Headquarters ship and transferred to shore when Forward Fighter Control took over.
 - e. Night fighters operating over the assault area would operate initially from SICILY and would be under the control of XII ASC who were to despatch them according to a pre-arranged schedule. On arrival in the assault area, they would be taken over by the Headquarters ship, which in turn would hand them over to shipborne or land-based GCI.
8. Availability of Airfields and Disposition of Units. As a result of extensive construction work, SICILY was well provided with airfields by the time the island was captured. This enabled all units

of Tactical Air Force to be based in the island and, at the same time, it was found possible to allocate sufficient airfields in the south of the island for the mounting of an airborne operation.

9. As the fighters would be operating over the assault area at maximum range, it was essential that they be based as far north as possible. The only suitable area for the construction of airfields in the north was the MILAZZO peninsula, and five additional airfields were constructed there.

10. Co-operation with Strategic Air Force. The whole effort of the Strategic Air Force was allocated to the support of the operation. Up to D Day, the general plan was to neutralize the enemy air forces in the battle area and to disrupt communications throughout the whole of ITALY.

11. Strategic Air Force also placed under control of Tactical Air Force from D - 3 Day, three F-38 Groups. These were needed to supplement the fighter force available for the protection of shipping and the assault beaches, during the opening phases of the operation. They also carried out fighter-bomber missions later. SAF established a small Headquarters echelon to work alongside Hq. XII ASC and to assist in the control of the F-38 Groups.

12. Air Transport. All transport aircraft for Air Force and Army use were under the command of Northwest African Troop Carrier Command and No. 216 Group. Up to D Day, all air transport requirements were met by No. 216 Group only, but from D Day onwards, Troop Carrier Command undertook to meet additional tactical requirements, involving the transport of airborne forces and their maintenance after landing, calling for up to 90 aircraft a day.

13. Transport aircraft operated into the forward zones only when called for by the local air commander, that is, either CG, XII ASC, or ACC, DAF. The local air commanders were also responsible for co-ordinating the demands for air transport by all services in their areas and for the routing and protection of the transport aircraft. When conflicting requirements arose, or demands were too great for the aircraft available, No. 216 Group referred the matter to TAF, which, in conjunction with 15 Army Group, decided upon priorities. All transport aircraft returning from the operational zone carried casualties for evacuation.

14. Plans were also prepared for the dropping of airborne forces in the VOLTURNO valley on the night of D - 1/D Day, but this operation was cancelled. However, a successful airborne operation was carried out on the nights of 13/14 and 14/15 September, when a part of the 82nd Airborne Division was dropped as reinforcements in a threatened zone in the beachhead.

PREPARATORY PERIOD (31 August - 8 September)

15. Ground Situation. At first light on 3 September, Allied troops made their first landing on the soil of the mainland of Europe when British and Canadian troops of the Eighth Army crossed the Straits of MESSINA and entered REGGIO. Little initial opposition was encountered; in fact, the invading forces were greeted by Italians waving white flags on the hills and beaches. REGGIO airfield was occupied by mid-day, and that night forward troops were in SCILIA. On the following day, commandos successfully landed at BIGNARA, and linked up with the advancing troops, who were unopposed as they entered BOVA and DELLANOVA. Contact with the Germans, who were drawing back to positions further north, was slight, with the exception of occasional encounters with enemy demolition parties, as at ROSARNO, which was captured on the 7th. Another bridgehead was established on 8 September at PIZZO in the face of enemy shelling; the invading troops here promptly linked up with those steadily advancing from the south at VIBO VALENTIA.

16. Weather. In the period 1 through 4 September weather was fair with light westerly winds and good visibility, although haze developed in the afternoons. Such conditions were favorable to the operations carried out in the toe of ITALY. On the 5th and 6th showers broke out on the north coast of SICILY. These, while local, were heavy and capable of bogging airfields, thus making them unserviceable and grounding aircraft when operations demanded a complete state of readiness. It was therefore arranged that special warning conditions likely to effect the airfields on the northern coast of SICILY and render them unserviceable would be passed to the SASO, Hq. NATAF, for action as considered necessary. As these warnings were of the greatest importance at that time, appropriate dispositions were made to render them as effective as possible.

17. Action by Strategic Air Force. The Strategic Air Force had been attacking aerodromes and lines of communication in ITALY throughout the summer. At the end of August these attacks were intensified and concentrated in the areas from which German opposition to the SALERNO landings were to be expected. The primary objectives were the enemy air force and lines of communication. A series of attacks on the German fighter bases at CAPUA, CAPODICHINO and the two GRAZZANISE landing grounds began on the night of 3/4 September, and during the following days the bomber bases at VITERBO and FOGGIA were well covered. The attack on lines of communication involved heavy bombing of marshalling yards at VILLA LITERNO, GROSSETO and BATTIPAGLIA, as well as attacks upon bridges and road and rail bottlenecks both in the SALERNO - NAPLES and in the Eighth Army areas. On September 8th the Strategic Air Force made a heavy attack with 131 B-17's on the German Headquarters at FRASCATI, south of ROME. The result of all these attacks was to reduce the German fighter strength in the immediate battle area and to hamper his communication and supply at a critical time.

Every night during this period sorties were made by Wellingtons dropping leaflets over the Italian cities.

18. Action by Tactical Bomber Force. The Tactical Bomber Force had the double task of supporting the Eighth Army's advance up the toe of ITALY, and at the same time co-ordinating its attacks by night and day with those of the Strategic Air Force upon targets affecting the SALERNO landings; the only limiting factor on the scope of TBF operations being the lack of long range fighters for escort duty.

19. Among the targets of support for the Eighth Army's advance were the marshalling yards at COSENZA and CATANZARO, the aerodromes at CAMIGLIATELLO and CRCTONE, and German gun positions up the Toe. As the situation actually developed, the Eighth Army met little opposition initially, and the effort of the Tactical Bomber Force turned towards attacks upon airfields and lines of communication in the SALERNO area in co-ordination with the Strategic Air Force. Thus CAPUA VETERE, BATTIPAGLIA, AVELLINO and AVERSA received the attention of B-25's and A-20's as well as heavy bombardment. In night operations pathfinders drawn from selected crews in TBF were used with success.

20. Action by Desert Air Force. The fighter and fighter-bomber strength of Desert Air Force was confined mainly to close support for the Eighth Army in its advance up the toe of ITALY. This began with the landing of Canadian and British troops on the beaches in the Straits of MESSINA at first light on 3 September. The fact that the enemy had pulled out and was awaiting attack at SALERNO reduced this commitment considerably.

21. Action by XII Air Support Command. During preparation for "Avalanche", the XII Air Support Command, occupying five new fields around MILAZZO, and receiving two Spitfire wings and three P-38 groups as re-inforcement for the assault period, operated on a lesser scale (mainly with the two A-36 groups) while gathering its force for the SALERNO attack.

22. Enemy Air Opposition. Fighter defense of the German aerodromes and communication centres was on a limited scale during this period. Of fifty bomber formations from the Strategic Air Force, only sixteen were attacked by enemy fighters; ten formations saw enemy fighters which failed to attack, and twenty-four saw no enemy fighters at all. The heaviest fighter opposition came at FOGGIA on 7 September and at FRASCATI (over German Headquarters) on 8 September. Operations of the Tactical Air Force in support of the Eighth Army's advance (Operation "Baytown") encountered little opposition. Enemy fighter aircraft were seen on a good many occasions but usually avoided combat. Conservation of the Luftwaffe's limited resources for a test at SALERNO was apparent. VITERBO, GROSSETO, TRUINIA and the FOGGIAS were active; other fields near NAPLES - SALERNO became unserviceable after our attacks.

23. The enemy kept up reconnaissance by fighter and bomber types over our ports, our convoys and the western approaches to ITALY, averaging seven bomber-reconnaissance planes by day and three by night, with about seven fighter reconnaissance sorties daily. Several fighter-bomber raids in the Straits of MESSINA took place early in September, doing no damage. On 6 September three waves of German bombers attacked BIZERTE and FERRYVILLE beginning at 2040 hours, at twenty minute intervals. Five of these were destroyed by night fighters and four by AA. On the night of 8 September, after the announcement of the Italian Surrender, the "Avalanche" convoy was attacked in the Tyrrhenian Sea for the first time, and our night fighters (controlled by GCI's installed on LST's) claimed four JU.88's, one He.111 and one unidentified enemy aircraft destroyed during the seven attacks.

24. Statistics. During the period from 31 August through 8 September the following air effort was expended by Tactical Air Force units:

a. Total Sorties.

i. Tactical Bomber Force

Day 1141
Night 235

ii. Desert Air Force

Fighters 2228
Fighter-Bombers . . . 702
Tac/R and P/R 96

iii. XII Air Support Command

*Fighters 153
Fighter-Bombers . . . 309
**Night-Fighters . . . 106

*Includes 113 sorties of P-38 from NASAF on 6 September temporarily under control of XII ASC.

**600 and 108 Squadrons throughout; 23 and 415 Squadrons after 5 September.

b. Losses. Operational Only.

	<u>Destroyed</u>	<u>Damaged</u>
A-36	2	1
B-25	2	2
P-40	-	1
Baltimore	-	8
Boston	-	4
Kittyhawk	1	1
Spitfire	4	-

c. Claims.

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
Do.217	2	-	-
Fw.190	7	-	1
Ju.88	1	-	1
Ma.200	-	-	1
Ma.202	7	1	-
Me.109	<u>8</u>	<u>1</u>	<u>3</u>
	25	2	6

THE ASSAULT AND ESTABLISHMENT OF THE BRIDGEHEAD (9 - 17 September)

25. Ground Situation. D Day for operation "Avalanche" was 9 September. H hour was at 0330 hours. The assault stage can be considered to have been prolonged until 17 September, when the bridgehead was secured and the German counter-attack of 13 September was finally liquidated.

26. The landing took place as planned, but there was no tactical surprise; the Germans had been waiting attack on these beaches for about two weeks. The Italian armistice, signed on 3 September and announced on the evening before the attack at SALERNO (8 September) guaranteed that there would be no Italian opposition, but the Germans were in good positions all around the Bay of SALERNO and needed no Italian help. Divisions identified during the first few days of combat included the 16th and 26th Panzer Divisions, the 29th and 15th Panzer Grenadier Divisions, and elements of the Hermann Goering and 3rd Panzer Divisions.

27. Under command of Lieutenant General Mark W. Clark, Commanding U.S. Fifth Army, the British 10 Corps and American VI Corps made their assault landings with the SELE River as the dividing line between them. It soon appeared that the German resistance was strong enough to inflict losses and impose a speed-up of the scheduled re-inforcements. The VI Corps captured PAESTUM and the main road in both directions -- to the SELE River on the north and to AGROPOLI on the south. The 10 Corps captured SALERNO on the morning of D plus 1 (10 September) and also captured MONTECORVINO and BATTIPAGLIA, losing them to enemy counter-attack on 13 September. The beachhead carved out on 9 and 10 September was about twenty miles long and ranged in depth from three to seven miles. The Germans were in strength on hills commanding the MONTECORVINO airfield and, in general, the whole beachhead. Their artillery was not strong enough to take full advantage of this commanding position. The weakness of our position was most marked at the area near the SELE River, where the two Army Corps joined. Perceiving this, the enemy launched his counter-attack on 13 September and penetrated almost to the sea.

28. To counter this serious threat, reinforcements were brought

in by air on the nights of 13/14 and 14/15 September. All available force of the VI Corps had to be moved north of the SELE River towards BATTIPAGLIA to stop the Germans, leaving the mountain passes to the south and southeast very weakly held by engineers and other non-combat troops. A pincer movement by the Germans above and below the VI Corps seemed imminent. It was decided to drop the 82nd Airborne Division (American) behind our own lines on lighted drop-zones, to take up the positions most endangered (AGROPOLI, OGLIANTO, CAPACCIO, ALBANELLA). This division established contact with the advance patrols of the Eighth Army at SAFRI on 16 September. The paratroop operation, carried out by the 52nd Troop Carrier Wing in C-47's and C-53's took place in brilliant moonlight, a pathfinder force being dropped first with Eureka beacons and other navigational aids. It was at least two-thirds successful, the exception being the regiment (509th) dropped at AVELLINO in a mountain valley which proved difficult to find.

29. From the air point of view the most disadvantageous circumstances in the whole assault was the failure to capture MONTECORVINO airfield on D Day, and the fact that even after it was captured it remained under German shellfire for some days. This compelled the quick construction and use of temporary landing grounds in the beach areas, the first of which was ready by the afternoon of D plus 1.

30. Weather. Weather from the 7th to the 17th was mainly fair with light winds, though from the 10th to 17th hazy visibility developed. Apart from a temporary increase in medium cloud on the 10th most of the cloud was above 20,000 feet; small amounts of low cloud only occurred during this period.

31. Convoy Protection. The Coastal Air Force assumed responsibility for protection of the "avalanche" convoys by day and night up to last light on D - 1 (8 September). From then on fighter protection was controlled day and night, by XIII Air Support Command. Shipping in the assault area was protected as follows:

- a. 2 Squadron of P-38's from first to last light.
- b. 1 Squadron of A-36's from as early as possible until as late as possible.
- c. 1 Squadron of Spitfires from 0800 hours to 1800 hours.
- d. 1 Squadron of Seafires (Carrier borne) from as early as possible until 0800 hours, and from 1800 hours until as late as possible.
- e. Carrier borne aircraft also maintained standing patrols as long as possible over the northern flank of the assault area throughout the day.

32. Fighter Cover Over the Assault Beaches. The first problem presented to the Air Force during the preliminary stages of the invasion of ITALY involved keeping as strong a fighter cover as possible over the assault beaches south of NAPLES between CAMPANELLI and LIOSI Point from dawn on the day of the landings until such time as landing grounds were established in that area on which fighters could be based.

33. From last light on 8 September XII ASC assumed the responsibility for continuous protection of the "Avalanche" convoy and landings, day and night. In order to meet the requirements for fighter cover it was decided that a force of 12 A-36's as low cover, 24 P-38's as medium cover, and 12 Spitfires as top cover, would be maintained over the area throughout daylight hours. The distance from the assault beaches to the nearest airdrome in SICILY was 150 miles. The A-36's and P-38's with the aid of long range tanks were to fly to this area and maintain a one hour patrol. Spitfires with 90 gallon long range tanks were scheduled to patrol the area for 25 minutes before being relieved. One group of P-38's and one group of A-36's were trained to land and take-off at night and were therefore able to patrol at first and last light. One squadron of Seafires from four British escort carriers were to be in position over the area as soon as possible after dawn until 0830 hours when the land-based Spitfires would take over. In the evening the Seafires relieved the Spitfires at 1830 hours and patrolled until as near dusk as possible. In addition, two Beaufighters were on continuous patrol at all hours at night.

34. The Spitfires available included ten British squadrons (Nos. 332 and 324 Wings) and three American squadrons (31st Fighter Group); the P-38's were the nine squadrons of the 1st, 14th, and 82nd Fighter Groups, temporarily assigned from NASAF. It was the responsibility of the 64th Fighter Wing to assign each flight to a specific patrol line, which was maintained at specific altitudes unless circumstances induced the Fighter Controller in the battle area to order otherwise. The fighter cover was in principle assigned as follows:

<u>Type</u>	<u>Altitude</u>	<u>Patrol Line</u>
Seafires	12,000 - 16,000	North flank (SALERNO - CAPRI - west)
Spitfires	16,000 - 20,000	SALERNO - AGROPOLI.
P-38	10,000 - 14,000	CAPRI - SALERNO and AGROPOLI - PISCIOTTA.
A-36	5,000 - 7,000	SALERNO - CAPRI and SALERNO - AGROPOLI.

35. HMS ANCON along with the ULSTER QUEEN was the first control in the area, and GCI and a land based control were set up as soon as was possible. The ANCON did not pass much useful information for the simple reason that she did not get it. However, the night fighters found the sea borne GCI most accurate although their control eastwards over land was restricted due to the high hills.

36. Everything went according to plan and very little enemy

action in the air was encountered on the first day. However, resistance increased more and more on the second, third and fourth days, and a group of Mustangs which had been strafing very successfully in the LAURIA sector was called in to stiffen the patrols. This was more than enough for the enemy encountered.

37. The enemy would not fight unless he had to. He was often seen but too far away to engage, his habit being to hang about the outskirts of the battle area where the Spitfires could not pursue him owing to lack of gasoline. When he did come in, he came in small numbers and was effectively dealt with. It was found that the Spitfires were able to go into the area ten minutes before their patrol time and sometimes increase the same mission by a further ten minutes. It is considered that in the future they will be able to maintain a set thirty minutes instead of twenty-five minutes on such an operation at that distance. Furthermore it is certain that they could maintain a ten minute patrol as far as 220 miles from base.

38. Very few snags were encountered. It was feared at one period that there would be a shortage of 90 gallon jettison tanks because the Army was behind schedule and the aircraft could not be flown into the Italian mainland as quickly as had been planned. However, there was little reason to jettison on the first day and supplies proved ample. All P-38's and A-36's had plenty of gasoline for their lengthy missions.

39. It was found that pilots became very fatigued in coping with such long patrols over an extended period. They themselves would have preferred four short trips involving the same length of time or even longer, than two long patrols. The cockpits of the A-36 and P-38 are larger and more comfortable than that of the Spitfire but on the other hand their patrols were correspondingly longer. It is felt that the accidents which occurred were due to pilot fatigue.

40. Night Fighter Operations. The Beaufighters for this operation were controlled from GCI's mounted in LST's, a system which had been tried out for the first time in the invasion of SICILY. The 600th and 415th Squadrons, operating from MILAZZO during this period, gained successes which may be measured by the following table of results:

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
8/9 Sept.	4 Ju.88 1 He.111 1 u/i e/a	-	1 He.111
9/10 Sept.	1 Ju.88	1 He.111	
10/11 Sept.	1 Ju.88 1 He.111		
11/12 Sept.	2 Ju.88		

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
12/13 Sept.	1 Ju.88 1 He.111	-	1 He.111
13/14 Sept.	1 Ju.88		
16/17 Sept.	2 Ju.88	1 Do.217	

41. Bomber Support. The whole bombardment strength of the air force, Strategic Air Force as well as Tactical Bomber Force, was applied to support of the Fifth Army on remarkably close terms when the crisis arose. In the first five days (up to and including 13 September) the targets taken by these forces were of indirect support, including railway junctions, communications bottlenecks and lines of supply (FORMIA, BENEVENTO, CAPUA, CANCELLO, MIGNANO, FROSINONE, etc). The closest they came to the battle area was on 13 September, when Strategic bombed at TORRE DEL GRECO and POMPEII. On 14 September, however, after the serious German counter-attack had taken place, both Tactical Bomber Force and Strategic Air Force came into the battle area with withering attacks (14 - 15 September) on BATTIPAGLIA and EBOLI and the roads near these towns, directly in front of our troops. The success of our own counter-attacks on 17 September was in large measure due to the devastating effect of this bombardment. It was also immensely encouraging to our ground forces, during the critical time on 14 - 15 September, to see in very plain view this powerful bludgeoning of the enemy. While attacks on road movement, bridges, railroad junctions and other communications targets further back did not give the Armies such a dramatic spectacle, they undoubtedly contributed to the difficulties which forced the Germans into beginning their slow withdrawal northwards.

42. Enemy Air Opposition. During the whole of this period the German Air Force available in the area seems to have been saved for attack upon our shipping and, to a lesser extent, on our ground forces. Little or no defensive activity was observed. The attacks on shipping were distinguished by determination and resource rather than by numbers. Small formations (four to six) of Me.109's and Fw.190's were used, and equally small groups of Ju.88's, He.111's and (after two days) Do.217's.

