THE GENERAL BOARD

United States Forces, European Theater

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# SUPPLY AND EVACUATION BY AIR

MISSION: Prepare a Factual Annotated Report of the Organization, Equipment and Procedure for Supply and Evacuation by Air in the European Theater.

The General Board was established by General Order Number 128, Headquarters, European Theater of Operations, U. S. Army, dated 17 June 1945, as amended by General Order Number 182, dated 7 August 1945, to prepare a factual analysis of the strategy, tactics, and administration employed by the U. S. Forces in the European Theater.

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UNITED STATES FORCES, EUROPEAN THEATER
APO 408

# SUPPLY AND EVACUATION BY AIR

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# SUPPLY AND EVACUATION BY AIR

## PREFACE

1. The general lack of War Department publications concerning the organization and procedure required for supply and evacuation by air together with the extensive use of both supply and evacuation by air in the European Theater, was such that it was deemed advisable by The Theater General Board to undertake this study. Thus the G-4 Section of the Theater General Board was given the mission to "prepare a factual annotated report of the organization, equipment, and procedure for air supply and evacuation in the European Theater". The scope of this report was to include:

a. A discussion of the organization planned for supply and evacuation by air, the changes in the planned organization and the reasons therefor, and the organization finally evolved.

b. A description of both the ground and air equipment used for aerial supply and evacuation.

c. A discussion of the use of supply and evacuation by air, both scheduled and emergency, during actual operations.

d. Recommendations based on experience in this Theater as to the organization and method of operations that should be adopted under similar situations.

2. This study has been limited to scheduled and emergency supply to ground force units, emergency supply to isolated units, the alleviation of emergencies created by enemy action and weather, augmentation of sea, road, and rail supply to tactical ground forces, and the evacuation of the wounded. The supply of airborne operations, the supply of tactical air forces, the movement of units and headquarters, and the provision of internal air transport and courier service have not been included as a part of this study. Each could be considered of such magnitude to warrant a separate study.

## CHAPTER 1

## PLANNED ORGANIZATION AND OPERATIONS

### SECTION 1

### SUPPLY BY AIR

3. Field Service Regulations. Supply by air is defined by Field Service Regulations as the transportation of supplies by cargo aircraft or gliders from a rear base to a forward landing area or over a forward area on which supplies are dropped from the planes to the ground by parachute. Supply by air is characterized by freedom of movement over terrain which is inaccessible to or impassable to normal means of transportation or through which normal movement is denied by enemy activity. Aircraft are thus able to close the break in the normal channel of supply

which is caused by terrain, distance or enemy activity. It is further characterized[2] by its speed, but this speed is only applicable once the airplanes are under way. Supply by air is limited by the availability of suitable and sufficient aircraft, equipment and crews; by the performance, that is speed, range and carrying capacity, of the available aircraft; by ground facilities at points of departure and destination; and by enemy activity and the weather. Field Service Regulations specify that the supply of ground units by air is an emergency expedient only and that routine use of troop carrier aircraft for supply purposes is costly and is not contemplated. Although Field Service Regulations state that supply by air is costly, the European Campaign has shown that supply and evacuation may no longer be considered costly in view of the importance of the results obtained. The usual mission[3] for air transport as a medium of supply for other than airborne divisions is stated to be the resupply of units which have been cut off from normal channels of supply by terrain, distance or enemy activity. The European Campaign has shown that the usual mission of supply and evacuation by air may be considered to be a supplement to other forms of transportation especially in fast moving situations or at the beginning of amphibious operations when water lift is scarce. This, and the fact that supply by air may no longer be considered costly, is predicated on air superiority.

4. Joint Administrative Plan. Early administrative planning as shown in Joint Administrative Plan for Operation "OVERLORD"[4] contemplates the use of aircraft for supply and evacuation by air. Responsibilities for evacuation by air were fixed and Air Force was charged with air phase of evacuation. Further instructions were to be issued on supply by air. Within the month of April SHAEF (Supreme Headquarters Allied Expeditionary Force) issued directives establishing CATOR (Combined Air Transport Operations Room) and fixed the responsibility for allocation of aircraft for aerial resupply.

5. Regulating Agency. Field Service Regulations[5] contemplated the establishment of an agency (regulating station) for the control of air traffic within a theater; that is, for the control of such air transport as might be allocated for the purpose of supply and evacuation. The regulating officer[6] designated for such air traffic would exercise such control over air transport as might be directed by the theater commander. In April 1944 SHAEF[7] directed Headquarters AEAF (Allied Expeditionary Air Forces) to establish and control such an organization, to be known as CATOR, for the purpose[8] of controlling the employment of allied troop carrier and transport aircraft on supply by air missions, other than those for airborne forces.