43. The defection of the Italian Air Force, and perhaps also motives of economy on the part of the Germans, made the enemy air attack numerically inferior to what had been expected. Enemy fighter-bombers (Fw.190 and Me.109) attacked ground forces on the beach five times on the morning of D Day, while Do.217's attacked shipping. The Germans abandoned any attempt at defensive fighting, allowing our missions to proceed almost unmolested (except where fighter craft were already airborne for other purposes and encounters occurred). They concentrated upon offensive tactics, taking every advantage of speed and cloud cover so as to make quick hits and escape when possible. Most of the attacks, even on shipping, were made by fighter-bombers, but bombardment aircraft in small formations were also used. On 11 Sept.

the radio-controlled bomb FX was used for the first time in a successful attack upon the U.S. cruiser SAVANNAH. FX and the smaller radio-controlled bomb HS.293, were reported in use repeatedly from then on, but their actual use was more restricted than the Army and Navy believed. As was determined by the interrogation of prisoners, some at least of the Do.217's using these bombs were from KG 100 at ISTRES. Fighter patrols engaged attacking aircraft repeatedly throughout the period, and in spite of the damage inflicted upon the USS SAVANNAH and HMS WARSPITE, it cannot be maintained that the radio-controlled bombs were a success. Our fighters destroyed three enemy fighter-bombers on D Day, eight on 10 September, nine on 11 September, three on the 12th, and six on the 13th, besides those counted as probables or damaged. On 13 September four Do.217's were destroyed; on the 15th eleven enemy fighter-bombers were certified with fifteen more probably destroyed or damaged. There can be no question that a determined effort was made against the shipping in SALERNO Bay, even though the daily average of German sorties was not much above a hundred. The success was relative (thirty ships out of many hundreds received real damage) and the losses incurred were heavy; from 17 September, when the Fifth Army's reinforced attack secured the bridgehead, German air activity declined, although it did not give up sporadic attempts on the SALERNO area until the capture of NAPLES.

44. Statistics. The effort of Tactical Air Force during the assault stage can be statistically summarized as follows:

a. Total Sorties (last light 8 - last light 17 September).

i. Tactical Bomber Force

Day 528
 Night 806

ii. Desert Air Force

Fighters 546
 Fighter-bombers . . . 993
 Tac/R 107

iii. XII Air Support Command

Fighters 3680
 Fighter-bombers . . . 3252
 Night-fighters . . . 208
 Tac/R 134

b. Losses, Operational only.

	<u>Destroyed</u>	<u>Damaged</u>
A-36	6	4
B-25	5	7

	<u>Destroyed</u>	<u>Damaged</u>
P-38	10	-
P-40	5	-
Mosquito	2	-
Spitfire	<u>11</u>	<u>1</u>
	39	12

c. Claims.

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
Do.217	5	1	1
Fi.156	1	-	-
Fw.190	32	14	14
He.111	3	1	4
Hs.59	1	-	-
Ju.52	2	-	-
Ju.88	14	-	-
Ma.202	-	-	1
Me.109	18	2	7
u/i	<u>1</u>	<u>1</u>	<u>-</u>
	77	19	27

EXPANSION OF THE BRIDGEHEAD AND THE CAPTURE OF NAPLES

(18 September - 1 October)

45. Ground Situation. The Fifth Army's attack upon the Germans, 17 September, came just when the Eighth Army was moving up into position in the center and the east. (Patrols of the Fifth and Eighth Armies had met on 16 September at SAIRI). A withdrawal from the German positions on the right flank of the Fifth Army was therefore to be expected, even without the vigorous attack which that Army, now strongly re-inforced, undertook beginning 17 September. This attack wiped out the enemy salient between the SELE and CALORE Rivers and captured the ruins of BATTIPAGLIA (17th) and EBOLI (18th). Against very stubborn opposition the Army slowly began to push through the pass at CAVA DEI TIRRENI on the road to NAPLES. The Eighth Army meanwhile had made brief contact with the enemy at GIOIA DELL COLLE and MATERA on 20 September, but the Germans extricated themselves and continued to withdraw northwards. CAPRI, ISCHIA, PONZA and the other islands in the approaches to NAPLES had been occupied by the Navy, MAIORI and the AMALFI road by the Rangers, leaving the task of clearing the main CAVA - NAPLES road to the Fifth Army. Naval bombardment had been of great assistance on 14 - 15 September when the battleships shelled BATTIPAGLIA and EBOLI; it was of great help again at CASTELLARE.

46. The British Navy and the First Airborne Division had taken possession of TARANTO on D Day; ground patrols occupied BRINDISI on 11 September and BARI on 14 September without opposition. This put the heel of the peninsula, with its airfields, under Allied control, and insured that as soon as the Eighth Army could move into position

there would be a line formed SALERNO to BARI, an accomplished fact by 21 September.

47. The Fifth Army's progress was slow and much impeded by mining and demolitions, but it was steady. The attack on the passes between SALERNO and NAPLES began on 23 September. Hills above CAVA DEI TIRRENI were occupied on 24 September. The German opposition was stiff, and progress necessarily slow in the rugged high country on the edge of the NAPLES plain. Heavy fighting in the AVELLINO area was carried on against considerable German strength, including armor. SCAFATI, CASTELLAMARE and POMPEII were all occupied on 28 September as the hill country was passed and the Germans accelerated their withdrawal. AVELLINO fell on 30 September, and the following day, 1 October, the first elements of the Fifth Army entered NAPLES. The capture of this city, with its very important port and its airfields, had been the designated objective of Operation "Avalanche".

48. Meanwhile the Eighth Army had pushed on in the eastern zone, entering BARLETTA on 25 September, FOGGIA on 27 September and LAN-FREDONIA on 28 September. The capture of FOGGIA plain, with its nexus of landing grounds already in existence and its possibilities for further development, was one of the main objectives of Operation "Baytown". The Fifth and Eighth Armies now met and consolidated their positions across the peninsula from NAPLES to FOGGIA, and were ready to exploit these successes in a further campaign.

49. Weather. From the 18th September cloudy conditions with thunderstorms over the sea spread slowly southwards over the peninsula. At first much of the cloud was above 8000 feet, from 25 September the showers became heavier and the cloud base fell at times to 2000 - 3000 feet over many area in Southern ITALY.

50. The remainder of the period from 26 September to the end of October was generally cloudy with many showery days; sometimes these showers were accompanied by thunderstorms which were more pronounced over the sea. Visibilities on the whole were good and although there was much cloud, it was in most cases medium cloud around 8000 feet with patches of low cloud at 3000 feet, the low cloud increasing in precipitation. Only from the 20th to 25th October was there a return of fair or fine weather with small amounts of cloud. During this fair spell, mist or fog occurred locally inland at night and cleared soon after sunrise.

51. Action by Strategic Air Force. The Strategic Air Force during this period engaged in two operations of great assistance to the Tactical Air Force and ground forces. The first lasting three days and two nights, was a counter-air force assault upon the main German airfields. The two CLAMPINOS, CISTERNA/LITTORIO, PRACTICA DI MARE, CERVETERI and VITERBO were the beneficiaries of these attacks, B-17's operating by day and Wellingtons by night. At the same time a very thorough machine-gunning attack by 91 F-38's covered the four

main satellites at FOGGIA. As a result of this counter-air-force operation, 270 enemy aircraft were claimed destroyed or damaged. The second operation of the Strategic Air Force, co-ordinated with TEF, was the bombardment of road junctions, bridges and other bottlenecks to the north and east of NAPLES, with the purpose of putting a ring of road blocks around the city and the German forces, thus helping to force their withdrawal.

52. Action by Tactical Bomber Force. The Tactical Bomber Force continued to operate from SICILY during this period except for the 47th Bomb Group and 232 Wing which moved to GROTTAGLIE and ERINDISI respectively on 27 September in support of the Eighth Army. The force was normally employed in the bombardment of enemy communications and supply, airfields, marshalling yards and troop concentrations. Armed reconnaissance at night proved useful occasionally. Bombing of the enemy front lines close to our own, the type of operation requested at BATTIPAGLIA and EBOLI on 14 and 15 September, was not again necessary during this period.

53. Action by XII Air Support Command. XII ASC had, as its two main tasks during this period, the provision of protective cover for shipping and the direct support of the Fifth Army. As landing strips were completed on the mainland and squadrons moved in from SICILY, the characteristic difficulty of the early stage -- operations at extreme range -- no longer obtained and our fighters and fighter-bombers were able to take full advantage of our great air superiority.

54. The build up of squadrons of XII ASC on the mainland was as follows:

<u>Unit</u>	<u>Date</u>	<u>Progressive Total of Squadrons</u>	<u>Airfield Location</u>
324 Wing RLF	12 Sept.	5	TUSCANO
33rd Fighter Group	13 Sept.	8	PAESTUM
111 Obs. Sqdn	13 Sept.	9	PAESTUM
27th Bomb Group	16 Sept.	15	SELE
322 Wing RLF	16 Sept.	23	ASA
86th Bomb Group	18 Sept.	12	CLPACCIO
31st Fighter Group	16-22 Sept.	18	MONTECORVINO
600 Sqdn. RLF	26-27 Sept.	24	MONTECORVINO

55. Enemy Air Opposition. The enemy air effort diminished as his troops withdrew from the SALERNO and NAPLES area. It consisted chiefly of small-scale operations upon shipping, carried out usually by He.109's and Fw.190's. German long range bombardment was used sparingly and consisted chiefly of Ju.88's in small formations from (in the early stage) FOGGIA and VITERBO. Some Do.217's from the south of FRANCE also operated according to indications from prisoners of war. This bombardment was reduced to negligible proportions at the end of the period under review, as the GAF moved to new fields and regrouped.

56. Statistics. In the last phase of the "Avalanche" operation, from last light on 17 September to the occupation of NAPLES on 1 October, the effort of the Tactical Air Force can be statistically summarized as follows:

a. Total Sorties

i. Tactical Bomber Force

Day 541
Night 171

ii. Desert Air Force

Fighters 1958
Fighter-bombers . . . 961
Tac/R 273

iii. XII Air Support Command

Fighters 1864
Fighter-bombers . . . 1346
Tac/R 180

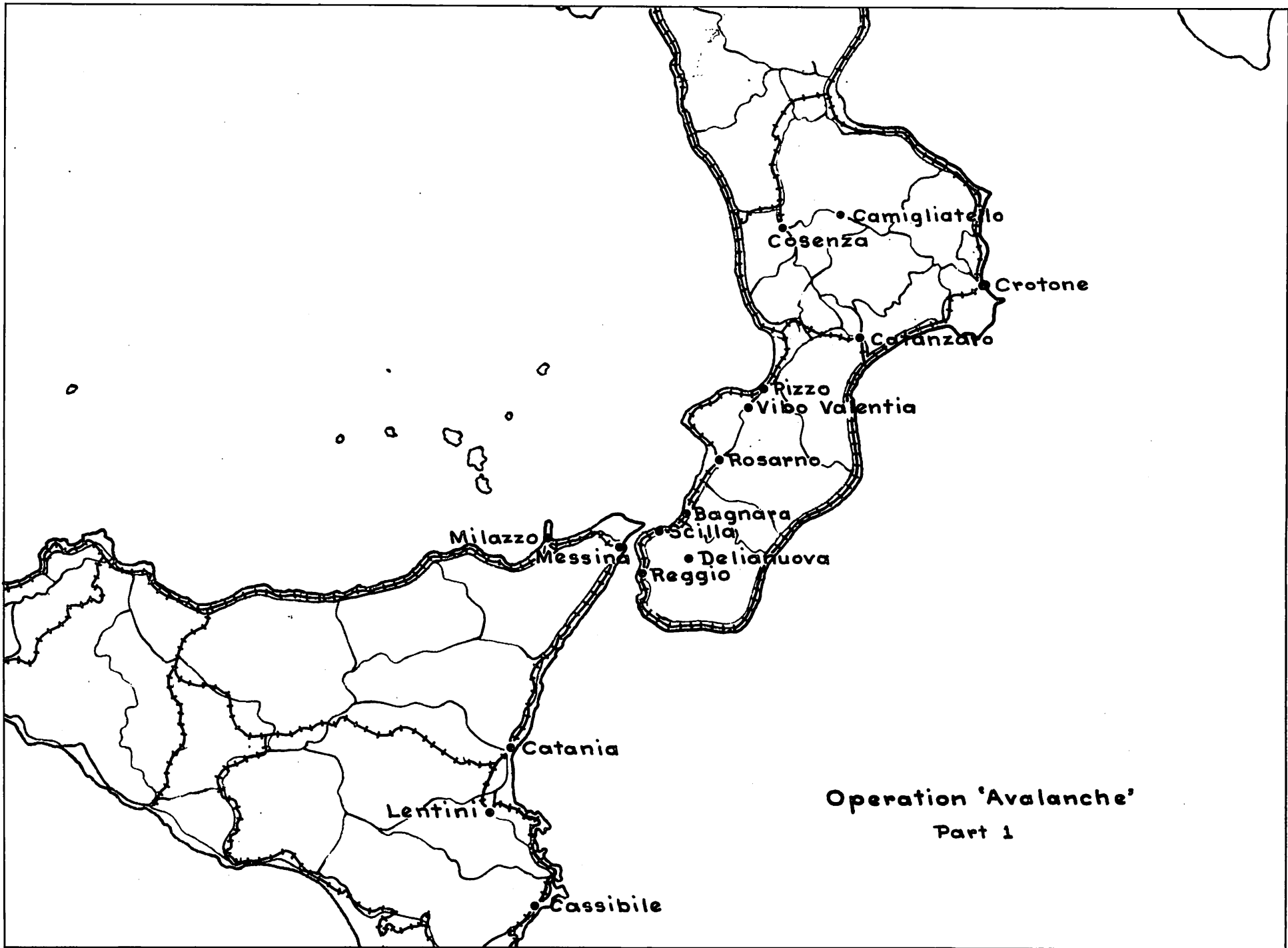
b. Losses, Operational only:

	<u>Destroyed</u>	<u>Damaged</u>
A-36	9	4
B-25	2	1
Boston	3	-
Kittyhawk	3	-
P-40	2	-
Spitfire	<u>3</u>	<u>3</u>
	22	8

c. Claims

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
Fw.190	3	1	3
He.111	-	-	1

	<u>Destroyed</u>	<u>Probable</u>	<u>Damaged</u>
Ju.52	1	-	-
Ju.88	1	1	1
Ju.89	-	-	1
Me.109	1	-	1
Me.210	-	1	-
Me.323	-	-	1
	<u>6</u>	<u>3</u>	<u>8</u>



Operation 'Avalanche'

Part 1



Operation 'Avalanche'
Part 2

PART II

MOVEMENT, SUPPLY, AIRFIELD CONSTRUCTION, AND SIGNALS

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PART II

MOVEMENT, SUPPLY, AIRFIELD CONSTRUCTION, AND SIGNALSMOVEMENT AND SUPPLY

1. Planning. Owing to the short period elapsing between the close of the Sicilian Campaign and the opening of Operation "Avalanche", preparations for the latter were taken to an advanced stage by the A-5 Section of NAAF before the Administrative Staff of Tactical Air Force and XII Air Support Command were consulted. As the NAAF Planning Staff was working on the alternative plans of Operations "Buttress" and "Avalanche" at the same time, ships had to be loaded both with supplies and personnel in TRIPOLI and North AFRICA before the Outline Plan for "Avalanche" was complete. Consequently NAAF A-5 had to take executive action which would in other circumstances have been beyond the scope of his responsibilities. This unavoidable situation resulted in a certain initial confusion as to how much executive action still remained to be taken when the Outline Plan was handed over to XII Air Support Command, a situation which the distance and poor communications between ALGIERS and SICILY did much to aggravate. As a result, the Movements Staff and Beach Units taking part in the initial landing never received detailed information of the allocation of POL and ammunition to ships in the assault and first follow-up convoys, a handicap which might have proved serious if the airfields had become available at an earlier date than proved to be the case.

2. A further weakness in the Movements Plan, which appeared to be due to the necessity of preparing for alternative operations, was that the bulk supplies of POL and ammunition were routed to the VI Corps beaches south of the SELE River, while only a token amount to cover requirements for a couple of days was sent to the X Corps beaches to the north, where MONTECORVINO, the only Italian airfield, was situated. The military plan assumed that the area between the two beaches would be occupied immediately and that petrol could be trucked from the south to the north. This assumption proved to be ill-founded, and it was actually D plus 11 before the main road through BATTIPAGLIA was available for general traffic. A track across the fields joining the areas was opened from about D plus 5, but it was not suitable for load-carrying vehicles. Consequently special LCT loads of petrol and ammunition had to be arranged, occupying the valuable craft at a time when everyone was needed to unload the stores ships. As the latter were tactically loaded with small quantities of all types of supplies, these LCT's could not be loaded direct from the holds, but the petrol had to be trucked from the dumps to the beach, a heavy drain on the available M/T and labor in the early stages of the operation.

3. Embarkation of the Air Forces from SICILY. MILAZZO was chosen as the port of embarkation for the Air Forces because of its proximity

to the forward fighter airfields in the MILAZZO area. Owing to the short notice of the details of the operation no preliminary reconnaissance of the district was made and in any case it was not possible to take into consideration the fact that the local terrain was by nature unsuitable for the embarkation of a large mobile force, there being no clear ground for transit areas or space for the marshalling of vehicles behind the loading points. "Fortbase" was responsible for preparing the area for the movement and due to the shortness of time had not, six days before the first units were due to embark, made any appreciable progress through the agency of Hq. No.151 Sub-Area. The latter Hq. commenced the necessary work upon the arrival of the Air Force Ferry Control Staff which was able to offer expert advice and represent to "Fortbase" the urgency of the situation and make priority demands for engineer services.

4. A serious situation arose when the LST's allocated for the use of the Air Forces from MILAZZO failed to arrive in the port for loading. On 4 September, the Movements Staff Officer of MTF signalled 15 Army Group advising them that the craft had not arrived. The following morning he flew to CASSIBILE to discuss the situation, where he was assured that all was in order and that there was no need to worry. On returning to MILAZZO the same afternoon he sent a further signal stating that the craft had not shown up, and a third signal to the same effect the next morning. On 7 September, 15 Army Group confirmed the fact that the craft had not been detailed, and admitted that it was then too late to obtain replacements which could be loaded in time to catch the planned convoy. Had action been taken on receipt of the first signal on 4 September, the position could have been rectified. The Beach Units from North AFRICA and TRIPOLI arrived about mid-day of D Day, and established Transit Areas before nightfall. Steps taken by 15 Army Group to replace the missing LST's resulted in ten LCT loads arriving from MILAZZO shortly before midnight on D Day.

5. The completion of the original D Day program was not reached until 12 September. On the following day the D plus 1 and D plus 3 personnel arrived, but then the craft were diverted by the U.S. Navy on their own initiative and no further Air Force units were embarked for seven days. Subsequently the ferry program ran smoothly. On no occasion were the craft diverted by the Fifth Army, and the readiness of their G-4 section to help the Air Forces in every possible way was most apparent throughout the operation. However, much trouble would have been avoided if the Fifth Army had sent a senior officer to MILAZZO at the beginning of the ferry program to preside over a Priorities Board. As it was, the X Corps representative was able to obtain a considerably larger lift than had been intended in the original plan.

6. The alteration of the D Day convoy determined Col. Ayling, Chief of Staff of III ASAC to fly in on the afternoon of 9 September instead of travelling by sea as he had intended. Unfortunately, he landed at MONTECORVINO airfield when it had been recaptured by the Germans after having been in Allied hands for a few hours, and he was

killed by the volley of fire which greeted the aircraft when it touched ground. His loss was a most serious handicap to the movements and supply organization.

7. Selection of Essential Units for Initial Landings. The use of landing craft has enabled a large number of men and vehicles to be included in an initial landing and to be got ashore at an earlier hour than was the case when only normal ocean-going ships were used. It has also made possible the initiation of a ferry service ensuring a steady flow of re-inforcements. The fact that a needed unit can thus be quickly moved to a new Theatre of Operations demands that a fresh examination be given to the units which are really essential to efficient air operations during the first few days of a campaign. The Army has learned its lesson, and is willing to make considerable sacrifice to ensure an adequate air cover. Care must be taken that no units are landed across beaches unless they can take an immediate part in the course of operations, or must make urgent preparations for the receipt of tactical air force units. To this end the Priorities Board must judge the situation closely and be prepared to make changes in the planned order of embarkation at any time. In other words the plan must be flexible.

8. Position of Specialist Units for Amphibious Operations. The problem of the employment of the personnel of Beach Units and of the Servicing Commandos during the long periods between successive amphibious operations is one needing immediate solution if a grave injustice is not to be done to the skilled men comprising these units. In both cases the men are required to be above the average mentally and bodily and to be possessed of keenness of mind calculated to enable them to perform arduous tasks in trying and possibly dangerous conditions. For a period of a few days they may be required to operate at intense pressure, but as soon as conditions become normal and the regular organizations take over, they have to face weeks or months of partial or complete idleness. Skilled personnel have no opportunity to practice their specialties and they inevitably become dispirited and out of condition. In both the Sicilian and SALERNO landings "A" parties of the Squadrons were brought in on the same day as the aircraft, so that the Servicing Commandos had little more to do than prepare the airfields for occupation. At the time of Operation "Avalanche" there were eight Servicing Commando units in ITALY, and hundreds of Group I technicians were thus prevented from giving the service of which they were capable, while the Squadrons were kept short of skilled personnel.

9. The change in the shipping position brought about by the use of craft which permits a larger number of personnel and vehicles to be landed in the early stages of an amphibious operation has eliminated the fundamental reason for the original creation of the Servicing Commandos, and it seems possible that their period of usefulness has now passed.

10. Motor Transport. For the first time in a landing it can

be said that the Air Forces had sufficient transportation for their essential needs. An Air Corps Quartermaster Truck Company Detachment was planned to cover the M/T requirements on the American beaches. Their trucks were landed over the British beaches, but as no land communication was possible between the areas until D plus 5, they served to reduce the burden which would otherwise have been carried by the British Division alone. During these first few days the American Division in the southern area supplied the deficiency by lending both trucks and labor until the allocated Service Troops could move south. In the British area the Army moved the POL and ammunition to the dumps satisfactorily and the Servicing Commandos with help from the American Truck Company were able to provide sufficient transport to collect supplies from the dumps to stock the airfields as they became available. This initial stocking did not require a large number of trucks, and the provision of ten trucks of the 3-ton type, shipped already loaded with petrol and ammunition, adequately meets the needs, as was proved by the American Truck Company Detachment. By the time new airfields are prepared and bombs are required, a complete Company or S. and T. Column is necessary.

11. Communications. The passing and receipt of signals to and from the base was again most unsatisfactory. Signals advising the sailing of LST's were not in any single case received until after the arrival and discharge of the craft. Telephonic communication within the area of operations was so unreliable as to be almost completely useless, and the provision of jeeps for key personnel as well as a considerable number of DR's on motor cycles is considered an absolute essential for any landing. The DR's did a very fine job throughout the operation, but it should be borne in mind that a district of narrow roads makes the riding of a motor cycle after dark much more dangerous than any enemy action the rider is likely to encounter. This makes the use of motor cycles after dark unjustifiable except in cases of emergency, and the provision of some jeeps for the purpose highly desirable.

USE OF R.A.F. COMPONENTS OF BEACH GROUPS

12. General. Three Beach Groups had R.A.F. Components for Operation "Avalanche": No. 9 Beach Group with Nos. 68 and 69 Beach Units; NO.21 Beach Group with Nos. 81 and 82 Beach Units, and No.35 Beach Group with No. 35 R.A.F. Component. Nos. 68 and 69 Beach Units were founded on the U.K. establishment with an M/T Light Repair Section forming approximately half the personnel. Nos. 81 and 82 Beach Units were founded on the North African establishment, and No.35 on the Middle East establishment. All three had additional M/T added to them for the operation, which undoubtedly increased the efficiency of their contribution to the execution of the movement. The allocation of one jeep and one three-tonner to each Beach Unit and one jeep for the Squadron Leader at Base Sub-area Hq. proved satisfactory.

13. Disembarkation of Personnel and Supplies. While the bulk

of the supplies was routed to the southern beaches which were manned by U.S. Service Command personnel, the Italian terminal point of the MILAZZO ferry was on the northern beaches, so that nearly all the RAF and USAAF units with their vehicles passed through the British beach organization. The successive arrivals were dealt with expeditiously and the majority of units complied with the instructions that they should report to the Transit Area. In a few cases, units or detachments tried to proceed directly to a location which had been given them in their briefs before sailing, without so reporting. As a result, some followed roads which were dead ends owing to blown bridges, while others were only stopped at the last moment from driving into the enemy lines. In both cases they added unnecessarily to the congestion of traffic on the roads.

14. The total number of personnel and vehicles passing over the northern beaches from D Day to D plus 14 amounted to 136 units comprising 7164 men and 1290 vehicles. The organization functioned smoothly. In every case the airfields were adequately stocked and the ancillary units were in position by the time that the military situation permitted their use, enabling the aircraft to be called forward without delay.

15. Numbers of Personnel Required in Beach Units. It was the unanimous opinion of the Commanding Officers of the RAF Beach Units that the number of personnel in their units, particularly of officers and senior NCO's, was greater than the task required. There had been confusion of thought on this subject due to the chaotic conditions which prevailed in the original landing in North AFRICA. In reality, that operation cannot be compared with the landings in SICILY or at SALERNO, because the whole basis of movement was different. In the first, only MT/Stores ships were used for the conveyance of vehicles, with the result that units were separated from their M/T, which, even if carried in the same vessel as the personnel, took days to complete off-loading instead of the minutes required to discharge an LST. Owing to the weight lifting limitations of ships' derricks, only small amounts of stores could be carried in the vehicles. As a result, each unit had several tons of equipment packed in cases, and labelled only with a code number, all of which had to be landed separately, loaded on trucks, unloaded in a sorting area, sorted for the individual units, and reloaded for delivery. Trucks had to be lifted out of the ships, driven ashore, sorted to units, and parked while they awaited collection. Personnel had to be conveyed or guided to Transit Areas and their heavy kit collected from the ships. Then the relevant personnel, kit, vehicles, and cases of equipment had somehow to be brought together, and dispatched to their destinations. For this colossal task, Movements provided six officers and 44 other ranks,

16. The situation in the SICILY and SALERNO landings was entirely different due to the use of LST's and LCT's. An LST carrying 60 vehicles can be completely discharged in 90 minutes, each unit with

its own M/T, with no kit or equipment except what is loaded in the trucks, ready to drive to a Transit Area, receive its last minute instructions and proceed immediately to its allotted location. For this comparatively simple task, Movements provided in the SALERNO area 21 officers and 167 other ranks. On the old basis of Stores Ships such a staff would have been fully occupied. On the new basis of landing-craft, it was much in excess of the requirement, even when allowance was made for casualties and duplication to cover day and night operations.

17. Representation of R&F Interests at Corps Headquarters. Experience gained during the operation led to the belief that a Movements Officer should be situated with the Movements Staff at Corps Headquarters. From here he would be in operational control of movements on each of the beaches controlled by the Corps. This officer should maintain close contact with the FMLO's of the Divisions composing the Corps both during the planning stage and during the course of the operations. There should be three Air Force officers for each Army Beach Group, one of whom could be usefully qualified "X" though the technical supervision of the ammunition supplies could probably be satisfactorily performed by an officer, so qualified, stationed at Corps but possessed of a jeep for his sole use. Such an establishment would have given a total of 10 officers for the northern beaches of the SALERNO sector.

18. The need of a senior officer who can represent the R&F in any case of dispute which might arise is not questioned in any quarter, and often this duty can be successfully performed by the Movements Officer. But many questions crop up during the early days of an invasion which are outside the sphere of Movements, and a Group Captain or Wing Commander, such as the D.O.A. of the controlling Air Force headquarters, would be able to settle matters on the spot and would provide the necessary rank to put the Air Force case with sufficient force in matters referred to him by his junior Movements colleague. It must, however, be strongly stressed that these officers should land early on D Day so as to be in ready touch with the first units ashore. To be aboard the Command Ship, even though Corps Headquarters is there, does not meet the requirements. The units ashore need personal contact with the officer in authority to settle their queries.

19. Preliminary Training. It is undoubtedly useful that the R&F Component of an Army Beach Group should know the officers with whom they will be working prior to commencement of the operations. The experience at SALERNO, however, showed that if the R&F section joins the Group fourteen days before D Day, the requirement is adequately met. Months of training with the Army Group is not only unnecessary but it is definitely detrimental. Little of the Army training concerns the R&F men who are on the beach as specialists to advise on the correct handling of R&F material and interests. During the Army training period, the Air Force officer sees no R&F equipment and the

"X" officer never handles any R.F. explosives, so that both become rusty in their specialist knowledge and often completely out-of-date.

20. Preservation of the R.F. Components as Integral Units.

The practice of adding R.F. personnel to an Army Group where they were attached to the various sections in small isolated groups proved to be most unsatisfactory, for it made any unit spirit of the Component impossible to foster. Similarly, it proved most undesirable to leave the application for shipping space for the R.F. men in the hands of the Army Beach Group. It resulted in the Air Force men being distributed over several ships, and invariably ended in their M/T being delayed until a time when it was of little service to them in doing their job. No. 35 R.F. Component was so dealt with, and its personnel distributed over five ships, while up to D plus 22, only one jeep of the vehicles intended for their use had been received by them. Both personnel and vehicles of the R.F. Beach Unit should be part of the R.F. shipping bid in the same way as all of the other Air Force units.

21. Treatment of Beach Unit Personnel. Beach Unit personnel are specially selected to undertake what is generally regarded as a dangerous but very necessary function. In return, they did not receive the special consideration which might have been expected, but, on the contrary, suffered from considerable administrative neglect as a result of being nobody's responsibility. There was no promotion for any of the other ranks or reclassification for the aircraft hands. Tradesmen and officers skilled in a particular branch of the service endured weeks of almost complete inaction during which their skill grew rusty or their knowledge out-of-date. They were moved from pillar to post so that their mail failed to catch up with them over long periods, and the officers in particular often suffered considerable financial loss owing to the destruction of their personal possessions as a result of enemy action and the ruining of their uniforms by the conditions in which their work was necessarily performed. An armorer or an explosives officer could not be kept on the top line in his section by supervising the handling of sealed boxes of ammunition, particularly when it is remembered that the ammunition requirements in the early stages of an invasion are of the simplest -- 20 mm and .303 S.M. for fighters and GP bombs for fighter-bombers. The permanent movements and Supply units took over before the more complicated explosives items came into use. Specialized Petroleum Officers were completely unnecessary. As a result of the operation, it was therefore suggested that the policy with regard to the manning of Beach Units required re-examination in the light of recent experience. Personnel could be withdrawn from the M.P.'s and Embarkation Units intended to operate in the captured area, and return to their units immediately the beaches close down as was originally suggested by R.F. ME. The argument that the beaches have not closed down by the time the ports open is not valid, because the work in the ports is reduced in exact proportion to the amount of supplies landed over the beaches and can therefore be handled by a smaller staff.

22. Signals. The provision of W/T sets for each of the Beach Units proved to be a complete failure. In the first place, the operators were not properly briefed or supplied with call signs and frequencies. The sets were not sufficiently powerful to make contact with SICILY and when they tried to contact each other they were ordered off the air by the Command Ship. The sets served no good purpose whatever, and great difficulty was experienced owing to the impossibility of signalling direct to Rear Headquarters and to the Sicilian loading points of the Ferry Service. Good signals communication would have added immensely to the efficiency of the move. The W/T supplied by III ASAC were of some use in the first few days, but were not sufficiently powerful to maintain contact between the beaches.

23. Signposting. One of the most useful contributions which can be made by the Beach Units to the smooth running of an operation is the thorough signposting of an area. Though units should normally be responsible for signposting their own location, the early signposting of such points as airfields, Air Force assembly areas and dumps is invaluable. It was therefore strongly recommended that adequate means of preparing such signs be part of the equipment of every Beach Unit.

24. Appointment of RAF Officer as AMLO. The Commanding Officer of No. 35 Beach Group created an innovation in appointing an RAF officer as one of the three Assistant Military Landing Officers of his Group. The job was a particularly successful one, and such co-operation between the Services goes far to the success of a combined operation.

25. Summary and Recommendations. Lessons learned during Operation "Avalanche" allowed the formulation of the following recommendations in regard to RAF Components of Beach Groups:

- a. Beach Units should have less personnel, particularly of officers and senior NCO's, than the U.K. and M.E. Establishment.
- b. The M/T of Beach Units should not be less in number than on the present operation.
- c. A senior Movements Officer at Corps Headquarters should control the Movements Staff of all the beaches used by that Corps.
- d. Personnel should be drawn from Embarkation Units, ASP's and AP's which are intended to operate in the area and should return to their units when the beaches close down.
- e. Such personnel should not be attached to the Army Beach Groups more than fourteen days before the commencement of the operation.

- f. They should be attached as one integral unit and not as so many individuals. All instructions for them by the CO of the Army Group should be passed through the R&F CO of the unit.
- g. Beach units should be supplied with adequate equipment for the signposting of the theater of operations.
- h. The policy of providing W/T sets should be re-examined to decide whether the sets can be sufficiently powerful to contact the Base and if so whether there is room on the air for them without interfering with messages of greater operational priority. The need for such communication is of the greatest importance and every step should be taken to ensure direct contact between the Senior Movements Officer and the Base.

AIRFIELD CONSTRUCTION

26. Airfields in SICILY. Prior to Operation "Avalanche" it was necessary to construct fields in Northern SICILY to cover the SALERNO area prior to, and during the landings. The only possible area was the MILAZZO peninsula and its environs. Five airfields were constructed there.
27. Type of construction was graded and compacted earth. This proved to be very dusty and therefore attempts were made to counteract this with oil, but this was frustrated partly by lack of road tankers and partly by the very congested lines of communication. These fields were constructed by a U.S. Aviation Battalion which was following up the advance of the Seventh Army.
28. Airfields in ITALY. To meet the planned requirements for "Avalanche", it was decided to send one British Airfield Construction Group and two Companies of a U.S. Engineer Battalion, all under command of the American Deputy Chief Engineer who had one British Air Liaison Officer attached to his staff.
29. These engineers were to land immediately after the initial assault, unloading their equipment as soon as possible, as the whole plan depended upon the construction of one field by D plus 1, two more by D plus 2, and two more by D plus 4, making a total of five airfields in five days. Opposition was heavy and the advance slow, with the result that no mechanical equipment was landed in the British sector until the afternoon of D plus 1, and in the American sector until the night of D Day/D plus 1. One LST was torpedoed with half a Mechanical Equipment Section aboard. Fortunately this was not lost, and the resulting delay in the arrival of the plant did not impede operations in any way.
30. Construction Program. Possible airfield areas were pre-

selected from map study and photo reconnaissance. Recce parties were sent out early on D Day, but as the Army did not penetrate as deeply as had been planned, it was possible to get to only one of these sites, namely PAESTUM. Other pre-selected sites were not used, and all airfields were constructed in the limited area of land that the tactical situation allowed. This meant utilizing sites which would normally not have been considered, as the slightest fall of rain would inevitably have put them out of action immediately.

31. Owing to the limited area available in which to construct airfields, the Engineers were nearly always within enemy artillery range and in several instances the artillery of both sides was firing over the heads of the construction parties. This seems to indicate either that the enemy was not interested enough to shell them, or else that he did not realize what was happening.

32. As the advance was very slow, the airfield construction program was also delayed, with the result that one field was operable by D plus 1, a second one by D plus 3, and a further two by D plus 4. A list of the airfields constructed in the SALERNO area showing the dates of commencement of work and the dates they were operational follows.

Name	Map Ref	Size	Work Commenced	Operational	Remarks
PAESTUM	N851057	1300 x 50 yds	10.9.43	11.9.43	PLS
SELE	N826092	1330 x 50 yds	11.9.43	14.9.43	PLS
TUSCLANO	N765205	1000 x 100 yds	11.9.43	14.9.43	PLS.
MONTECORVINO	N773248	1330 x 330 yds	12.9.43	13.9.43	Grass field
ASA	N733237	900 x 100 yds	12.9.43	16.9.43	PLS
CAPACCIO	N874022	1500 x 50 yds	15.9.43	17.9.43	PLS
SERRETELLE	N801185	1500 x 100 yds	18.9.43	23.9.43	PLS & Grass
GAUDO	N843044	1170 x 33 yds	18.9.43	31.9.43	RSP
BATTIPAGLIA	N855182	1080 x 50 yds	25.9.43	27.9.43	PLS

PLS - Prepared Landing Strip

RSP - Pierced Steel Planking

33. As an example of the phasing of airfield construction and the conditions under which the program was carried out, there follows a short diary of the British 15 Airfield Construction Group.

D Day, 1300 hours - Construction personnel started to land, but slowly.

Night D/D plus 1 - LST with mechanical equipment torpedoed and beached elsewhere.

D plus 1, 1300 hours- 47 vehicles ashore.
1800 hours- Work started on TUSCLANO airfield (farmland site). Enemy only 2000 yards away.

- D plus 2, morning - MONTECORVINO (German ALG) captured.
 afternoon - 150 men, 6 vehicles, 2 angledozers put to work on MONTECORVINO, although enemy only 1000 yards away.
- D plus 3, dawn - TUSCIANO and MONTECORVINO ready for use. Started on ASA airfield (farmland site).
- D plus 4, morning - RAF occupies TUSCIANO although only 1000 yards long and our field guns fire over it.
- D plus 5, dawn - ASA, only 900 yards, finished with dispersals.
- D plus 6, dawn - RAF occupies ASA.
- D plus 9 - MONTECORVINO still not occupied, though ready for five squadrons, as enemy has good observation of it from his line one mile away. Recce made of another site although enemy holds one edge. All sites bad, as subsoil clay and cut into small fields by wet irrigation ditches. Ground rough and needs cross-cutting before longitudinal grading.

34. Summary. Few new lessons were learned during Operation "Avalanche" from the airfield construction point of view, but the following points are worthy of consideration:

- a. Mechanical equipment should be landed early although it is not necessary to bring it in with the first assault as recces have to be made first. It is considered that it should be landed not later than H plus 12 hours.
- b. Communication between the Engineers and the Air Force concerned was good because the Deputy Chief Engineer was able to contact the Commanding General of the Air Forces immediately through the VI Corps Command Ship link thus keeping the Air Force and also the Commanding General of the assault troops right up to date.
- c. It was found that construction can be carried out with apparent safety when within range of enemy artillery.
- d. The combination of U.S. and British Airfield Construction units worked very smoothly, and this was possibly largely due to the combination of a DCE, US, with a British R.F Liaison Officer attached to him.