6. First SHAEF Directive. This first SHAEF directive stated[9] that supply by air was an overall title and referred to the transportation by air of all types of supplies, replacements, etc. It included both scheduled and emergency supply by air.

a. Scheduled supply by air[9] was defined as the use of aircraft on a scheduled basis for meeting predetermined commitments for the carriage of supplies or personnel from an air base, base depot or rear area to a forward base, depot or operational headquarters. Those commitments were normally anticipated and planned for in advance of operations. Scheduled supply by air was authorized[10] for the conveyance of staff officers and couriers, official dispatches and press material, and certain categories of Navy, Army and Air Force supplies, which by their nature and the urgency of their daily requirement were necessarily carried by air.

b. Emergency supply by air[9] was defined as the employment of aircraft to meet emergency demands for the carriage of supplies or replacements from an air base, base depot or rear area to any part of the operational theater. Emergency demands were normally the result of unforeseen and unexpected operations requiring urgent movement of supplies or personnel which could not be planned for in advance. Emergency supply by air was authorized[10] only under the following conditions:

(1) As a priority task for the purpose of meeting the need for urgent movement of particular supplies when other

means of transportation were not immediately available or were impracticable in the conditions prevailing.

(2) For the maintenance of a fighting unit in the field, when for operational reasons, the normal means of maintenance were considered too slow, were broken down, or were interrupted by the enemy.

(3) For the movement of the air echelons of air force units, ground staffs, and military replacements.

c. The employment of all transport and troop carrier aircraft[11] was made subject to the overriding control of the Supreme Commander, who could allot aircraft to specific ground or air force units for a specific time and purpose as necessary. First priority was given to airborne operations for the employment of all heavy transport and troop carrier aircraft controlled by the IX Troop Carrier Command. In case of simultaneous demands for emergency supply by air and airborne operations, the allocation of aircraft[11] for emergency supply purposes could only be made on authority of the Supreme Commander. However, a limited number of heavy transport planes unsuitable for airborne operations and light aircraft controlled by the Ninth Air Force were made available[11] to meet supply by air commitments on a limited scale in the American area. The use of aircraft for supply by air was initially limited[12] by the availability of airfields, the degree of air superiority, the availability of supply dropping equipment and aircraft, and the weather.

d. Bids[13] for scheduled supply were initially to be submitted to CATOR and duplicated through normal Navy, Army and Air Force channels to the authority responsible for providing the supplies requested. Copies of bids for scheduled and emergency supply were to be submitted to SHAEF (G-4 Movements and Training) and in the case of emergency bids, to SHAEF (G-3). Demands for supply by air were only to be submitted by a naval or army headquarters after full consultation with the air force headquarters with which they were operating. Tactical Air Forces and ANXF (Allied Naval Expeditionary Force) were authorized to submit their bids for air supply direct to CATOR but army groups were to submit their bids to CATOR through their respective Tactical Air Forces. This was later amended[14] so that the naval headquarters on the continent submitted their demands through their proper tactical air headquarters in accordance with the same procedure as used by the army group. Since 21 Army Group was initially responsible[13] for both British and American Forces, First US Army was to coordinate its requirements with Headquarters 21 Army Group (US Administrative Staff) and not with 1st US Army Group. Lower echelons were to submit their demands for supply by air through normal channels to the army group or tactical air force which was to transmit them to CATOR if approved. It was the responsibility of CATOR[13] to coordinate all demands by:

(1) Arranging for the introduction of all scheduled air courier services and providing all aircraft required to meet emergency demands.

(2) Arranging with Headquarters AEAF for the provision of fighter escorts as necessary.

(3) Notifying supply organizations of the location of airfields and the time at which supplies were to be delivered.

e. When demands for scheduled or emergency supply by air were in excess of available aircraft and the shortage could not be resolved, Headquarters AEAF was directed to refer the matter to SHAEF for a decision on priorities.[15] CATOR was made responsible[15] for notifying the Tactical Air Forces daily of the estimated air lift available the following day to assist them in regulating demands and coordinating priorities.

f. The selection[16] of base supply airfields to serve base depots

in the UK (United Kingdom) was a responsibility of AEAF, in consultation with ETOUSA (European Theater of Operations United States Army), and the selection of base supply airfields on the continent to serve advanced base depots was a responsibility of the Ninth Air Force in consultation as necessary with either the Communications Zone or 1st US Army Group. The selection of delivery airfields in forward areas was to be decided upon after consultation between the ground and air force unit making the demand. The selection and marking of dropping zones would be performed by the unit demanding supply by air after consultation with its air force liaison officer. After an aerial dropping had been made, the unit receiving such supplies was responsible for the recovery of parachutes, panniers, and special containers used in the dropping. The unit was responsible[17] for returning this equipment to the UK or elsewhere as specified as soon as possible through normal supply channels.

g. The movement[18] of supplies from depots to airfields was the responsibility of the supply organization meeting the demand. The packing, handling, reception, weighing, and outloading of the supplies at the supply airfield and the unloading at the delivery airfield was made the responsiblity of the Ninth Air Force. The clearance of the supplies from the delivery airfield to the forward depot and the provision of personnel to assist in this unloading was the responsibility of the headquarters demanding the supplies. In the case of emergency supply by air the unloading and the clearance of supplies from the delivery airfield or dropping zone was the responsibility of the unit being supplied by air.

7. Second SHAEF Directive. In May 1944, SHAEF issued another directive[19] further clarifying the supply by air procedure. 1st US Army Group and 21 Army Group were to submit their requirements[20] for scheduled air lift through their respective Tactical Air Forces, who were to coordinate these requirements with their own and submit them to CATOR. Naval requirements were to be submitted to ANXF and thence to CATOR through the appropriate Tactical Air Force. Four (4) days notice was required for increasing the amounts of scheduled supply by air and CATOR was to be notified immediately in event of cancellation or decreases in requirements.

a. In scheduled[20] supply by air CATOR was to notify the headquarters demanding the air lift and the supply and movement agency of the tonnage allocated for scheduled supply by air. Details of the stores and supplies required were to be submitted to both CATOR and the supply and movement agency by the demanding authority. The supply and movement agency was to arrange for the movement of the supplies to the supply loading airfield.

b. Bids for emergency[21] air lift were to be submitted by signal communication through the same channels as for scheduled supply by air and bulk tonnages by commodities indicated. At the same time as requesting these bids for air lift, the detailed list of the stores or supplies required was to be sent by signal communication to CATOR and repeated to the supply and movement agency. After CATOR had allotted the necessary air lift, CATOR was to notify the demanding headquarters and the supply and movement agency. The supply and movement agency was then to arrange for the movement of necessary stores and supplies to the supply loading airfields.

c. The supply and movement agency[22] for US Army ground force units and US Army air force units was ETOUSA; for the US Navy, it was COMNAVEU (Commander Naval Forces Europe).

d. Where demands for air lift exceeded[23] the air lift available, CATOR was to refer all demands to the SHAEF Air Priorities Board which would make the necessary decisions for the allocation of available air lift. The SHAEF Air Priorities Board[24] consisted of representatives of the following:

SHAEF (G-3) (Chairman)
ANXF
AEAF
AEAF Air Movements Section (Secretary)

8. Third SHAEF Directive. At this same time, SHAEF issued another directive[25] in which ETOUSA and COMNAVEU were respectively made responsible for the documentation and marking of stores and supplies moving by air to the continent. Twenty-first Army Group, 1st US Army Group and ANXF were made responsible for the documentation and marking of stores moving within and from the continent.

9. AEAF Directive. In accordance with these SHAEF directives, the Air C - in - C (Commander in Chief) directed[26] that CATOR be established at STANMORE, England as a special staff section of Headquarters AEAF responsible for the control of all scheduled and emergency air lift as defined by SHAEF. CATOR was organized[27] into an Operations Section and a Supply Section, and was initially under the general direction of the senior air staff officer in all operational matters and of the air officer i/c (in charge) administration in all administrative matters. The Operational Staff was drawn from the Air Transport Branch of AEAF and the Administrative Staff was attached from the War Office, SOS (Services of Supply) (ETOUSA), Ninth Air Force Service Command, and SESO's (Senior Equipment Staff Officer) Branch, AEAF.[28]

a. The functions assigned to the Operations Section[29] were:

(1) To keep all interested parties informed of the air lift available from time to time.

(2) To allocate aircraft between operational tasks, scheduled and emergency demands, in conformity with the policy of the Air C - in - C on behalf of the Supreme Commander.