SIGNALS

35. Planning. In view of the fact that planning for "Avalanche" was begun while "Husky" was still in its final stage and the air forces to be engaged were the same, no complete new plan was drawn up for this operation. It was merely considered as an extension of the operation in progress at the time of the landings in the south of ITALY. The only addition to the standard day-to-day procedure which was necessary was the control procedure from Headquarters and Fighter Director ships for support of the landing. These arrangements were quickly arrived at by representatives of NATAF, XII ASC, and NATAF since only a short time before a similar operation on a larger scale had been carried out against SICILY.

36. Execution. It was found only a short while after the original landings that the scale of communications ashore was not large enough to adequately keep the higher echelons of command informed as to what was occurring on the beach-head from hour to hour. Consequently a B-25 equipped with an airborne EC-610 was flown in to SELE Air-drome on D plus 5 and installed there with remote control lines running to the advanced CP of XII ASC. This particular set was used to keep NATAF and NATAF informed of the progress of the battle and was not used for operational requirements by XII ASC.

37. The use of radar reporting by radio had a kick-back in the operation since the Germans entered the nets and sent false sensings in some cases. This created some confusion over the beach-head in the first few hours before filtering had reached the stage of perfection and caused some misdirection of fighter effort. However, this condition was soon corrected and the fighter support over the beach-head assumed its normal function.

38. Communications Channels. Channels for administrative communications was provided by the XII Air Support Command between its advanced echelon aboard ship, its Command Post ashore, its rear headquarters in SICILY, NATAF, and through these latter two headquarters to NATAF and XII Air Service Command. In addition, arrangements were made for the advance detachment of the Service Command (III ASC) to enter a rear link radio net of the XII Air Support Command for direct communication between it and the advance and rear headquarters of XII Air Support Command. The Service Command detachment, due perhaps to a shortage of radio equipment, did not come in on this net for radio communication. Consequently there was a delay of several days before telephone communication was available between the advance headquarters of XII Air Support Command and the advance detachment of III ASC.

39. It was anticipated that wire communications for administrative communication at the XII Air Support Command rear headquarters at LENTINI would be severely limited by the shortness of time and the facilities available. Every effort was made to supplement these wire facilities by radio, but again equipment and personnel were limited.

40. Conclusions. The functional separation of the Air Support Command and the Service Command was not fully appreciated by the NAF Signal Planning Staff for "Avalanche". This staff provided beach brick signal sections to handle the initial administrative communications on the various beaches. Instead of being offered to the Service Command, they were held for the tactical Air Commander (CG, XII Air Support Command) who had no direct use for them. Consequently these beach brick signal sections were never properly used. Had a closer liaison been less difficult due to the factor of space and time, this omission might have been discovered and corrected. The resulting beach communications could not be considered adequate.
41. The obvious solution to the problem of liaison between the tactical and service units involved in an amphibious operation is to place both under the operational control of a single Air Commander during the planning and initial stages of the assault.
42. In any event, a far closer liaison must be effected in the future between the Signal Planning Staff of the Tactical Air Commander and the Signal Staff of the Service Command for the purpose of evolving a completely integrated tactical and administrative communications system. In this matter, close liaison between the A-4 section and the Communications Office, such as exists between the A-3 section and the Communications Office, would have been of immeasurable assistance.
43. It is not believed that sufficient time was spent in planning for signals during Operations "Avalanche" and as a result many of the things enumerated above occurred which normally would have been foreseen and eliminated. This points out again the necessity of having a planning staff continually on the job prepared at any time to issue directives to lower units as to the scope of future operations sufficiently far in advance to enable them to make the necessary arrangements to meet their new commitments without upsetting their normal operations.

PART III

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PART III

ARMAMENTEMPLOYMENT OF BOMBS

1. Operation "Avalanche" was preceded by heavy air attacks on enemy airfields, strongpoints, railheads and marshalling yards. In the former attacks large numbers of American 20 lb. Fragmentation clusters together with British 250 lb. bombs with pre-impact fusing were used very effectively against dispersed aircraft. When attacking aerodrome buildings the heavier type of Demo bombs i.e. 500 lb. fused 0.10 sec nose and 0.025 tail were found to be most effective. In attacks against railheads and marshalling yards heavy bombs of the 500 lb. Demo type American and British MC or GP were used very successfully in disrupting traffic and caused considerable damage, and from evidence recently obtained it is felt that the attacks were highly successful. The fusing for this type of attack were usually 0.025 secs. delay tail. During the early stages of "Avalanche" considerable air support was given to ground forces by medium, light and fighter-bombers. The chief targets were enemy strongpoints and gun emplacements, and the bomb loads consisted of 500 lb., 300 lb., and 250 lb. British and American bombs which were fused for the most part with short delay 0.025 secs. tail. In attacks against gun emplacements the American 20 lb. Fragmentation Cluster was found to be effective.¹ This also applies to British 250 lb. bomb with pre-impact fusing i.e. No. 44 Pistol. In attacks against bridges by formations of mediums and light bombers and also fighter-bombers, bombs used were the 500 lb. American Demo fused 0.10 secs. nose and 0.025 tail. It has been found that this type of bomb is only effective if several direct hits are obtained on the bridge and then only if the bridge is of light structure. It is felt that the best type of bomb for use against bridges is the American 1000 lb. Demo or the British 1000 lb. MC fused 0.025 tail against small bridges of light structure and 0.10 secs. delay for bridges of a very heavy construction.² Recently P-40 aircraft of XII ASC and DAF have

¹Recent tests indicate that 90-lb fragmentation bombs are more effective than 20-lb. Frags in causing material damage to guns and are proposed for this type target. (Notes in this section added by Chief Armament and Ordnance Officer, Hq. MSTA, March 1945).

²Subsequent experience and bomb damage surveys have indicated the following choice of bombs and fuses to be the most effective:

	<u>Bomb</u>	<u>Fuse</u>
a. Narrow Masonry, Reinforced Concrete or deck type steel truss bridges (less than 22', single track).	500-lb. GP	.1/.01
b. Wide Masonry, Reinforced Concrete or deck type steel truss bridges (more than 22', double track).	1000-lb. GP	.1/.01
c. Overhead steel truss bridges (girders).	1000-lb. GP	.1/ND
d. Overhead steel truss bridges (piers)	1000-lb. GP	.1/.01

carried out such attacks with 1000 lb. Demo bombs satisfactorily, not only against bridges but against enemy strongpoints. In addition to the 1000 lb. Demo bomb these aircraft have also carried 6 individual American 20 lb. fragmentation bombs. These have been very effectively used against gun crews defending the bridges, strongpoints and such targets attacked with the heavier type of bomb.

2. From the commencement of "Avalanche" up to the present period Fighter-bombers have been employed most successfully against troop concentrations and MT vehicles on roads. In these attacks the P-40 aircraft have carried two 250 lb. British GP bombs with pre-impact fusings. The A-36 aircraft of XII ASC carried two 500 lb. Demo bombs Direct Action nose. These bombing attacks have been followed also very successfully by ground strafing.

3. In attacks against harbor installations and shipping, medium, light and in some cases fighter-bombers have been employed. Bombs used were of the 500 lb. American GP and 500 lb. British MC fused either 0.025 secs. or 0.010 secs. delay. In attacks against medium tonnage ships it is considered that the 0.025 secs. delay is the most suitable and that 0.10 delay should only be used against very large ships with four or five decks, otherwise it is quite possible that a bomb fused 0.10 secs. would penetrate and go right through a ship of small tonnage and explode well below the ship without causing serious damage.

4. Night Intruder Light Bomber aircraft from the commencement of "Avalanche" up to the present period have also been employed very successfully against troop concentrations, MT on roads and enemy gun emplacements. The 500 lb. MC bomb was chiefly used, fused 0.12 secs. for gun emplacements. The 40 lb. GP fused pre-impact with 500 lb. MC similarly fused were used against concentrations of troops and MT.¹ Night Intruder "mosquito" aircraft of No. 23 Squadron which carried two 250 lb. British GP bombs with pre-impact fusings did good work against vehicles on roads and against trains. Bombing attacks were carried out in conjunction with ground strafing with 20 mm. cannons. Subsequent surveys indicated that the far greater percentage of vehicles destroyed was due to strafing and not to bombing.

SUPPLY OF BOMBS AND SAA

5. The supply position of bombs, SAA and explosives has proved very satisfactory and adequate stocks have been available at all times. The stocking of airfields in the early stages presented no major problems. It should be noted that for the first time ample stocks of No. 44 and No. 45 Pistols together with appropriate type sensitive detonator for pre-impact fusings were and still are available, and thereby dispensing with the need for the provisioning of rods extension

¹The 20-lb. American Frag bomb has proven much more effective than the British 40-lb. GP.

which have caused some concern, as very often in the past the demands exceeded the supplies available.

6. In the very early stages complaints were received from American units that bombs were received without components, arming wires, fins or fuses. In addition, the wrong type of fins were received for a specific type of bomb, but this problem has since been rectified and the supply situation is now extremely satisfactory. It is desired once again to mention that bombs and tail units are being roughly handled during transit, consequently tail units suffer accordingly, and TBF reported recently that approximately 5% of tail units upon receipt were damaged beyond repair. These facts have been brought to the notice of the ordnance supply depots and RAF Maintenance Units.

TRANSPORTATION OF BOMBS

7. In spite of better working conditions at present being experienced in this country, it is considered that the type "B" bomb trollies are not satisfactory for the transportation of bombs in the field owing to the bad condition of roads and dispersal areas, particularly at this time of year when we are experiencing heavy rains and very considerable muddy areas. Under these conditions it is seldom possible if trollies are used to tow them right up to dispersal points. Further, the trollies are designed to carry a load of 1000 lb. and consequently at least two trolley loads are required to bomb-up one light bomber. Difficulty has also been experienced in the numerous moves of units in transporting trollies from one area to another. The limited transport available does not allow them to be carried en bloc on trailers, result being they are towed behind vehicles. This is not by any means satisfactory and it is obvious that they will not stand up to this method of transportation and unserviceability results. TBF report a total of 3 made unserviceable during the last move from SICILY to ITALY, chiefly due to fractured front springs. It is suggested that steps be taken to provide two Bomb Service Trailers M5 and Bomb Service Truck M6 USA pattern to each British light bomber squadron. It is realised that it may not be possible to obtain these from American sources, but the need for these mobile motor trollies for units in the field cannot be too strongly stressed. The British light bomber squadrons have found it necessary to resort to the use of lorries for transportation of bombs on airfields. This throws additional work on to the bombing-up crews and considerable wear and tear on existing transport required for other duties.

INSTALLATIONS

8. Turrets. Very little trouble has been experienced with turrets. No. 232 Wing reported that trouble had been experienced with fractured adjustment rollers on two Glenn Martin turrets to Baltimore aircraft. This fault was remedied however by the correct

adjustment of these rollers and no further defects have been reported. There has been no shortage of hydraulic seals which in the past have been difficult to obtain. Ample stocks are now available. Some trouble has been encountered with the Ampidyne Motor generator brushes, which appear to be too soft and wear rapidly. This wearing may on the other hand be due to incorrect adjustment. A few cases have occurred where Main Power Relays have burnt out due to the fusing of the points. There have been no further cases of cracked Plexiglass of Turret canopies. Work continues satisfactorily on waist guns installations for B-25 aircraft of 12th and 340th Bomber Groups.

9. Bomb Sights. Little or no trouble has been experienced with bomb-sights. The British Mk IX CSBS is well liked by American units and has been used with success for medium altitude bombing attacks. A little difficulty has been experienced in mounting this sight in the B-25 P.D.1, but this has been overcome. It is interesting to note that Bombardiers of the 12th and 340th Groups prefer the British Mk IX sight in place of the D.8 sight, with which their aircraft are normally equipped. The 321st Group equipped with B-25 aircraft use the American Norden Bombsight which is undoubtedly far superior to the British Mk IX CSBS. It is anticipated that in the very near future, after suitable training of bombardiers, a percentage of aircraft of the 12th and 340th Bomber Groups will be equipped with the Norden Bombsight.

10. Gun Sights. The Baltimore Pilots Ring Sight constructed of light alloy are easily broken. A few cases have occurred of this defect and spares have not been obtainable. The normal Fighter Pilot GM III reflector sight has stood up well and no defects have occurred.

11. Air Gunners complain that the Bendix Telescopic Gunsight fogs up and vibrates when firing and produces a blinding glare when turned towards the sun. A great desire has been expressed by all for the M.6.A Sight which has not been obtainable in sufficient quantities to meet demands. Lower turrets of B-25 aircraft are fitted with periscopic sights which are reported to be unsatisfactory and not very popular with the gunners.

PERFORMANCE OF CANNON AND GUNS

12. 20 mm. Cannon. The absence of dust and sand has had the effect of simplifying maintenance problems and generally speaking the performance of cannons has greatly improved there being fewer stoppages. Although expenditure figures are not given, it is interesting to note that as against the old figure of approximately 500 rounds per stoppage, records show that an average of something like 650 to 700 rounds per stoppage has been maintained. No. 324 Wing has recently shown a much higher figure over a monthly period of something like 1200 rounds per stoppage, and 7 SAAF Wing has recorded an even higher figure.

13. The chief causes of cannon stoppages have been due to:

- a. Weak or broken driving springs, and
- b. Loss of tension.

14. It has been reported that the performance of American BFM has a superior performance to that of the British BFL. Actual stoppage figures indicate that this is so, but it is considered that the combination of the two British and American BFM's would give a greatly improved performance. The American BFM as it stands is not superior to the British as it only possesses 3 sprockets and there is no steel strip inserted in the front cover cam. The ideal mechanism is felt to be the British Mk 1 with the following additional modifications incorporated from the American:

- a. Driving spring to be anchored.
- b. The BFM cover slotted in which the single end of the link rides (the slot reduces frictional resistance to feed).
- c. The sprocket shaft with phosphor bronze bearing which rides in a bush in the BFM.

15. With a view to improving the performance of the BFM the Armament Officer of No. 324 Wing is carrying out a series of trials with the modified BFM with the suggested modifications quoted in sub-para a, b, and c above. Preliminary results of the trials appear to be very satisfactory and a full report will be rendered upon the completion of these trials.

16. There have been no serious defects of any note reported and cannon spares have been adequate.

17. .30 and .303 Browning Guns. Little or no trouble experienced. Guns continue to function with the greatest possible reliability. Average number of rounds per gun per stoppage approximately 8,000 to 9,000 rounds. No shortage of spares and no major defects reported.

18. .50 Browning Guns. Units of TBF equipped with .50 Browning Guns have experienced few failures or defects. Very little operational firing having been carried out. Fighter and fighter-bomber units also report few stoppages or defects. Some trouble has been experienced with defective Ammo, particularly DM Tracer 1943 and also with deep set caps and hang fires. In the earlier stages the A-36 units had a little solenoid trouble, but generally speaking the performance of .50 calibre guns has been remarkably efficient.

19. A shortage of specific spares for the installation of synchronised guns of A-36 aircraft existed prior to the operation

"Avalanche", but units reported that sufficient stocks of these items were made available in time and did not interfere with the operational efficiency of the units concerned.

20. Reports on gun performance of .50 calibre guns varies considerably. The units equipped with P-40 aircraft report very few stoppages and average something like 12,000 rounds per stoppage, but with the A-36 aircraft a lower figure is quoted, approximately 5,000 to 6,000 rounds per stoppage. Figures for bomber units are not included as expenditure figures are so low and no useful purpose would be served in quoting stoppage figures. No major defects or failures have occurred and no shortage of spares have been experienced.

BOMB RELEASE GEAR FAILURES AND DEFECTS

21. British. Very few failures experienced by the British units and a fairly high standard of maintenance maintained and defects have been kept down to a minimum. Although better maintenance conditions exist in ITALY, units are still experiencing a certain amount of trouble with Small Bomb Containers. The handling, storage and transportation of these containers in the field still present a problem and in spite of every effort to prevent dust and damp entering into the EM units, it is not always possible to do so. It is considered that for rapid rearming in the field the SEC's are not ideal for use.

22. An analysis of total failures reported by British units was due to the following causes:

<u>Maintenance</u>	<u>Manipulation</u>	<u>Enemy Action</u>	<u>Unknown</u>
51%	20%	4%	25%

23. The percentage of failures to total sorties carried out has been extremely low and works out at 1.5%.

24. American. Very few failures have been reported from American units, although it is known that the A-36 Bomb Carriers and release gear have given considerable trouble. It is not intended to go into full details of these failures as a detailed report has been submitted to Colonel Neely, MAAF, but it is known that the carrier itself is poorly designed, particularly regarding the linkage, and it is understood that every effort is being made to rectify this defect. It is interesting to note that in spite of this poor design the A-36 Groups have by very careful maintenance cut down the number of failures considerably. During the "Husky" operation the failures were as high as 20%, but after very hard work and exceptional keenness of the Group Armament Officers concerned, these failures have been reduced to below 10%.

25. The malfunction of the Douglas glide rack in the A-20B aircraft is well known, but continued maintenance efforts to over-

come these troubles have slightly improved the performance and failures are fewer.

26. The chief trouble experienced with B-25 aircraft has been due to faulty A.2 release units, electrical failures and in some cases faulty bomb carrier adjustments. The wing carriers have caused a certain amount of trouble, chiefly due to short circuits in the wiring system, due to friction and vibration, and difficulty has been experienced in obtaining access to cables and turnbuckles in the wings. This alone has resulted in badly adjusted wing carriers.

GENERAL TECHNICAL POINTS, EQUIPMENT TOOLS, ETC.

27. The general situation regarding tools and armament equipment appears to be fairly satisfactory. There still appears, however, to be a shortage of cannon tools and American tools particularly spanners for the maintenance of Glenn Martin Turrets. USA units also report that although the situation has improved, there still appears to be a shortage of hand and turret tools. Supplies of cleaning materials, oils, etc. have been adequate to meet requirements. Fighter Wings reported that the following items were in short supply at one period:

- a. 2 EA single spring washers.
- b. Recoil adjustment washers.
- c. Plasticene.

28. One or more squadrons from each Spitfire Wing have now been fitted with the new type Front Hispano Gun mounting No. 3 Mk II, and from reports received they are very satisfactory.

AMMUNITION

29. On the whole there are no serious defects to report. Several cases of loose nose caps of SAP/I 20 mm ammunition have been reported. It was reported by No. 322 Wing that three rounds removed from a sealed container had been tampered with prior to their removal, i.e. charges removed. The rounds together with the cardboard container were forwarded with a report to the Command Armament Officer, NAAF. Except for trials the new AP Mk III 20 mm ammunition has not been used in combat against enemy armored vehicles or tanks. It is understood that on one occasion Spitfires of DLF were airborne to go out to attack tank targets, but unfortunately contact was not made.

WING BELTING PARTIES

30. The formation of Wing Belting Parties for each Fighter Wing has once again proved invaluable. Although the great majority of 20 mm ammunition is received cartoned, a percentage of belted ammunition

must inevitably be expected and usually requires very careful checking and cleaning before use. In some cases the belted 20 mm ammunition must be broken down and cleaned and rebelted to the correct sequence before use. It is pointed out once again that on many occasions belted ammunition has been received in an unserviceable condition due to water having entered the containers, and also to damage of containers in transit, and it is considered that the only way to overcome this difficulty is to have all ammunition inspected, cleaned, gauged and belted to the correct sequence by the Wing Belting Parties as soon as possible after Wings have arrived in the forward areas.

REPLACEMENT AIRCRAFT

31. Several instances have occurred in the past of fighter aircraft being received from replacement pools with their aircraft armament equipment in a dirty and unserviceable state. This has been the subject of two previous letters to Hq. N.A.F who have been requested to make every effort to ensure that these faults are remedied. It was pointed out that this called for a considerable additional armament maintenance work before the aircraft could be made operationally serviceable.¹

SPITFIRE BOMBERS

32. It was decided that 7 SAAF Wing should have the aircraft of Nos. 2 and 4 Squadrons modified to carry bombs and two additional 20 mm cannons installed to the exclusion of four .303 Browning guns, as it was considered the greater weight of fire power would be more effective for ground strafing. In order to carry out the necessary modifications to the aircraft as quickly as possible, the Air Ministry modification No. 934 of carrying the bombs under the fuselage was accepted in preference to the North African modification where bombs are carried under the wings, and which necessitated the drilling of bombs and obtaining stay rods -- this was not considered a practical proposition in the field. The modification of carrying bombs under the fuselage has the disadvantage of not being able to carry the long range tanks as the bomb carrier frame is attached to the long range tank fittings, but it has the advantage of a quick change-over from fighter to fighter-bomber when the occasion demanded, inasmuch as the bomb carrier and frame could be fixed and removed very quickly, and in addition can be jettisoned if so required.

33. No difficulty was experienced of bomb carriers and the wiring of these aircraft, but in view of the shortage of the necessary

¹This was due mostly to length of time between assembly of fighter aircraft and final delivery to using unit. Many transit airfields had no provisions for armament maintenance and the guns suffered accordingly when pilots had to await proper flying weather or stop for engine repairs enroute to forward using units.

gun mountings and other necessary items to instal the additional cannons it was decided to carry out the installation of the two additional cannons by flying over each Squadron in turn to MALTA to have the modification completed, as the Malta MU had had previous experience in the installation of the four cannon Spitfire and sufficient quantities of the required airframe parts etc. were available to complete the modification on the spot. Up to date, 16 aircraft of these Squadrons have been modified to carry four 20 mm cannons. As it was only intended that the carriage of bombs under the fuselage was to be a temporary measure, NAAF recently designed a light fixed crutch fitting which was produced by No. 144 MU and could easily be assembled, and which made use of the existing wing rack now being incorporated in repaired Spitfire VC aircraft. Trials were carried out with these fixed crutch fittings fitted to a Spitfire aircraft, and after a slight alteration in the design of the crutches this modification was discussed with AOC, DAF, and it was agreed that the aircraft fitted with these fixed crutches should carry out trials with 7 SAAF Wing. At present, 35 sets of this modification are available and are being fitted to aircraft of this Wing.

34. An improved light carrier complete with crutches which can easily be fitted and removed has been designed by 7 SAAF Wing and approved by Hq. DAF who in turn have forwarded the drawings and full particulars together with a specimen bomb carrier to Hq. NAAF who have been asked to manufacture this type of improved carrier in place of the crutch fitting of the NAAF design.

PERSONNEL

35. The situation which in the past has caused a little concern because of the shortage of Armourers and Ordnance personnel has improved, and most units report that they are now up to strength. Both British and Americans reported a shortage of personnel due to sickness, but as a rule replacements were provided with little or no delay, and the situation now is considered fairly satisfactory. The problem of reclassification and promotion of Armourers Assistants has once again been strongly represented by TBF and the British Fighter Wings. They are classified as ACH/GD's for the purposes of promotion, and as the squadrons only allow 25% for LAC's, very often the very excellent semi-tradesman Armourer/Assistant is overlooked and there is very little chance of promotion for them, and improvement in the status of Armourer/Assistants is overdue, as in the field they are very often called upon to do the work which is mostly identical to that of a skilled Armourer.

UNEXPLODED BOMBS

36. British. Since arriving in ITALY it has been possible to obtain a large amount of information concerning Allied bombs which have failed to explode and have been recovered from the numerous targets attacked in this country. A good liaison has been established

with the Officer Commanding, No. 17 Bomb Disposal Company who has given us invaluable help by rendering monthly reports on all Allied unexploded bombs recovered. In addition, through the same source a percentage of pistols and fuses recovered from these bombs have and are being made available to this Headquarters and to appropriate American Ordnance Department. Briefly, the cause of failure of British bombs is as follows:

- a. The bombs fitted with No. 37 Mk III or IV long delay Pistols, 85% of the total had fully armed and the delay functioned, but owing to the partial softening of the celluloid washer this resulted in the striker being thrown off centre and instead of striking the percussion cap, it was found that it had struck the brass detonator cap holder. Some of the strikers were found to be as much as two mm off centre. Reports have been rendered to Hq. NAAF and this failure has also been reported to Air Ministry by W/Cdr. Rowlands, who on a recent visit to this country was able to obtain all details of the failure. Of the remaining total of bombs recovered fitted with long delay Pistols, 7% had not armed and of the remaining 8% recovered it has not been possible to ascertain the causes of the failures.
- b. Of the 20 bombs recovered fitted with No. 27 nose Pistol, all were armed and the greater majority of the bombs were found lying on the surface on the ground. It would appear that the bombs had dropped from too low an altitude causing the bombs to fall on their sides or the tail units had become detached during flight. In one case only had the striker been driven forward and struck the cap of the detonator but the cap had failed to fire.
- c. In other cases where the bombs failed to explode and had been fitted with pre-impact fuses i.e. No. 44 or 45 Nose Pistols, it was established that they too had been released from either too low an altitude or that tail units had fallen off during flight, as the bombs were found lying on their sides without the strikers having been driven forward.
- d. Of the No. 28 Tail Pistols recovered, failures were due either to pistols not being screwed into the bomb, rusted spiral striker spring, dirt and grit in the pistol and in some cases incorrect detonator used with incorrect pistols, i.e. sensitive detonators and with non-sensitive pistols.

37. In many cases bombs were recovered which had been dropped safe by bombardiers. Reports were received from aircrews that when bombing specific targets with bombs fused tail delay No. 47 detonator 0.12 secs. that a percentage of the bombs had failed to explode. This was the subject of a report to the AID Inspector, NAAF who issued instructions for the red-carding of certain lot numbers of this type of

detonators. It is hoped later on to recover some of these unexploded bombs to investigate the cause of these failures. In one or two cases a few bombs have been recovered minus detonators.

38. American. It is not intended to go into details regarding the causes of failure of unexploded American bombs recovered, but the greater majority of unexploded bombs failed to function owing to the failure of the M.103 Nose Fuse. It is understood that special instructions have been issued by the American Ordnance Department regarding the use of this type of fuse and restricting the use of early batches which have been the chief cause of these failures.

39. Of the bombs recovered fitted with the M.110 Nose Fuse, approximately 70% had armed. Failures were due chiefly to the bombs having fallen on soft soil and on their sides, and the striker and spring had been fouled by loose earth and prevented the striker from being driven forward.

40. In other cases the pressure plates had received no direct pressure and only a slight knock on one side. The whole striker assembly had been bent over thus preventing the completion of the forward movement. There appears to be no striker guide in the fuse and should the striker go down off centre it is likely to jam.

41. Of the remaining 30% recovered it appears that one or two of the safety lugs had fallen away but leaving the third in position and thereby preventing the striker from going forward on impact.

42. Of the bombs recovered fitted with M.106 tail fuses, chief fault appears to be the stem of the fuse shears off on impact, thus preventing the functioning of the fuse. Very few bombs were recovered fitted with M100A1 or M100A2 series fuses.

43. Every effort is being made to forward details of unexploded Allied bombs recovered and the causes of failures to the appropriate authorities, and also to various units in order to ensure that failures are reduced to a minimum. But it is considered that the number of unexploded bombs recovered represents a very small percentage of the total tonnage which has been dropped and does not give rise to undue alarm.

CONCLUSION

44. In conclusion, from an Armament point of view, things have gone very well since the occupation of the Southern part of ITALY. All Armament and Ordnance personnel have worked well as a team, achieving good results, and many of the problems which in the past have caused some little concern now no longer exist, and no doubt with future experience and much better conditions we can expect a higher stand-

¹This fuse is now obsolete and is no longer used.

ard of maintenance. It can be stated that no real lessons have been learnt from this campaign as yet, but this report covers as far as possible every aspect of the Armament problems which must inevitably be experienced by any units working in the field.

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ANNEX A

Reference:-
TAF/59/AIR

COPY NO.

HEADQUARTERS
TACTICAL AIR FORCE

17th August 1943.

TO : Commanding General, XII Air Support Command.

OPERATIONAL DIRECTIVE FOR OPERATION "AVALANCHE" NO. 1.

INFORMATION

1. "Avalanche" is the code name for an amphibious assault by the 5th Army, mounted from North AFRICA and SICILY against the Italian mainland, with the primary object of establishing air forces on MONTE-CORVINO and the neighbouring airfields, and by seizing the port of NAPLES to develop a base from which to conduct operations against the remainder of ITALY.

This Operation is an alternative to Operation "Buttress", but Operation "Baytown" - an assault across the Straits of MESSINA by 8 Army (13 Corps) - will either precede or be co-ordinated with "Avalanche".

2. Although every effort will be made to launch "Avalanche" in preference to "Buttress", planning for "Buttress" must be continued so that either operation may be initiated at relatively short notice. This essential flexibility can only be achieved by careful preparation and the highest degree of co-operation between the Commanding General, XII Air Support Command and the Air Officer Commanding, Desert Air Force.

3. Appendix 'A' summarises the naval and land forces taking part in "Avalanche".

4. The date on which the assault will take place will be passed to you separately.

ROLE OF TACTICAL AIR FORCE

5. The role of Tactical Air Force may be summarised as follows:

i. Period up to D - 1 Day

- a. To assist Strategic Air Force to neutralize the enemy air forces located in Southern ITALY.
- b. To impose the maximum interference on the movement of enemy forces and supplies inside Southern ITALY and towards the assault area.

ii. Period D - 1 Day

As for sub para. i above, and to provide Coastal Air Force with such fighter assistance as is required for the protection of the "Avalanche" convoys.

iii. The Assault from First Light D Day and Establishment of Bridgehead.

- a. To provide protection by day and night for the assault beaches and shipping lying off them.
- b. To prevent the movement of enemy forces and reserves in and to the assault area.
- c. To provide the assault forces with direct support during their landing and subsequent operations.

COMLIND

6. Under the general direction of Air Officer Commanding, Tactical Air Force, you will be responsible for the operational control of all fighter and fighter-bomber aircraft participating in "Avalanche" from D - 7 onwards. You will retain this control until the area of operation is so increased in size that a second control becomes necessary. As "Avalanche" may be launched simultaneously with "Baytown", or in any case, shortly after "Baytown", it will not be possible to regard air operations in the one operation as being divorced from air operations in the other, although Air Officer Commanding, Desert Air Force will be responsible for "Baytown" and you responsible for "Avalanche". It is thus essential that Headquarters, XII Air Support Command and Desert Air Force be alongside each other before these operations are launched.

Operational Directif for Operation "Buttress" No.1, allocated Tactical Bomber Force to operational control of Air Officer Commanding, Desert Air Force from D - 8. If "Avalanche" is launched with or soon after "Baytown", the two main operational areas will be widely separated. When it becomes possible to establish bombers in the NAPLES area it will still be necessary to retain a small bomber force for the direct support of the "Baytown" operations. Prior to D Day however, the bombing programme must be co-ordinated with Strategic Air Force,

and the Tactical Bomber Force will fulfil a strategic role rather than a tactical one.

Before D Day therefore, it is proposed to retain Tactical Bomber Force under one centralized control which will be exercised by Air Officer Commanding, Tactical Air Force through Desert Air Force. Once the assault is launched, however, part of Tactical Bomber Force will be allocated to XII Air Support Command and part to Desert Air Force. Planning will be based on the assumption that Tactical Bomber Force units are allocated as follows:-

<u>XII Air Support Command</u>	<u>Desert Air Force</u>
326 Wing	232 Wing
3 SAMF Wing	47 Group
12 (B.) Group	
340 (B.) Group	

Despite this division of Tactical Bomber Force, it will remain under the general control of Air Officer Commanding, Tactical Bomber Force, who will establish a small Advanced Headquarters alongside Advanced Headquarters XII Air Support Command and Advanced Headquarters Desert Air Force.

FORCES AVAILABLE

7. For the purpose of planning, it is assumed that "Avalanche" and "Baytown" have been launched either together or within a short time of each other and that part of the Tactical Air Force which will be available for "Avalanche" is given at Appendix 'B'. In addition to those Tactical Air Force units, three P-38 Groups will be placed under your control for a period of three to four days. The date on which these additional forces will be placed under the control of XII Air Support Command will be notified later.

DISPOSITION OF UNITS

8. Instructions have already been issued for the construction of up to 5 airfields in the MILAZZO/MESSINA area, with the object of enabling us to locate at least three Groups or Wings in this area. If it is found that a larger number of airfields can be constructed in this area, or if the newly constructed airfields will accommodate a larger force than proposed above, the disposition outlined below will be reconsidered. Assuming three Groups or Wings of Spitfires can be located in the MILAZZO/MESSINA area, the remainder of the available forces and general disposition of units will be as follows:-

Desert Air Force	-	CATANIA PLAIN
Tactical Bomber Force	-	CATANIA PLAIN
XII Air Support Command	-	CATANIA PLAIN
3 P-38 Group	-	CATANIA PLAIN

As units are moved out from the Northern coastal airfields, they will be replaced by others from further South in accordance with the development of the air situation.

LOCATION OF HEADQUARTERS

9. Tactical Air Force Headquarters will probably remain at its present location.

Desert Air Force Headquarters will remain with 8 Army in their present location. From there, communications will be highly developed to both the CATANIA PLAIN area and the airfields on the North coast. It is therefore desirable that an advanced headquarters Tactical Bomber Force and that part of XII Air Support Command Headquarters which is controlling "Avalanche" operations from the mainland should be located in the same area, and the Rear XII Air Support Command should remain there until it is decided to transfer all units of the XII Air Support Command to ITALY.

RESPONSIBILITY FOR SHIPPING PROTECTION

10. Responsibility for protection of convoys will be as follows:-

- i. For the South and East coasts of SICILY - Desert Air Force and Malta.
- ii. On the North coast the protection of the assault convoys will be the responsibility of Coastal Air Force up to last light on D - 1 Day.
- iii. Coastal Air Force will be responsible for the protection of convoys subsequent to the assault, i.e., follow up convoys, up to 40 miles from the Italian mainland.

XII Air Support Command will be responsible for the protection of follow up convoys when within 40 miles of ITALY,
(NOTE; This sub para, is subject to confirmation)

iv. D Day

Tactical Air Force will be responsible for the protection of assault convoys from first light on D Day, and you will be responsible for the organization of fighter forces em-

ployed in protecting these convoys. For this purpose use should be made of the three P-38 and two A-36 Groups which are available; and also of Spitfires fitted with 90 gallon tanks to provide top cover. It is appreciated that the employment of Spitfires fitted with 90 gallon tanks is in many ways undesirable, but the operational disadvantages must be accepted in the initial stages of the assault.

The protection of shipping over the assault area will be undertaken with P-38's, A-36's and Spitfires. The scale of fighter protection to be provided over the beaches will be determined by you. Your plan must be so regulated, that maximum cover can be provided until such time as fighters can be established ashore. In this connection, you must watch the air situation carefully, in order that the number of aircraft detailed for this defensive role can be reduced as early as possible, and the effort diverted to offensive tasks. In particular, it is desirable that the use of Spitfires with 90 gallon tanks be reduced immediately it becomes evident that strong top cover is no longer necessary.

AIRFIELD CONSTRUCTION AND DEFENCE

11. The only airfield in the immediate vicinity of the assault is MONTECORVINO, and it is therefore essential to provide and land strong airfield construction units as early as possible. The immediate airfield requirement will be a minimum of four additional airfields and sufficient personnel and equipment to enable us to repair without delay CAMPO DI CHINO, POMIGLIANO D'ARCO. Before any flying units are moved over to ITALY, you are to satisfy yourself that adequate AA has been established and that at least a limited early warning system has been installed.

DESPATCH OF AIR FORCES TO ITALY

12. The decision to despatch units to operate in ITALY is to be made by you as airfields become available. Before taking this decision you are to satisfy yourself that the Army is sufficiently firmly established to ensure reasonable security. Units are to move into ITALY in the following order:-

1 Spitfire Group	U.S.	D Day or D plus 1
1 Spitfire Wing	R.A.F.	D plus 1 or D plus 2
½ Sqn. P-51 Recce	U.S.	D plus 1 or D plus 2
½ Sqn. Spit. Tac/R	R.A.F.	D plus 1 or D plus 2
½ Sqn. Beaufighter (N)	R.A.F.	D plus 1 or D plus 2

1 Spitfire Wing	R.A.F.	D plus 3 or as early as possible after that date.
1 P-40 Group	U.S.	D plus 3 or as early as possible after that date.
2 A-36 Groups	U.S.	D plus 5 or as early as possible after that date.

The subsequent build-up will depend upon the ground situation, the construction and availability of airfields. Administratively, provision should be made, however, to enable two light bomber wings - R.A.F. - to operate from the mainland by D plus 10, and an additional two groups of B-25's by D plus 20.

MOVE OF UNITS TO NORTH AFRICA

13. Shipping limitations may necessitate the despatch of certain administrative and signals units to North AFRICA for embarkation in the assault convoys. Details of any unit which must be moved to North AFRICA on account of shortage of shipping space will be passed to you as soon as the outline plan is received by this Headquarters. In the meantime, action to prepare those units required in the assault convoys is to continue with the utmost speed. It will be necessary to issue special briefing instructions to those units just before sailing.

CONTROL OF FIGHTERS

14. Control of all fighters up to D Day must be exercised through one centralized operations room as the probable operational area lies within Radar cover. This central operations room will be provided by No.1 MORU but in order to assist control of fighters and fighter-bombers belonging to XII Air Support Command, No.64 Fighter Wing will detach two Controllers to No.1 MORU. No.64 Fighter Wing will also provide sufficient R/T channels to enable these Controllers to direct their own aircraft.

On and after D Day there will be no question of controlling fighters operating over "Avalanche" from SICILY. A despatching agency will, however, be necessary to ensure adequate fighters are detailed to operate over the assault area. This agency will be centralized in Headquarters, XII Air Support Command, who will maintain close liaison with the Hq. Ship.

On arrival in the assault area these fighters will come under the control of Hq. Ship, until such time as No. 64 Fighter Wing forward-fighter control is established ashore, and capable of taking over the commitment. To assist this FFC to control R.A.F. Fighter Wings operating under XII Air Support Command, Air Officer Commanding, Desert Air Force will attach two Controllers to No.64 Fighter Wing

and provide sufficient R/T equipment to enable them to exercise control.

In order to ensure continuity, the Senior Controller of the FFC and one of the two Controllers detached by Air Officer Commanding, Desert Air Force will be carried in the Hq. Ship and transferred to the shore when FFC takes over.

15. Night fighters operating over the assault area will be based initially in SICILY. They will operate under the control of XII Air Support Command, who will despatch aircraft in accordance with a pre-arranged programme. On arrival in the assault area the control of aircraft will be taken over by the Hq. Ship, which will be kept informed of aircraft movements. The Hq. Ship will in turn hand night fighters over to the control of either the ship borne or land based GCI whichever is in operation.

If the flow of night fighters into the assault area is found to be inadequate, the Hq. Ship will call upon XII Air Support Command to accelerate the despatch of aircraft.

EMPLOYMENT OF BOMBERS

16. A separate operation instruction will be issued regarding employment of bombers before and during "Avalanche". Requests for air support from D Day onwards will be made by the Air Support Parties and Air Support Tentacles attached to U.S. and British formations to 5 Army Air Support Control, alongside Advanced XII Air Support Command. Filtered requests will then be passed direct to the Bomber Wings and/or Groups allocated to XII Air Support Command.