(3) To advise organizations demanding supply by air whether or not air lift was available. In the latter event, they were to determine whether alternative arrangements for supply by other means were acceptable, and if so, the Supply Section was to be advised accordingly.

(4) To allocate scheduled and emergency supply by air missions to the troop carrier and air transport forces and give any special operational or briefing instructions.

(5) To arrange with Headquarters AEAF for the provision of fighter escorts.

(6) To notify the Supply Section of the acceptance of air lift and the time and place at which supplies were required for air dispatch together with any special instructions regarding marking and packing.

b. The functions assigned to the Supply Section[30] were:

(1) To receive the breakdown of all emergency demands for supply by air and to arrange with the appropriate authorities for the supply and movement to base supply airfields of the loads which were demanded.

(2) To issue to the appropriate authorities any special instructions regarding marking and packing.

(3) To arrange with the appropriate authorities for alternative means of transportation when required.

c. CATOR was designated as the controlling authority[31] for the employment of troop carrier and transport aircraft on supply by air missions. No demands were to be accepted by the IX Troop Carrier Command through any other source. No demands for individual air passage were to be accepted by CATOR as all such demands were to be referred to AEAF Air Traffic Office in London in accordance with SHAEF directives.

d. All demands for supply by air were to be in accordance with the procedure[32] established by SHAEF directives. Direct demands[33] on CATOR for supply by air were to be accepted only from the Ninth Air Force, Second Tactical Air Force, and the 85 Air Group (British) US naval and army group demands were to be accepted only through the Ninth Air Force.

e. CATOR was directed[34] to transmit all demands, including operational and briefing instructions, to the Troop Carrier Command or to the Ninth Air Force Service Command as appropriate. The Troop Carrier Command and the Ninth Air Force Service Command were directed to notify CATOR of the allocation of aircraft to meet the demands made on them. If such demands could not be met or if there was any alteration or cancellation of missions already confirmed, they were made responsible for so notifying CATOR. The IX Troop Carrier Command and Ninth Air Force Service Command were directed to provide CATOR with daily aircraft status reports for US aircraft which were to reach CATOR not later than 1200 hours on the day preceding the use of the listed aircraft. CATOR was directed to arrange with the Air Staff of AEAF for aircraft movement control policy and for the provision of fighter escorts.

f. CATOR was made responsible[35] for notifying all authorities concerned of the introduction of all scheduled air supply services giving time, date and airfields from which such services would operate and the number and capacity of aircraft employed. CATOR was likewise responsible for notifying the Air Traffic Office and all other interested authorities of the introduction of all scheduled courier, passenger and ADLS (Air Delivery Liaison Service) traffic, giving in each case the operating schedules and the number and capacity of aircraft employed.

g. With respect to emergency supplies which were pre-stocked at base supply airfields, CATOR was responsible[36] for notifying the 490th Quartermaster Depot Company and the SOS Headquarters of the items, quantities, tonnages, airfield of dispatch, type of aircraft allocated, time of loading, and time of required delivery, so that the supplies could be loaded and replacement made at the designated airfield. If such supplies were not prestocked at the base supply airfield, CATOR was responsible for notifying the SOS Headquarters of the items, quantities, tonnages, airfields of dispatch, type of aircraft allocated, and time delivery was required so that such emergency supplies might be delivered to the base supply airfield. CATOR had no responsibility for the issue of detailed instructions to the SOS base depots. With respect to air force supplies, CATOR notified Ninth Air Force Service Command, otherwise the procedure was the same as for ground force supplies. The appropriate supply agency[37] or depot was responsible for notifying CATOR as soon as the movement of the supplies to the designated airfield had been initiated together with the expected time of arrival of the supplies at the airfield. In the event that air lift was not available and the demanding unit would accept an alternative means of transportation, CATOR was responsible[38] for notifying the supply organization to make the necessary arrangements with the appropriate surface movement authority. This authority was then responsible for advising the demanding unit of the time and method of dispatch of the requested supplies.