CO-OPERATION WITH NAVAL FORCES

17.

AIR SEA RESCUE

18. Coastal have been asked to undertake responsibility of ASR in the area between the North SICILIAN coast and the assault areas. Details of the organization provided will be issued later.

NAVIGATIONAL AIDS

19. Homing facilities will be provided MILAZZO/CATANIA area and fixer facilities in the MILAZZO area by day and night. Similar arrangements must also be made for the airfields in the "Avalanche" area. Coastal Air Force have been asked to provide navigational aids on the LIPARI ISLANDS and also to arrange for both visual and

wireless aids on USTICA ISLANDS. Details of navigational aids established on these islands will be issued as soon as possible.

AIR TRANSPORT

20. Troop Carrier Command and No.216 Group will be requested to establish advanced operational controls alongside Headquarters, XII Air Support Command, in order to facilitate airborne operations and call forward of transport aircraft.

INTRUDERS

21. Northwest African Air Forces have already been asked to authorize the move of No.23 Squadron from MALTA for operation "Buttress/Baytown". This squadron, if moved into SICILY, will operate in support of "Avalanche" and "Baytown".

NIGHT FIGHTER SQUADRON

22. Northwest African Air Forces are being requested to provide a replacement unit to take over the defence of Eastern SICILY and the "Baytown" area in order that No.600 Squadron can be made available for ultimate transfer to "Avalanche". As No.600 Squadron is only equipped with Mark IV A.I., arrangements are being made with Coastal Air Force to operate number of Mk VIII A.I. Beaufighters from aerodromes on the mainland against enemy aircraft attacking NAPLES from the sea.

FITTING OF LONG RANGE TANKS

23. Immediate action must be taken to ensure that the lugs fitted to Spitfires taking part in "Avalanche" are adjusted to take 90 gallon tanks. This Headquarters will take up at once the question of provision of these tanks and lugs.

PLANNING FOR "AVALANCHE"

24. In view of the little time available for preparation and planning, Commanding General, XII Air Support Command and Air Officer Commanding, Desert Air Force will send senior representative to this Headquarters on 19th August at 1030 hours, to co-ordinate arrangements required for "Avalanche". It will probably be necessary to hold a similar conference every three or four days, apart from the daily interchange of information which will be necessary between Tactical Air Force, XII Air Support Command and Desert Air Force.

25. You should inform this Hq. of any difficulties which might arise, in order that immediate action can be taken to assist you.

Air Marshal,
Air Officer Commanding,
Tactical Air Force

Distribution:

	<u>Copy No.</u>
Commanding General, XII Air Support Command	1 & 2
Air Officer Commanding, Desert Air Force	3
Commanding General, Northwest African Air Forces	4 & 5
C.G.S., 15 Army Group	6

Internal

A.O.C.	7
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APPENDIX APROVISIONAL ORDER OF BATTLE.NAVAL FORCES AND LAND FORCESLAND FORCES

Land forces taking part in "Avalanche" will be under the command of the 5 Army (Lieutenant-General Mark W. Clark), and initially will be comprised of the following:-

6th U.S. Corps (34th and 36th Divisions, 1st U.S. Armoured Division).
 82nd U.S. Airborne Division.
 10th British Corps (46th and 56th Divisions, 7th British Armoured Division).
 1st British Airborne Division.

NAVAL FORCES

The Naval Task Force for "Avalanche" will be under the command of Vice Admiral H.K. Hewitt, U.S.N., and the estimate of naval forces available is as follows:-

UNITED STATES NAVYGun Support and Escort Forces

3 Cruisers
 15 Fleet Destroyers
 3 Old Destroyers
 16 P.C.
 36 S.C.

Minesweepers

6 L.M.

24 Y.M.S.

Coastal Forces

18 P.T.

12 A.R.B.

Auxiliaries

4 Tugs

BRITISH NAVYGun Support Force

15th Cruiser Squadron
 MAURITIUS (Flag of C.S.15)
 UGANDA, ORION
19th Destroyer Flotilla
 LAFOREY (D.19) LOCKOUT,
 LOYAL, TARTER, NUBLAN.
Monitors
 ROBERTS, ABERCROMBIE.

Convoy Escorts

10 HUNT class Destroyers*
 3rd Auxiliary A/S Trawler group (5 Ships)
 29th Trwler Group (4 ships)**
 One A/S M/S Trawler Group (4 Ships)**
 22nd and 31st M.L. Flotillas (10 boats each)

Gunboats

FLORES, SOEMBA

Gun Support Landing Craft

9 L.C.G.
 12 L.C.F.
 3 L.C.R.

Convoy Escorts

8 H.D.M.L. **

- * This number can be increased; but only at the expense of escorts already allocated to through Mediterranean convoys.
- ** Subsequently available for local defence in captured ports.

Minesweepers

1 Div. 12th Fleet Mine-sweeping Flotilla (4 ships) Oropese and LL.

1 Div. 13th Fleet Minesweeping Flotilla (4 ships) Oropesa.

6 M.M.S.* (SA and LL only)

- * Subsequently available for captured

Submarines

3 for beachfinding and marking (if required)

APPENDIX B

PROVISIONAL ORDER OF BATTLE D DAY - "AVALANCHE"

		31 Gp - 3 Sqns Spits	MILAZZO area
		111 Sqn - 1 Sqn P-51 Tac/R	MILAZZO area
		33 Gp - 3 Sqns F-40	CATANIA PLAIN) If requir-
		99 Sqn - 1 Sqn P-40	CATANIA PLAIN) ed forward
		27 Gp - 3 Sqns A-36	CATANIA PLAIN
		86 Gp - 4 Sqns A-36	CATANIA PLAIN
	C.G.		
	XII ASC	322 Wg - 4/5 Sqns Spits	MILAZZO area
		324 Wg - 4/5 Sqns Spits	MILAZZO area
		600 Sqn - Beaufighter (N)	CASSIBILI
		3 Gps P-38 - 9 Sqns	CATANIA PLAIN or COMISO -
		(D - 1 to D plus 3 App.)	PONTE OLIVO area
		225 Sqn - 1 Sqn Spits Tac/R	CATANIA PLAIN
		244 Wg - 5 Sqns Spits	CATANIA PLAIN
		7 SAAF Wg)-2 Sqns Spits	CATANIA PLAIN
) - 1 Sqn P-40	CATANIA PLAIN
A.O.C.	A.O.C.	57 Gp - 3 Sqns P-40	CATANIA PLAIN
T.B.F.	D.A.F.	79 Gp - 3 Sqns P-40	CATANIA PLAIN
		239 Wg - 5 Sqns P-40	CATANIA PLAIN
		- Sqn - Beaufighters	CATANIA PLAIN
		No. 23 Sqn- 1 Sqn Mosquito	CATANIA PLAIN
		Intruder (Possibly)	
		<u>TO OPERATE WITH XII AIR SUPPORT COMMAND</u>	
		326 Wg - 2 Sqns Bostons	CATANIA PLAIN
		3 SAAF Wg-2 Sqns Bostons	CATANIA PLAIN
		1 Sqn Baltimore	CATANIA PLAIN
	A.O.C.	12 (B) Gp-4 Sqns B-25	CATANIA PLAIN
	T.B.F.	340 (B) Gp-4 Sqns B-25	CATANIA PLAIN
		<u>TO OPERATE WITH DESERT AIR FORCE</u>	
		232 Wg - 2 Sqns Baltimore	CATANIA PLAIN
		47 (B) Gp - 4 Sqns A-20	CATANIA PLAIN
		<u>NORTH AFRICA</u>	
		Reserve Units - 241 Sqn - Hurribomber	
		40 Sqn - Spits Tac/R	
		341 Gp - F-40	
		<u>MIDDLE EAST</u>	
		6 Sqn - Hurricane IID	

ANNEX B

Reference:-
TAF/59/AIR

COPY NO.

HEADQUARTERS
TACTICAL AIR FORCE

17 August 1943.

TO: Air Vice Marshal H. Broadhurst, D.S.O., D.F.C., A.F.C.,
Air Officer Commanding, Desert Air Force.

OPERATIONAL DIRECTIVE FOR OPERATION "AVALANCHE" NO. 1A.

INFORMATION

1. "Avalanche" is the code name for an amphibious assault by the 5th Army, mounted from NORTH AFRICA and SICILY against the Italian mainland, with the primary object of establishing air forces on MONTECORVINO and the neighbouring airfields, and by seizing the port of NAPLES to develop a base from which to conduct operations against the remainder of ITALY.

This operation is an alternative to Operation "Buttress". but Operation "Baytown" - an assault across the Straits of MESSINA by 8 Army (13 Corps) - will either precede or be co-ordinated with "Avalanche".

2. Although every effort will be made to launch "Avalanche" in preference to "Buttress", planning for "Buttress" must be continued so that either operation may be initiated at relatively short notice. This essential flexibility can only be achieved by careful preparation and the highest degree of co-operation between the Commanding General, XII Air Support Command and the Air Officer Commanding, Desert Air Force.

3. Appendix "A" summarises the naval and land forces taking part in "Avalanche".

4. The date on which the assault will take place will be passed to you separately.

ROLE OF TACTICAL AIR FORCE.

5. The role of Tactical Air Force may be summarised as follows:

i. Period up to D + Day

- a. To assist Strategic Air Force to neutralize the enemy air forces located in Southern ITALY.
- b. To impose the maximum interference on the movement of enemy forces and supplies inside Southern ITALY and towards the assault area.

ii. Period D - 1 Day

As for Sub para. i above, and to provide Coastal Air Force with such fighter assistance as is required for the protection of the "Avalanche" convoys.

iii. The Assault from First Light D Day and Establishment of Bridgehead

- a. To provide protection by day and night for the assault beaches and shipping lying off them.
- b. To prevent the movement of enemy forces and reserves in and to the assault area.
- c. To provide the assault forces with direct support during their landing and subsequent operations.

COMMAND

6. Under the general direction of Air Officer Commanding, Tactical Air Force, the Commanding General, XII Air Support Command will be responsible for the operational control of all fighter and fighter-bomber aircraft participating in Operation "Avalanche" from D - 7 onwards. After D Day he will also be responsible for the operational control of 326 Wing, 3 SAMF Wing, 12 Bomber Group and 340 Bomber Group. A copy of the directif issued to Commanding General, XII Air Support Command is attached at Appendix "B".

As "Avalanche" may be launched simultaneously with "Baytown", or in any case, shortly after "Baytown", it will not be possible to regard air operations in the one operation as being divorced from air operations in the other, although you will be responsible for "Baytown" and Commanding General XII Air Support Command responsible for "Avalanche". In view of this, Commanding General, XII Air Support Command will establish an advanced Headquarters alongside your Headquarters before these operations are launched.

Up to D Day ("Avalanche") it is desirable to retain Tactical Bomber Force under one control. This control will be exercised by you under my general direction in order that the available forces may be used to the best advantage in support of "Baytown" if already

launched, and in co-ordination with Strategic Air Force while preparing for "Avalanche". After D Day, the greater part of Tactical Bomber Force will be required in support of "Avalanche" and as explained above, will be allocated to XII Air Support Command. Operational control of No.232 Wing and No.47 Bombardment Group will be retained by you. As it may be necessary to move these two groups into the "Avalanche" area or alternatively to re-inforce the bomber force allocated to you, Air Officer Commanding, Tactical Bomber Force will retain general control of all tactical bombers as at present, in order to co-ordinate such action if required.

FORCES AVAILABLE FOR "AVALANCHE"

7. In order to strengthen the fighter force in XII Air Support Command you will be required to transfer two Spitfire Wings to that Command. It is not yet certain whether these Wings will continue to operate on a 5 Squadron basis or whether they will be reduced to 4 Squadrons each. You should be prepared however, to transfer two complete wings and are to nominate these immediately. These wings will be located in the MILAZZO area.

In addition to the present Tactical Air Forces, three P-38 Groups will probably be placed at the disposal of XII Air Support Command for the first few days of "Avalanche".

See paragraph 16 regarding provision of Night Fighter Squadrons.

DISPOSITION OF UNITS

8. Orders have already been issued for the construction of up to five airfields in the MILAZZO area with the object of locating at least three groups or wings in this area. If it is found that a larger number of airfields can be constructed, or if the newly constructed airfields will accommodate a larger force than proposed above, the disposition outlined below will be reconsidered. Assuming three groups or wings of fighters can be located in the MILAZZO area, the general disposition of the remaining units will be as follows:-

Desert Air Force	- CATANIA PLAIN
Tactical Air Force	- CATANIA PLAIN
XII Air Support Command	- CATANIA PLAIN
3 P-38 Groups	- CATANIA PLAIN

If it is possible to locate additional units in the MILAZZO area, additional units of XII Air Support Command will be located there.

As units are moved from the MILAZZO airfields they will be

replaced by others drawn from XII Air Support Command or Desert Air Force as required by the operational situation.

LOCATION OF HEADQUARTERS

9. Tactical Air Force Headquarters will probably remain at its present location. Tactical Bomber Force and XII Air Support Command will establish a part of their Headquarters in the vicinity of your Headquarters with 8th Army. Therefore, when selecting sites for your own Headquarters, you should ensure that space is also available and reserved for their Headquarters.

RESPONSIBILITY FOR SHIPPING PROTECTION

10. Responsibility for protection of convoys during "Avalanche" will be as follows:-

- i. South and East coast of SICILY - Desert Air Force and Hq. Malta.
- ii. Of the North coast, the protection of assault convoys will be the responsibility of Coastal Air Force up to last light D - 1 Day.
- iii. After D Day, Coastal Air Force will be responsible for the protection of follow up convoys North of SICILY to within 40 miles of the assault area. XII Air Support Command will be responsible for the protection of follow up convoys within 40 miles of the assault area.
- iv. Commanding General, XII Air Support Command has been charged with the responsibility of organising fighter protection required over the beaches and assault ships on D Day. He will make use of the P-38 and A-36 Groups under his command. He will also employ Spitfires fitted with 90 gallon tanks to provide top cover. Although this is in many ways undesirable, the operational disadvantages must be accepted in the initial stages of the assault. You should therefore ensure that the two Wings nominated for transfer to XII Air Support Command are fitted with lugs capable of taking 90 gallon tanks.

DESPATCH OF AIR FORCES TO ITALY

11. The two Spitfire wings transferred to XII Air Support Command will be required to move to ITALY on D plus 1/ plus 2 and on D plus 3 respectively. They are already being prepared for a similar contingency under "Buttress" and there should be little difficulty in shipping them under "Avalanche". Detailed instructions regarding their move will be issued by the Commanding General, XII Air Support Command.

MOVE OF UNITS TO NORTH AFRICA

12. Shipping limitations may necessitate the despatch of certain Administrative and Signals units to North AFRICA for embarkation in the assault convcys. As far as is known, the RAF units will be very similar to those required for "Buttress", arrangements for which you have already put in hand. Any change in requirements resulting from the change to "Avalanche" will be passed to you immediately they are made known to us.

CONTROL OF FIGHTERS

13. It has been decided that up to D Day ("Avalanche") all fighters in North-east SICILY must be controlled through one central operations room, as the probable operational area not only lies within Radar cover, but "Baytown" may already be in progress. This central control will be exercised by you through No.1 MORU but, in order to assist No.1 MORU to control fighter and fighter-bomber aircraft belonging to XII Air Support Command, No.64 Fighter Wing will detach two controllers to work alongside them. They will also provide sufficient R/T channels to enable these controllers to direct their own aircraft.

On and after D Day it will not be practicable to control fighters operating over "Avalanche" from SICILY. XII Air Support Command however, will establish a despatching agency to ensure adequate fighters are detailed to operate over the assault area. From and including D Day onwards therefore, you will not exercise any control over the XII Air Support Command fighters.

After a landing has been made, No.64 Fighter Wing will establish a forward fighter control ashore. To assist this control to direct aircraft of the RAF fighter component of XII Air Support Command, you are to attach two controllers to No.64 Fighter Wing, and are to provide sufficient R/T channels to enable them to control these aircraft.

Night fighters operating over the assault area will operate initially from SICILY under the control of XII Air Support Command who will despatch aircraft in accordance with a pre-arranged programme. On arrival in the assault area, the aircraft will be taken over by the Hq, Ship, who in turn will hand them over to ship-borne or land-based GCI. The ship-borne GCI being prepared for "Buttress" will be employed in "Avalanche".

EMPLOYMENT OF BOMBERS

14. Separate Operation Instruction will be issued regarding the employment of bombers before, during and after "Avalanche".

INTRUDERS

15. As you are aware, Northwest African Air Forces have already been asked to move No.23 Squadron from M.L.T.M. for operations "Buttress/Baytown" and, if the move is accepted, they will be employed in support of "Avalanche".

NIGHT FIGHTER SQUADRON

16. For Operation "Avalanche" it is proposed that No.600 Squadron should move ultimately into ITALY. As this move may take place soon after the assault, Northwest African Air Forces will be requested to arrange for this unit to be replaced as soon as possible. You should take the necessary preparatory action to enable No.600 Squadron to move into ITALY on the basis of the initial move being limited to one flight.

PLANNING FOR AVALANCHE

17. In view of the little time available for preparation and planning you will send senior representatives to this Headquarters on August 19th at 1030 hours to co-ordinate your requirements with those of XII Air Support Command. It will probably be necessary to hold a similar conference every few days, apart from the daily interchange of information which will be required between Tactical Air Force, XII Air Support Command and Desert Air Force.

18. You should inform this Hq. of any difficulties which may arise in order that immediate action can be taken to assist you.

Air Marshal,
Air Officer Commanding,
Tactical Air Force.

Distribution:

	<u>Copy No.</u>
Air Officer Commanding, Desert Air Force	1 & 2
Commanding General, XII Air Support Command	3
Commanding General, Northwest African Air Forces	4 & 5
C.G.S., 15 Army Group	6

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G/Capt. Plans	11
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ANNEX C

Reference:-
TAF/59/AIR

COPY NO.

HEAD QUARTERS
TACTICAL AIR FORCE

17 August 1943.

TO: Air Commodore L. Sinclair, G.C., C.B.E., D.S.O.,
Air Officer Commanding, Tactical Bomber Force.

OPERATIONAL DIRECTIVE FOR OPERATION "AVALANCHE" NO. 1B

INFORMATION

1. "Avalanche" is the code name for an amphibious assault by the 5th Army, mounted from NORTH AFRICA and SICILY, against the Italian mainland with the primary object of establishing air forces in MONTECORVINO and the neighbouring airfields, and by seizing the port of NAPLES to develop a base from which to conduct operations against the remainder of ITALY.

This operation is an alternative to Operation "Buttress", but Operation "Bagtown" - an assault across the Straits of MESSINA by 8 Army (13 Corps) - will either precede or be co-ordinated with "Avalanche".

2. Although every effort will be made to launch "Avalanche" in preference to "Buttress", planning for "Buttress" must be continued so that either operation may be initiated at relatively short notice. This essential flexibility can only be achieved by careful preparation and the highest degree of co-operation between the Commanding General XII Air Support Command and the Air Officer Commanding, Desert Air Force.

3. Appendix "A" summarises the naval and land forces taking part in "Avalanche".

4. The date on which the assault will take place will be passed to you separately.

ROLE OF TACTICAL AIR FORCE

5. The role of Tactical Air Force may be summarised as follows:

i. Period up to D - 1 Day

- a. To assist Strategic Air Force to neutralize the enemy air forces located in Southern ITALY.
- b. To impose the maximum interference on the movement of enemy forces and supplies inside Southern ITALY and towards the assault area.

ii. Period D - 1 Day

As for sub-paragraph i above, and to provide Coastal Air Force with such fighter assistance as is required for the protection of the "Avalanche" convoys.

iii. The assault from First Light D Day and Establishment of Bridgehead.