10. FUSAG Directive. (First US Army Group) Based on these SHAEF directives, the First US Army Group[39] published their instructions for supply by air on the first of June 1944. Emergency supply by air was authorized[40] only as stated in SHAEF directives. Requests for supplies to be stocked at designated airfields were placed in three categories, namely, scheduled, emergency, and supplies for specific airborne operations.

a. In requesting[41] the delivery of supplies by air, armies and such other units as might be designated by army group commanders were directed to assemble and coordinate requests from units under their command and forward same by the most expeditious means to army group headquarters. It was essential that each such request for supply by air contain the following information: designation of unit requiring supply, its location, items of supply needed, quantity of each item, time when supplies would be needed, location of landing airfield or dropping zone, if available. The army group was to submit coordinated requests

for scheduled and emergency supply by air to CATOR through its designated air force. Information copies of such requests were to be submitted to SHAEF, ETOUSA, and Headquarters Communications Zone. The army group was responsible for notifying the armies and Communications Zone of the action taken on their respective requests for supply by air.

b. The responsibilities of the armies[42] were enumerated as follows:

(1) Coordinating requests for supply by air of units under their command after consultation with the air force with which they were operating.

(2) Establishing priorities on all requests for supply by air made by units under their command; and, assembling, coordinating and forwarding same to army group.

(3) Clearing and transporting supplies delivered to airfields in the army area.

(4) Providing personnel requested by the air force to assist in unloading planes in the army area.

c. The responsibilities of the Communications Zone[43] were enumerated as follows:

(1) Coordinating all requests for supply by air to units under the command of the Communications Zone, after consultation with the air force.

(2) Establishing priorities of supply by air to units under command of the Communications Zone.

(3) Providing necessary personnel requested by the air force to assist in unloading planes at delivery airfields in Communications Zone.

(4) Clearing and transporting of army supplies from delivery airfields in the Communications Zone to railheads and truckheads in the army area and the delivery of other supplies to distribution points in the Communications Zone area.

(5) Furnishing and transporting supplies to loading airfields in the Communications Zone area.

d. The air force[44] was stated to be responsible for notifying army group of the serial number of the plane or planes used for supply by air, the landing field and estimated time of arrival, the number of pieces of cargo with total weight, the consignee, destination, and such other pertinent information as might be available. The army group, in turn, was to notify the unit concerned. The air force was responsible for notifying the headquarters initiating the request for supply by air, of the completion or non-completion of the delivery.

e. In connection with the delivery of emergency supply by air, the unit[45] receiving such emergency supply was made responsible for:

(1) The selection and marking of the dropping zones after consultation with the air force liaison officer, if such officer were available.

(2) The selection of the delivery airfield after consultation with the air force liaison officer, if such officer were available.

(3) Unloading and clearing of the supplies from the airfield or dropping zone.

(4) Recovering parachutes, panniers and special containers used for parachute delivery and returning same to UK or elsewhere as specified through normal supply channels.

f. In order to facilitate emergency supply by air, four standard signal forms[41] were developed to be used by all agencies concerned.

(1) The form "SAD" (Supply by Air Demand) was to be used by the headquarters requesting the supply. This form was prepared by the army and submitted to army group and numbered chronologically. It included information concerning the general nature of the supplies required, the weight in tons, the coded map reference of the area in which the supplies were required, whether a suitable airfield was available or whether the supplies had to be dropped, the date and time limits between which the supplies were required, and the situation making supply by air necessary.

(2) The form "SAC" (Supply by Air Confirmation) was to be used by the army group to notify the army of the action taken on the "SAD". These were numbered serially and referred to the "SAD" by number. It stated merely that the mission would or would not be carried out or that certain items only would be supplied by air.

(3) The form "SAN" (Supply by Air Navigation) was to be submitted by the army following the "SAD" and was required in army group headquarters at least eight hours prior to the take-off of the first airplane. The "SAN" carried the same number as its corresponding "SAD". This form gave the map reference of the pin point for the guide beacon, the nature of the guide beacon (i.e., smoke, triangular flares, triangular red lights, petrol tins illuminated in the shape of a letter, etc.), an indication of the line of flight by pin pointing the beginning and end of the center line of the dropping zone or the pin point location and length of the landing strip, and the wind speed and its direction at the dropping zone.

(4) The form "SAR" (Supply by Air Receipt) was to be used by the army upon receipt of its supplies indicating that all supplies had been received. This was sent to army group and repeated to CATOR and carried the number corresponding to the "SAD" and "SAN" numbers. It included information of the number of successful sorties with their time of landing or dropping together with serial numbers of panniers received. It also included details of further requirements resulting from incomplete deliveries.

11. Early Changes in Directives. Two early amendments were made to the first SHAEF directive.

a. It was first changed[14] so that demands for supply by air were to be submitted to Headquarters AEAF for CATOR and in the case of emergency demands would include full details of the supplies required, their total weight, time and place at which delivery was to be made, and any special operational or briefing information. This was the information required in the form "SAD".

b. The second change[46] eliminated the necessity of the form "SAN" being numbered identically as the "SAD" number to which it re-

ferred; instead it was to include a reference to the "SAC" number of the message received from the army group. The form "SAR" was likewise changed to eliminate the necessity of carrying the identical number as its corresponding "SAD" and "SAN"; instead it was to refer to its corresponding "SAD" number; distribution of this form was also to be made to Ninth Air Force in addition to the army group.

12. ETOUSA SOP (European Theater of Operations US Army Standard Operating Procedure). On the ninth of June 1944, ETOUSA published an SOP[47] on supply by air which incorporated all of the principles established by SHAEF and army group directives. Scheduled supply by air was defined[48] as the use of aircraft for the delivery of predetermined quantities of supplies on a schedule. Emergency supply by air was defined[48] as the employment of aircraft for the delivery of emergency requirements to any part of the theater of operations.

a. Twenty-one Army Group and FUSAG (when in operational command) were delegated the responsibility[49] for coordinating and submitting bids for scheduled air lift for ground force requirements to CATOR. CATOR was then responsible for notifying the headquarters requesting the air lift and Headquarters Communications Zone of the tonnage thus allocated. In the event that the air lift requested exceeded that available, CATOR was responsible for so informing the SHAEF Air Priorities Board in order to determine a decision as to the use of the available air lift.

b. The Communications Zone was responsible[50] for pre-stocking three (3) days of supply for emergency supply by air at those base airfields designated by the Ninth Air Force Service Command. Supplies for the following number and type units were to be pre-stocked at these designated airfields:

1 Regimental Combat Team
2 Ranger Battalions
1 Tank Destroyer Battalion
1 Tank Battalion, Medium
1 Infantry Battalion

The 490th Quartermaster Depot Company under the direction of Ninth Air Force Service Command was made responsible for receiving, storing, packaging and loading supplies for delivery by air. The bids for air lift and the details of the supplies required were to be submitted to CATOR who would arrange for the air movement. The replacement of the items pre-stocked at the airfields was to be automatic by the chief of the supply service concerned, except for items specifically marked for airborne operations. Requisitions for supplies for airborne operations were to be assembled and submitted by the senior airborne headquarters concerned in any airborne operation. The re-stocking of such supplies used would be done only on specific request of this airborne headquarters. In the case of items not pre-stocked[51] at these designated airfields and requested for emergency delivery by air, the ETOUSA representative at CATOR would obtain this information together with the designation of the loading airfields and transmit such information to the Communications Zone for delivery. Headquarters Communications Zone was made responsible[52] for keeping SHAEF informed through ETOUSA as to the general nature and quantity of supplies scheduled and pre-stocked for supply by air.

c. The vehicle waybill (SOS Form TC-79) was to be prepared[53] by depot commanders for all air shipments and marked on the face of the waybill "Shipment by Air". In addition, the waybill was to show weight and cubage as accurately computed; packing lists, if required, were to be attached; where two or more trucks were required for one consignment, waybills were to be properly cross-referenced; and the air shipping index number, which included the airport code letter or plane number, consignment number and priority, was to be shown (this information furnished Communications Zone by CATOR). On all emergency shipments by air all packages were to have stenciled on at least two sides in a prominent position, the unit serial number, the words "US Forces",

the landing strip designators (when established by AEAF and furnished to Communications Zone through CATOR), and a description of the contents and weights.

13. Critical Medical Items. To facilitate the supply of critical medical items by air, ETOUSA published an SOP[54] in June 1944. Some medical items required rapid delivery to the continent because of their nature. These included whole blood, blood plasma, sulfonamide drugs, biologicals, and penicillin. In addition, litters, blankets and splints were required in exchange when evacuating patients. Empty whole blood shipping containers and used blood recipient sets required return air transport for refilling. The Communications Zone was responsible for procuring the necessary medical supplies, for packing and refrigerating medical supplies (except those to be dropped by parachute), for delivery to designated airfields, for labeling the containers showing contents, urgency, priority and destination, and for maintaining liaison with the air force and CATOR. The armies and ADSEC (Advanced Section Communications Zone) were responsible for receiving and refrigerating, if necessary, the supplies transported by air, for distributing same to using installations or depots, for returning empty shipping containers and used blood recipient sets to designated airfields, and for maintaining liaison with the air force. The air force was responsible for loading and unloading the supplies to and from the air transport, for packing and preparing supplies to be dropped by parachute, for the transportation of the supplies by air, and for notifying the surgeon of the receiving army or ADSEC when landing medical supplies at airfields other than those designated for supply by air, for returning empty shipping containers and used blood recipient sets by air, and for maintaining liaison with Communications Zone, the armies and ADSEC.