- a. To provide protection by day and night for the assault beaches and ships lying off them.
- b. To prevent the movement of enemy forces and reserves in and to the assault area.
- c. To provide the assault forces with direct support during their landing and subsequent operations.

COMMAND

6. Under the general direction of Air Officer Commanding Tactical Air Force, the Commanding General XII Air Support Command will be responsible for the operational control of all fighter and fighter-bomber aircraft participating in "Avalanche" from D - 7 onwards. The Commanding General XII Air Support Command will retain this control until the area of operations is so increased in size that it becomes necessary to establish a second control. A copy of the Directif issued to Commanding General XII Air Support Command is attached.

Operational Directif for Operation "Buttress" No.1 allocated Tactical Bomber Force to the operational control of Air Officer Commanding Desert Air Force from D - 8. If "Avalanche" is launched with or soon after "Baytown", the two main operational areas will be widely separated. Prior to D Day, however, the bombing programme must be co-ordinated with Strategic Air Force, and the Tactical Bomber Force will fulfil a strategical role rather than a tactical one. Before D Day, therefore, it is proposed to retain Tactical Bomber Force under one centralized control which will be exercised by Air Officer Commanding Tactical Air Force through Air Officer Commanding Desert Air Force with whom you will work in the same way as during the last stages of "Husky".

Once the assault is launched, it is proposed to allocate a part of Tactical Bomber Force to XII Air Support Command and a part to Desert Air Force as follows:-

XII Air Support Command

326 Wing
3 SAAF Wing
12 Bomber Group
340 Bomber Group

Desert Air Force

232 Wing
47 Group

Despite this division of Tactical Bomber Force, it will still remain under your general control. It will therefore be necessary for you to establish a small Advanced Headquarters alongside both Advanced XII Air Support Command and Advanced Desert Air Force.

FORCES AVAILABLE

7. The probable Order of Battle of Tactical Air Force on D Day is given at Appendix "B". In addition to Tactical Air Force units, three P-38 Groups will be placed under the control of Commanding General XII Air Support Command for three or four days during the opening phase of the operations.

DISPOSITION OF UNITS

8. It is intended to locate two Spitfire Wings and one Spitfire Group in the MILAZZO area. If the number of airfields which can be constructed will allow, it is probable that additional units of XII Air Support Command will be located in this area.

The remaining units of XII Air Support Command and Desert Air Force will be located in the CATANIA Plain. The units under your command will also be based in this area in accordance with the arrangements which have already been made.

LOCATION OF HEADQUARTERS

9. Although Operations "Avalanche" and "Baytown" take place in widely separated areas, it is not possible to draw a clear cut division between air operations in support of "Baytown" as opposed to those assisting Operation "Avalanche". It is thus essential that the controlling Headquarters should be in the immediate vicinity of each other. Advanced Headquarters Desert Air Force and XII Air Support Command will be located together in the LENTINI area and it will be necessary for you to establish a small Advanced Headquarters with each of them in order that you can be fully represented when either XII Air Support Command or Desert Air Force move nearer to their particular area of operations.

DESPATCH OF AIR FORCES TO ITALY

10. Initially, only fighters and fighter-bombers will be moved into ITALY, but provision is being made to enable two light bomber wings (RAF) to operate from the mainland by D plus 10. The actual day on which transfer of bombers will take place will naturally depend, however, on the speed with which land operations develop.

CONTROL OF FIGHTERS

11. Control of all fighters up to D Day must be exercised through one centralized operations room as the probable operational area lies within Radar cover. This central operations room will be provided by No.1 MOPU, but in order to assist control of fighters and fighter-bombers belonging to XII Air Support Command, No.64 Fighter Wing will detach two Controllers to No.1 MOPU. No.64 Fighter Wing will provide sufficient R/T channels to enable these Controllers to direct their own aircraft.

On and after D Day there will be no question of controlling fighters operating over "Avalanche" from SICILY. A despatching agency will, however, be necessary to ensure adequate fighters are detailed to operate over the assault area. This agency will be centralized in Headquarters XII Air Support Command, who will maintain close liaison with the Hq. Ship.

On arrival in the assault area these fighters will come under the control of Hq. Ship until such time as No.64 Fighter Wing forward fighter control is established ashore and capable of taking over this commitment. To assist this forward fighter control to control RAF Fighter Wings operating under XII Air Support Command, Air Officer Commanding, Desert Air Force will attach two Controllers to No.64 Fighter Wing and provide sufficient R/T facilities as outlined and provide sufficient R/T equipment to enable them to exercise control.

In order to ensure continuity of control, the Senior Controller of the forward fighter control and one of the two Controllers detached by Air Officer Commanding Desert Air Force will be carried in the Hq. Ship and transferred to the shore when forward fighter control takes over.

EMPLOYMENT OF BOMBER FORCE

12. During the preparatory period and prior to D Day "Avalanche"/"Eavtown", the Tactical Bomber Force will be required to assist Strategic Air Force with attacks on airfields and communications by day and night.

Operation instructions covering the employment of the Tactical Bomber Force during the phase will be issued to you immediately

the plan for the employment of Strategic Air Force has been received.

13. In view of the difficulty of providing fighter escorts, particularly for attacks in the "Avalanche" area, you should be prepared to operate your force intensively by night.

14. Prior to D Day, fighter escorts for bombers operating against Southern ITALY will be drawn from both Desert Air Force and XII Air Support Command, the overall requirements being co-ordinated by Air Officer Commanding Desert Air Force through No.1 MORU.

15. During the "Avalanche" assault, before our fighters are established ashore, bomber support for the landing will be provided as far as possible by Strategic Air Force and fighter-bombers. You must be prepared, however, to operate light bombers with a small escort under the general cover of the fighters in the target area.

16. On the successful conclusion of the assault stage, light bomber effort by day is likely to be required for the support of our land forces. Requests for bomber support will be initiated by the Commanding General XII Air Support Command and Air Officer Commanding Desert Air Force. You are to provide a small Advanced Headquarters with Advanced Desert Air Force and Advanced XII Air Support Command to handle these requests and arrange the fighter escort requirements. These advanced Headquarters will require direct W/T communication with your main Headquarters and the bomber units controlled by them.

GROUND RECOGNITION

17. You are to discuss the means to be employed to assist the recognition of our ground forces with the 5 Army - 6th U.S. Corps and X British Corps - and with 8 Army - XII Corps - and ensure that all visual signals are known to the flying crews in your units.

AIR SEA RESCUE

18. Coastal have been asked to undertake responsibility of Air Sea Rescue in the area between the North Sicilian coast and the assault areas. Details of the organization provided will be issued later.

PLANNING FOR "AVALANCHE"

19. In view of the little time available for preparation and planning, Commanding General XII Air Support Command and Air Officer Commanding Desert Air Force will send senior representative to this Headquarters on 19th August at 1030 hours to co-ordinate arrangements required for "Avalanche". It will probably be necessary to hold a similar conference every three or four days apart from the daily interchange of information which will be necessary between Tactical Air Force, XII Air Support Command and Desert Air Force.

20. You should inform this Headquarters of any difficulties which may arise in order that immediate action can be taken to assist you.

Air Marshall,
Air Officer Commanding,
Tactical Air Force.

Distribution:

	<u>Copy No.</u>
Air Officer Commanding, Tactical Bomber Force.	1 & 2
Air Officer Commanding, Desert Air Force.	3
Commanding General, XXI Air Support Command	4
Commanding General, Northwest African Air Forces	5 & 6
C.C.S., 15 Army Group	7

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ANNEX D

MEMORANDUM

SC7/Ops./7.
15 November 1943.

SUBJECT: Air Support Control Arrangements at Hq. Fifth Army for "Avalanche" and Subsequent Operations of Fifth Army to Date.

PLANNING

1. In the early part of August, 10 Corps were ordered to plan for Operation "Buttress", under command Eighth Army. Although 7 A.A.S.C. had been allotted to the Corps for the operation no use could be found for this unit since 2/5 A.A.S.C. was already operating at Hq. Eighth Army and was prepared to allot tentacles to 10 Corps. These tentacles were accordingly shipped from SICILY to NORTH AFRICA and joined 10 Corps formations in preparation for the "Buttress" landing.

2. The plan was then suddenly altered and 10 Corps was placed under command Fifth Army to take part in operation "Avalanche". 10 Corps applied to AFHQ for the services of No.7 A.A.S.C. and the unit was placed once more under command 10 Corps. It was, however, decided that there was insufficient time to deploy 7 A.A.S.C. tentacles to 10 Corps formations, some of which were in TRIPOLI, some in the ALGIERS area.

3. The following compromise plan was therefore agreed to by 10 Corps and authorised by Fifth Army after consultation with XII Air Support Command.

- a. 2/5 A.A.S.C. tentacles to remain with 10 Corps but to be relieved for return to Eighth Army by 7 A.A.S.C. tentacles before D plus 21.
- b. From D Day to D plus 3 these tentacles would work on the British Air Support wave to Hq, Ship, USS ANCON to a staff and operators provided by 7 A.A.S.C.
- c. From D plus 3 until such time as tentacles and Control of No.7 A.A.S.C. were landed (i.e., before D plus 21) to a control provided by 2/5 A.A.S.C. but to a staff provided by No.7 A.A.S.C. with the addition of one officer from 2/5 A.A.S.C.
- d. The necessary 7 A.A.S.C. staff, personnel and vehicles

were shipped to SICILY where they were to join the Control contingent supplied by 2/5 ASC, before sailing for ITALY, where they were scheduled to arrive on D plus 1.

4. XII ASC was anxious to adopt the British Air Support Control system throughout Fifth Army and proposed that the Air Support Parties allotted to 6 Corps and the U.S. Divisions should not work directly to their own A-3 (Operations) Staff but instead to the British Air Support Control Staff which would be part of the G-3 organization of Fifth Army Hq. Thereby the demands of both 6 and 10 Corps would be dealt with by the same staff and these, when approved by G-3 Fifth Army on either Corps front, would be passed under normal British ASC practice to A-3, XII ASC for action. No final decision on this important point of policy was made at this juncture.

5. Fifth Army, at the request of XII ASC, agreed to find two ALO's who would be sent to each of the US Fighter Bomber Groups, as it was considered desirable to start the ALO system with Air Corps Groups.

ASSAULT: Phase I - Headquarters Fifth Army and XII ASC on Board USS ANCON 9 - 13 September.

6. By the evening of D Day, tentacles with 128 Bde, 46 Div., 167 Bde, 168 Bde and 56 Div. were in good communication with Control on board USS ANCON. 10 Corps Hq. which was on board HMS HILARY had also been in communication with Control, but throughout the landing operation unnecessary difficulties were experienced with the latter station, probably because the operators on HMS HILARY were not trained in Air Support procedure.

7. Owing to the complete commitment of fighters to the protection of beachheads and the assault convoy, no close support day bombing was possible during this phase, as no fighter escort was available. The provision of the Air Support net was, however, fully justified as Tac/R results and changes of bomblines were passed regularly. Requests for Tac/R were also received. On certain occasions, generally at night, permission was given for the passing of administrative traffic from Brigades to Divisions.

8. Owing to a mistake in shipping arrangements, no Air Support Parties were available at US Divisions or at 6 Corps. This was unfortunate as inevitable delay was caused in the passing of much valuable Tac/R information.

9. The Tac/R aircraft called the ANCON when returning from their missions and detailed interrogation results were sent by radio from XII ASC Rear Hq. in SICILY to the ANCON after the aircraft had landed. Attempts were also made to broadcast these results from the Tac/R aerodromes, but unfortunately this scheme was not successful as sufficiently powerful transmitters had not been provided for the purpose.

Phase 2 - Headquarters Fifth Army and XII ASC ashore 13-30 Sept.

10. It was decided that Army and Air Headquarters should go ashore on D plus 3.
11. Although it had been decided that throughout the operation there should always be a joint Army-Air Hq., this principle was temporarily abandoned. XII ASC wished to move to the MONTECORVINO area since the majority of their communications equipment had been landed in that area as it had been hoped that the aerodrome would be captured on D Day. For tactical reasons Army Hq. had to be sited in the PAESTUM area, some twenty miles further south. The Air Support Control was ordered to remain with XII ASC.
12. This division of Hq's. proved quite unworkable, as it was impossible to establish line communication between the two Hq's. owing to the close proximity of the enemy. Accordingly on the following day, 13th September, XII ASC moved to Army Hq. near PAESTUM.
13. G-3, Fifth Army and A-3, XII ASC now agreed to experiment with the British Air Support Control system. The Air Support Control established itself adjacent to G-3 and arrangements were made to deal with the 6 Corps message traffic from Air Support Parties, who had joined up with their formations on 13th September, as well as the traffic from 10 Corps tentacles. From 13th September to date this system has worked to the complete satisfaction of both Army and Air Corps. Demands for support and changes of bomblines are submitted to G-3 Army for decision and agreement and are passed to A-3, XII ASC for action. Air Support Control is now accepted as part of G-3 Staff and is responsible for the detailed "laying on" of targets, approved by G-3, with XII ASC, who regard the ASC as the medium through which they deal on all detail in Army-Air matters, with the exception of policy.
14. From 13 to 16 September it was not possible to accept opportunity targets from the tentacles or Air Support Parties, as no fighter bombers had yet been established on landing grounds in Fifth Army area. The situation was critical since the enemy had nearly succeeded in splitting the bridgehead in two by making a strong push from BATTIPAGLIA to the sea. On the 14th September an immense volume of air effort was concentrated on the BATTIPAGLIA and EBOLI areas. Fortresses and mediums from Strategic Air Force, as well as the whole Tactical Bomber Force, participated in the "blitz". P-38's with long range tanks were ordered, in addition, to search out their own opportunity targets and to bomb and strafe as close to the bomblines as possible. These attacks were repeated on 15th September, and were also backed up by heavy naval bombardment from battleships and cruisers.
15. By 16th September the situation had been, to a large extent, restored. A share of the credit for this effort must go to the Air Corps for the supreme efforts that were made during these two vital days.

16. During this period the Air Support Control had been passing results of pre-arranged air effort forward to formations. This information was provided by XII ASC. In addition bomblines changes were received. It was also possible to broadcast Tac/R results over the Air Support Party and tentacle nets until arrangements for squadron Tac/R broadcasts from aerodromes became operative on 16th September. From then onwards Tac/R broadcasts were not passed over Air Support channels unless formations stated that they were unable to receive broadcasts.

17. On 16th September a fighter-bomber squadron commenced to operate from PAESTUM by day, returning to the mainland before dark. It was thenceforward possible to accept opportunity targets according to the number of aircraft available.

18. By 20th September all Air Support Parties and tentacles were visited by an officer from Air Support Control. Formations expressed themselves well satisfied with the working of the new system. U.S. formations were particularly emphatic on this point. It had, however, become apparent that it was not possible to obtain results of air missions with either sufficient speed or detail unless rear links with Air Liaison Officers were deployed to Air Corps fighter-bomber and fighter groups. XII ASC stated that they were in full agreement with this view and were prepared to accept rear links and ALO's with their formations as soon as they could be made available.

19. Fifth Army agreed that No.7 ASC needed strengthening, and requested that wireless sets and certain personnel of No.9 ASC be made available by 15 Army Group, in order that the full commitments for tentacles on a possible three Corps front could be met. Fifth Army also stated that they intended to create an American Air Support Control which would be trained by 7/9 ASC and eventually relieve it.

20. G.1 (Air) 15 Army Group visited Fifth Army on 21st September, when it was agreed that the majority of No.9 ASC would be made available, that ALO's would be provided and that the landing of the balance of No.7 ASC would be speeded up. It was also agreed that certain changes in establishment were necessary in order to give 7/9 ASC with Fifth Army the same status as 2/5 ASC with Eighth Army. These changes included the upgrading of the Commanding Officer to G.S.O.1 and the provision of four (including the G.S.O.1), instead of three, staff officers at Control.

21. From 21 - 30 September no changes were made within the Air Support Control organization. Opportunity targets could be engaged more often as by now three squadrons of 86 Fighter-Bomber Group were operating from PAESTUM. The Tac/R broadcast arrangements by which the two Tac/R squadrons broadcast their results at alternate clock quarter hour intervals on the same frequency began to work more smoothly and repeats over Air Support nets became less frequent.

22. An air meeting was held regularly each evening by G-3 at which the following days air support requirements were discussed and a programme agreed to. Representatives from G-2, XII ASC and Air Support Control attended this conference, which had now become a standing arrangement. G-3 agreed that Air Support Control should send a high grade cipher message over Air Support channels to Corps and divisions giving the intentions for air support for the following day with as much detail as possible, including targets to be attacked, type of aircraft and time of attack. Corps were instructed to telephone their requests for air support by 1800 hours each evening, in time for discussion at the Air conference.

Period 1 October to 15 November

23. On 7th October, Lt. Col. Hansborough, U.S. Army, was selected by Fifth Army to form the new American Air Support Control. Long discussions took place in which the future immediate employment of 7/9 ASC and the best methods for the training and equipping of the new U.S. organisation were decided upon. The policy to be followed was:-

- a. 7/9 ASC was to continue to function with Fifth Army until such time as the U.S. Staff, wireless operators and equipment became available and were sufficiently well trained to take over from the British Unit, which by then would be working tentacles and Air Support Parties on a three Corps front, and would have allotted rear links with ALOs to all Groups of XII ASC. The Air Support Communications Squadron at present supplying the Air Support Parties with 6 Corps formations would also continue to work as at present with 7/9 ASC until the change took place.
- b. The new American organisation would be developed to function on practically the same lines as those followed by 7/9 ASC. The proposed establishment of personnel and equipment of the unit would be prepared as soon as possible by Lt. Col. Hansborough for the approval of the Commanding General of Fifth Army and XII ASC after a careful study had been made of the existing arrangements and operational methods of 7/9 ASC.
- c. 7/9 ASC would assist in the training of this new organisation in the following ways:-
 - i. Each of the U.S. Hq. Staff was to be attached to No. 7/9 ASC for a period of at least three weeks, during which time they would work as part of the British Staff.
 - ii. Tentacles were to be deployed with all U.S. formations with Air Support Parties in order that during the training period it should be possible for oper-

ators with existing ASP's to be withdrawn to form new ASP's and be replaced by newly joined personnel. With the tentacles as a stand-by and all messages to and from Air Support Control duplicated on tentacle and Air Support Party nets, formations should suffer no loss of efficiency in Air Support communications during this training period. New radio operators would also have the additional advantage of being trained under battle conditions.

- iii. Arrangements were to be made for the attachment of U.S. Army officers to Desert Air Force for training as Air Liaison Officers with Fighter-Bomber Groups. These officers would then replace existing British ALO's with XII ASC Groups.

24. During this period, owing to the arrival of the balance of No.7 ASC on 5th October and of certain personnel and equipment of No.9 ASC on 18th and 27th October, it has been possible to implement the decisions mentioned in paras. 19,20 and 23, by the following action:-

- a. Rear links with ALO's have now been allotted to all XII ASC formations (See Appendix 'A' - Lay-out of tentacles and rear links 7/9 ASC as at 15th November, 1943).
- b. Tentacles of 7 and 9 ASC are now allotted to U.S. formations in 6 and 2 Corps in parallel with Air Support Parties (See Appendix 'A').
- c. The proposed establishment of U.S. Air Support Control has been approved by XII ASC and Fifth Army. This embodies an Hq. Staff of 16 Officers from whom ALO's with Air Corps formations and Liaison Officers with Army formations, in addition to Hq. Control Staff, will be found. An Army Air Support Communications Squadron comprising 32 radio sets will provide ASP's (tentacles) on a possible three corps front, rear links at all XII ASC formations and a Control at Army-Air Hq. The provision of personnel and equipment will be an Army responsibility with the exception of the basis of the communications squadron which will consist of No.2 Air Support Communications Squadron (comprising 8 Air Support Parties) made available to Fifth Army by XII ASC. This squadron has had considerable operational experience.
- d. Five American ALO's have been attached to either Desert Air Force or Tactical Bomber Force and have now returned for service with XII ASC Groups.

25. It is now proposed to discuss the details of Air Support

provided for Fifth Army by XII ASC during the period. This support has been continuous and effective. The machinery established for the purpose has worked smoothly and with the exception of the gradual provision of ALO's with rear links with fighter and fighter-bomber Groups, has hardly altered since the early days of the assault landing.

26. The ALO system has been justified, both in the quick results obtained of all missions carried out on the Fifth Army front and for the extra information on Army matters now available to Air Corps formations. This latter factor is of immense importance in the briefing of fighter-bomber pilots engaged in direct support Army missions. Every pilot should be able to obtain satisfactory explanations of the motives and reasons behind all Army request sorties.

27. An increasing use of air photographs in the briefing of pilots for direct support missions is now being made. 1/50,000 mosaics of the immediate Army front are already issued to Tactical Bomber Force and all Fighter-bomber Groups. Arrangements are now in hand for the issue of specially gridded 1/15,000 mosaics. Special reference using this grid will be given in addition to map references in all pre-arranged and opportunity targets, so that all missions can be briefed in detail on photographs as well as maps. At the moment no important pre-arranged close support missions are arranged without the provision of annotated air photographs for the briefing of pilots.

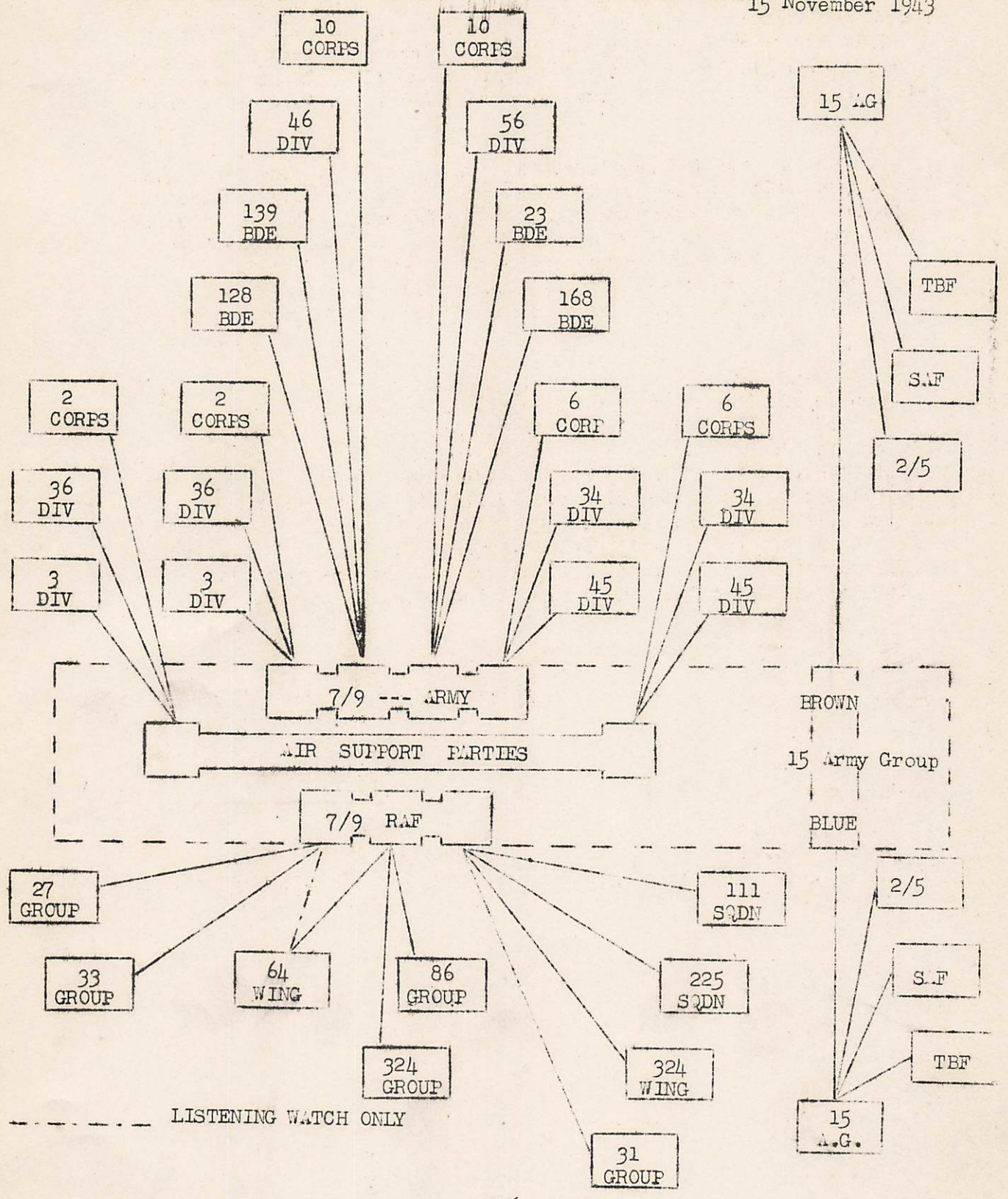
28. At Appendix 'B' Line Diagram of 7/9 ASC at Joint Hq. Fifth Army - XII ASC, is shown.

15 November 43.

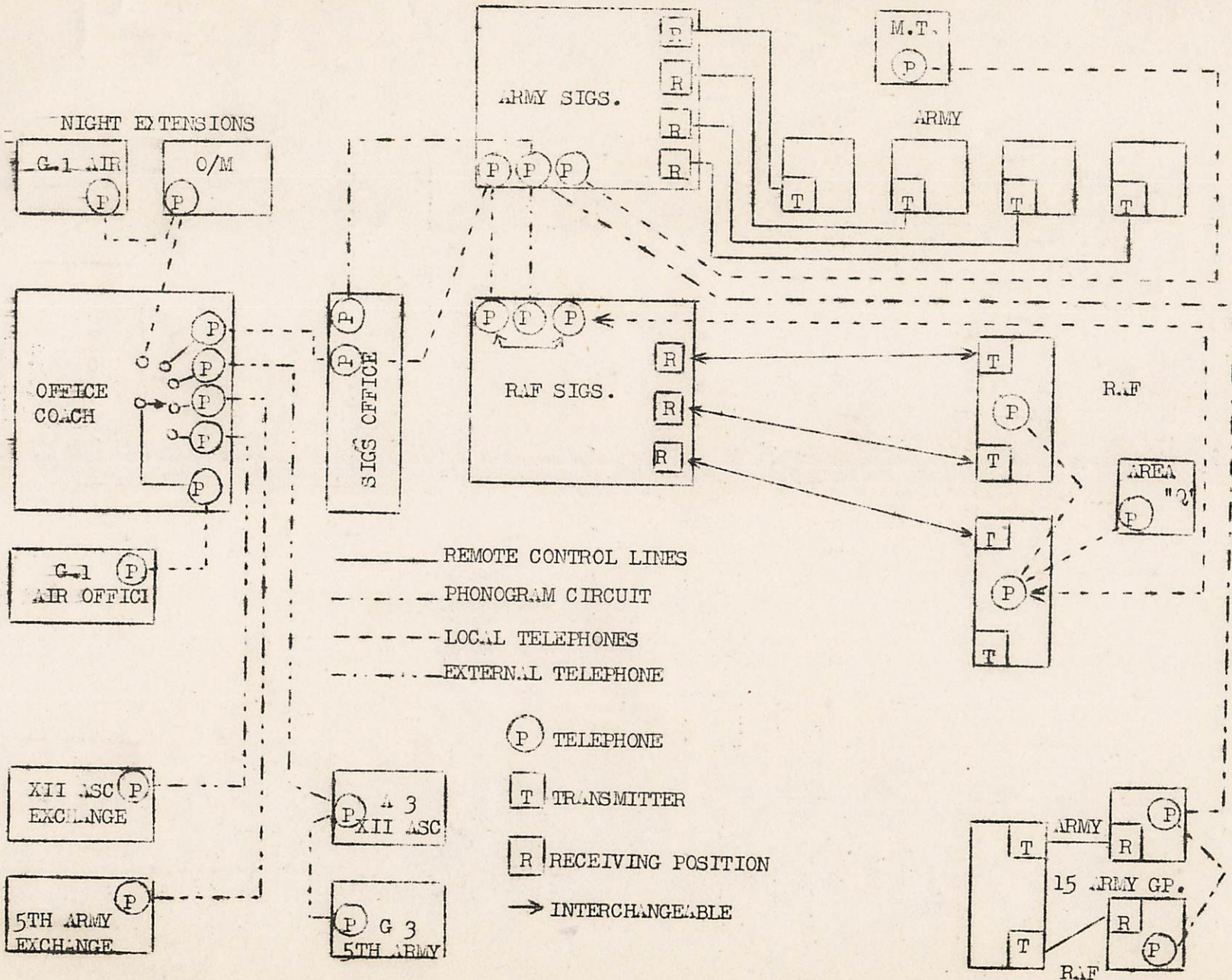
Lt. Col.,
G.S.O.1
Commanding 7/9 ASC.

NO. 7/9 A. AIR S.O. OPERATING AT JOINT H.Q. 5TH ARMY & XII ASC

15 November 1943



LISTENING WATCH ONLY



ANNEX E

EFFORT OF USAF GROUPS IN PREPARATION FOR AND IN SUPPORT OF
AVALANCHE OPERATIONS

(15 August 1943 to 18 September 1943 Incl)

GROUP	TYPE OF A/C	AVERAGE A/C STRENGTH	AVERAGE A/C OPERATIONAL	EFFECTIVE SORTIES	NON-EFFECTIVE SORTIES	SPARES	TOTAL AIRBORNE	HOURS FLOWN	A/C AIRBORNE ON FB MISSIONS
2 B Gp	B-17			435	50	0	485	2793.75	
97 B Gp	B-17			375	122	0	497	3065.75	
99 B Gp	B-17			437	33	0	470	2541.50	
301 B Gp	B-17			474	41	0	515	3009.75	
TOTAL	B-17	220	179	1721	246	0	1967	11410.75	
17 B Gp	B-26			622	6	0	628	3070.25	
319 B Gp	B-26			644	41	28	713	3185.00	
320 B Gp	B-26			608	54	20	682	3117.75	
TOTAL	B-26	201	158	1874	101	48	2023	9373.00	
12 B Gp	B-25			697	36	0	733	1753.00	
310 B Gp	B-25			801	1	0	802	3215.25	
321 B Gp	B-25			905	12	0	917	3859.25	
340 B Gp	B-25			624	80	0	704	1993.75	
TOTAL	B-25	304	273	3027	129	0	3156	10821.25	
47 LB Gp	A-20	65	53	432	43	3	478	740.25	
27 FB Gp	A-36			1310	77	0	1387	3053.75	957
86 FB Gp	A-36			1395	42	0	1437	2905.75	960
TOTAL	A-36	157	127	2705	119	0	2824	5959.50	1917
1 F Gp	P-38			1401	181	13	1595	5418.50	334
14 F Gp	P-38			1300	54	14	1368	5178.75	490
82 F Gp	P-38			1636	132	61	1829	5124.25	483
TOTAL	P-38	245	199	4337	367	88	4792	15721.50	1307
33 F Gp	P-40			512	15	0	527	819.50	50
57 F Gp	P-40			656	13	0	669	1468.75	180
79 F Gp	P-40			462	34	0	496	1057.00	203
99 F Sq	P-40			24	26	0	50	71.25	12
TOTAL	P-40	264	168	1654	88	0	1742	3416.50	445
111 R/Sq	P-51	14	8	215	0	0	215	417.00	0
31 F Gp	Spit	80	54	643	6	0	649	1550.00	0
GRAND TOTAL		1550	1239	16608	1099	139	17846	59309.75	3668

A/C LOSSES

COMBAT CREWS

GROUP	TYPE OF A/C	DESTROYED	MISSING	DAMAGED	DESTROYED & MISSING	KILLED	MISSING	SEVERELY WOUNDED	KILLED & MISSING	A/C STAGES INVOLVING CREW PERSONNEL	A/C STAGES INVOLVING FULL CREWS
2 B Gp	B-17	2	4	42	6	0	50	8	50	5	5
97 B Gp	B-17	3	1	82	4	1	28	9	29	3	3
99 B Gp	B-17	2	0	45	2	2	10	3	12	2	2
301 B Gp	B-17	<u>1</u>	<u>0</u>	<u>50</u>	<u>1</u>	<u>0</u>	<u>9</u>	<u>3</u>	<u>9</u>	<u>1</u>	<u>1</u>
TOTAL	B-17	8	5	219	13	3	97	23	100	11	11
17 B Gp	B-26	0	0	19	0	0	0	3	0	0	0
319 B Gp	B-26	7	2	26	9	0	27	8	27	6	4
320 B Gp	B-26	<u>10</u>	<u>0</u>	<u>71</u>	<u>10</u>	<u>2</u>	<u>30</u>	<u>0</u>	<u>32</u>	<u>7</u>	<u>5</u>
TOTAL	B-26	17	2	116	19	2	57	11	59	13	9
12 B Gp	B-25	1	0	58	1	0	0	1	0	1	0
310 B Gp	B-25	10	0	43	10	1	47	2	48	9	8
321 B Gp	B-25	0	0	8	0	0	0	2	0	0	0
340 B Gp	B-25	<u>5</u>	<u>2</u>	<u>35</u>	<u>7</u>	<u>10</u>	<u>10</u>	<u>0</u>	<u>20</u>	<u>7</u>	<u>5</u>
TOTAL	B-25	16	2	144	18	11	57	5	68	17	13
47 LB Gp	A-20	0	0	11	0	0	0	0	0	0	0
27 FB Gp	A-36	4	7	11	11	0	7	0	7	7	7
86 FB Gp	A-36	<u>10</u>	<u>3</u>	<u>25</u>	<u>13</u>	<u>4</u>	<u>4</u>	<u>0</u>	<u>8</u>	<u>8</u>	<u>8</u>
TOTAL	A-36	14	10	36	24	4	11	0	15	15	15
1 F Gp	P-38	3	28	13	31	1	28	0	29	29	29
14 F Gp	P-38	3	8	14	11	0	11	0	11	11	11
82 F Gp	P-38	<u>9</u>	<u>16</u>	<u>4</u>	<u>25</u>	<u>0</u>	<u>22</u>	<u>0</u>	<u>22</u>	<u>22</u>	<u>22</u>
TOTAL	P-38	15	52	31	67	1	61	0	62	62	62
33 F Gp	P-40	3	0	2	3	1	1	0	2	2	2
57 F Gp	P-40	4	2	6	6	0	2	0	2	2	2
79 F Gp	P-40	2	1	10	3	0	2	0	2	2	2
99 F Sq	P-40	<u>1</u>	<u>0</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
TOTAL	P-40	10	3	20	13	1	5	0	6	6	6
111 R/Sq	P-51	1	0	0	1	0	0	0	0	0	0
31 F Gp	Spit	3	3	9	6	0	3	0	3	3	3
GRAND TOTAL		84	77	586	161	22	291	39	313	127	119

BOMB EXPENDITURE

GROUP	TYPE OF A/C	BOMBS EXPENDED								TONS EXPENDED ON T-RGET
		2000	1000	500	300	250	100	40	20	
2 B Gp	B-17	-	-	2480	1504	144	1556	-	5004	991.44
97 B Gp	B-17	-	36	2280	752	-	1862	-	10080	894.70
99 B Gp	B-17	64	64	2384	0	32	480	-	14658	866.58
301 B Gp	B-17	-	-	2576	1270	23	3418	-	8186	1090.14
TOTAL	B-17	64	100	9720	3526	199	7316	-	37928	3842.86
17 B Gp	B-26	-	-	2020	684	290	3333	-	2040	830.90
319 B Gp	B-26	-	244	1314	1164	50	3485	-	2760	833.20
320 B Gp	B-26	-	96	2240	511	-	2609	-	4308	858.18
TOTAL	B-26	-	340	5574	2359	340	9427	-	9108	2522.28
12 B Gp	B-25	-	878	1907	196	1917	-	-	-	1184.78
310 B Gp	B-25	-	-	2710	2062	-	854	-	-	1029.50
321 B Gp	B-25	-	-	4171	1183	201	-	-	-	1245.33
340 B Gp	B-25	-	431	976	395	4482	-	-	-	1079.00
TOTAL	B-25	-	1309	9764	3836	6600	854	-	-	4538.61
47 LB Gp	A-20	-	-	-	-	541	614	-	14719	245.52
27 FB Gp	A-36	-	-	1481	2	-	-	-	-	370.55
86 FB Gp	A-36	-	-	1422	-	-	-	-	-	355.50
TOTAL	A-36	-	-	2903	2	-	-	-	-	726.05
1 F Gp	P-38	-	-	358	-	-	-	-	-	89.50
14 F Gp	P-38	-	161	389	-	-	-	-	-	177.75
82 F Gp	P-38	-	24	620	-	-	-	-	-	167.00
TOTAL	P-38	-	185	1367	-	-	-	-	-	434.25
33 F Gp	P-40	-	-	11	-	26	-	-	-	6.00
57 F Gp	P-40	-	-	34	-	48	-	546	-	25.42
79 F Gp	P-40	-	-	69	-	144	-	150	-	38.25
99 F Sq	P-40	-	-	0	-	-	-	-	-	-
TOTAL	P-40	-	-	114	-	218	-	696	-	69.67
31 F Gp & 111 R/Sq. (No Bombs Carried)										
GRAND TOTAL		64	1934	29442	9723	7898	18211	696	61755	12379.24

AMMUNITION EXPENDITURE

GROUP	TYPE OF A/C	AMMUNITION EXP.		
		50 Cal	20 MM	303
2 B Gp	B-17	309291		
97 B Gp	B-17	119092		
99 B Gp	B-17	296125		
301 B Gp	<u>B-17</u>	<u>127485</u>		
TOTAL	B-17	851993		
17 B Gp	B-26	76600		
319 B Gp	B-26	68656		
320 B Gp	<u>B-26</u>	<u>85795</u>		
TOTAL	B-26	231051		
12 B Gp	B-25	4194		
310 B Gp	B-25	36630		
321 B Gp	B-25	75720		
340 B Gp	<u>B-25</u>	<u>10</u>		
TOTAL	B-25	116554		
47 LB Gp	A-20	2255		
27 FB Gp	A-36	168672		
86 FB Gp	<u>A-36</u>	<u>195945</u>		
TOTAL	A-36	364617		
1 F Gp	P-38	63319	6731	
14 F Gp	P-38	80627	8033	
82 F Gp	<u>P-38</u>	<u>79542</u>	<u>1648</u>	
TOTAL	P-38	223488	16412	
33 F Gp	P-40	16818		
57 F Gp	P-40	15110		
79 F Gp	P-40	45110		
99 F Sq	<u>P-40</u>	<u>0</u>		
TOTAL	P-40	77038		
111 R/Sq	P-51		100	
31 F Gp	Spit		1059	5547
GRAND TOTAL		1866996	17571	5547