## SECTION 2

## EVACUATION BY AIR

14. Field Service Regulations. Field Service Regulations in effect at the start of the European Campaign did not mention the subject of evacuation by air of casualties. The first War Department publication to include information on this subject was FM 8-5, "Medical Department Units of a Theater of Operations", published in May 1945.

15. Early Planning. Planning[55] for evacuation by air started in November 1943 when the Chief Surgeon of ETOUSA recommended that a board of officers be appointed to study the technical, operational and medical aspects of evacuation of sick and wounded by air and to submit for approval a general plan for this operation. This board was to have representatives from the 1st US Army Group, Eighth Air Force, Ninth Air Force, Troop Carrier Commands, First US Army and the SOS Headquarters. Representatives of these headquarters were appointed and the first meeting[56] was held in December 1943 to discuss this problem. As a result of this conference and subsequent studies, a policy[57] was established as a basis for future operations. This policy was concurred in by the First US Army, Ninth Air Force and the SOS Headquarters.

a. The responsibilities of the air forces[57] with respect to evacuation by air of casualties were enumerated as follows:

(1) The equipping of all transport aircraft with suitable litter racks and insuring that each transport aircraft carried such equipment at all times.

(2) The medical care and treatment of casualties from the time they were loaded on aircrafts until they were unloaded.

(3) The temporary medical care and treatment with local resources of such casualties as might be delivered in an emergency to an airdrome at which no provisions for the reception of casualties had been made.

(4) The delivery of casualties to airdromes convenient to fixed hospitals, unless military necessity required that they be delivered to other airdromes.

(5) All transport type aircraft returning from forward areas, during actual operations, were to be utilized for evacuation by air of the wounded, unless military necessity required otherwise.

b. The responsibilities of the armies[57] with respect to evacuation by air of casualties were enumerated as follows:

(1) The establishment and maintenance of a holding medical unit in the immediate vicinity of each airdrome, within its zone of responsibility, from which casualties were to be evacuated.

(2) The delivery of casualties to such holding medical units.

(3) The loading of casualties upon aircraft within its zone of responsibility.

(4) The provision of such additional equipment, within its zone of responsibility, as might be required by the impracticability of effecting property exchange with the Air Force.

(5) The necessary liaison with the Air Force concerned, required for the evacuation of its casualties.

(6) The receipt of casualties without delay, when notified by the Air Force concerned, at any airdrome within its zone of responsibility at which an aircraft transporting casualties was forced to land and remain on the ground for an extended period.

c. The responsibilities of the SOS in UK and the Communications Zone[57] with respect to evacuation by air of casualties were enumerated as follows:

(1) The establishment and maintenance of such holding units in the immediate vicinity of each airdrome, within its zone of responsibility, as might be required for the evacuation and reception of casualties evacuated by air.

(2) The loading and unloading of casualties within its zone of responsibility.

(3) The reception of casualties without delay at any airdrome within its zone of responsibility, either by previous agreement with, or notification by, the Air Force concerned.

(4) The provision of such additional equipment, within its zone of responsibility, as might be required by the impracticability of effecting property exchange with the Air Force.

(5) The necessary liaison with the Air Force concerned required for the evacuation and reception of casualties within its zone of responsibility.

16. Joint Administrative Plan. Administrative planning, as shown in the Joint Administrative Plan for Operation "OVERLORD", contemplated the use of aircraft to assist in the evacuation[58] of casualties. But it was anticipated that facilities would not be available prior to D plus 14. Provision was to be made in conjunction with AEAF to use air transport facilities to

the maximum for the evacuation of casualties from the continent at the earliest practicable date. It was anticipated that in the early stages aircraft could be made available for the evacuation of casualties only in an emergency due to the limited number of aircraft available. Detailed instructions[59] for obtaining emergency air transport were to be issued later. The responsibilities[59] of the air forces, the armies, the SOS in UK, and the Communications Zone were enumerated in the Joint Administrative Plan; these were identically the same as agreed upon earlier.

17. ETOUSA Directive. Based on the instruction issued in the Joint Administrative Plan for Operation "OVERLORD", ETOUSA issued instructions[60] early in April 1944 relative to the evacuation of casualties. These instructions repeated verbatim the detailed instructions enumerated in the Joint Administrative Plan and as agreed upon earlier.

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# CHAPTER 2

# ADMINISTRATIVE CHANGES DURING OPERATIONS

## SECTION 1

## SUPPLY BY AIR

PHASE OF INITIAL OPERATIONS (6 June - 31 July 1944).

18. Shortages on "SAD's". Early in July 1944, it became apparent that some requests for supply by air were not being completely filled by Communications Zone and that sometimes these shortages were automatically delivered to CATOR at a later date. The procedure that was established by agreement between US Administrative Staff, 21 Army Group Rear, and CATOR was that shortages on "SADs", made up by Communications Zone within a period of three days, would be automatically delivered by CATOR and shortages, made up by Communications Zone after an elapse of time greater than three days, would not be shipped by air by CATOR without prior approval of the US Administrative Staff, 21 Army Group. In some cases there was a possibility that the need for air lift had ceased or possibly the need for the supplies no longer existed and in view of this, it was deemed inadvisable for Communications Zone to ship these shortages automatically to CATOR. It was agreed between Communications Zone and the US Administrative Staff that necessary changes to procedure would be made, so that Communications Zone would check first with the requesting authority before making automatic shipment of "SAD" shortages to ascertain (a) if the items were still desired and (b) whether or not shipment by air was still necessary. If the items were still desired and shipment by air was still necessary, Communications Zone would deliver the items to CATOR who would contact the US Administrative Staff to obtain approval for air lift.

19. Communications Zone Accepted Control. On 26 July 1944, ADSEC, Communications Zone, accepted from First US Army the control[2] on the continent of shipments by air; the US Administrative Staff, 21 Army Group (Rear) retained control in the UK of all shipments by air to US ground forces on the continent.

a. This ADSEC control[2] included receiving, coordinating, and consolidating requests from all elements on the continent, preparing and forwarding "SADs", and the movement of supplies from the air terminals on the continent to the appropriate installations of the requisitioning agency. In accepting this responsibility from First US Army, ADSEC was informed by First Army that an allocation of 250 tons per day, air lift, had been obtained and that plans were being developed to increase the supply by air program to 1500 tons per day for US Forces on the continent. Based on this, the First US Army had been submitting daily "SADs" totaling 250 tons. In relinquishing control of air shipments to ADSEC, First Army had agreed that ADSEC would be sub-allocated 50 tons and First US Army 200 tons daily. First US Army was to submit its daily requests totaling 200 to ADSEC who would incorporate these requests into their own "SAD" for a total of 250 tons. Prior to accepting this responsibility from First US Army, ADSEC had contacted Ninth Air Force who had informed ADSEC that there was no set daily allocation of air lift to the Army and that "SADs" were to be used only in emergency when no other means of transportation was available. First US Army claimed there had been no official directives limiting the tonnage of "SADs". However, on 27 July, First US Army informed ADSEC that they had received official information that "SADs" would be used only in case of extreme emergency and that each request had to be supported by a statement[2] as follows:

"Items requested are urgently needed for present phase of operation and no other means of transportation are immediately available." Further, all requests would have to be approved by Ninth Air Force. TWXs had been received from the US Administrative Staff, 21 Army Group Rear, stating:

"Supply by air is an emergency method of supply and it is not to be used on a daily basis except for scheduled supply by air".

"Emergency supply by air is intended as a priority task for purpose of meeting urgent need of movement of particular supplies when other means of transportation are not immediately available or impracticable. Numerous "SADs" received recently include items not of emergency nature. Request proper action to eliminate all items from "SADs" which are not of immediate emergency. "SADs" are not intended for daily supply but only for emergency supply. Request appropriate action to screen all requests for supply by air with view to emergency of requests". In view of these various discrepancies, ADSEC requested[2] clarification by ETOUSA.

b. In attempting to straighten out this difficulty SHAEF sent a TWX[3] to Communications Zone in which it was stated that no agreements for the allotment of air lift were valid unless they had been processed in accordance with previous SHAEF directives. Further, that no demand had ever been received by CATOR from First US Army for a scheduled lift of 250 tons per day but that emergency demands up to this amount had been received and delivered. It was stated, however, that if a daily lift of 250 tons was required, it became scheduled supply by air not an emergency lift and that the necessary bid should be submitted as such.

c. The Ninth Air Force had objected[4] to the use of large tonnages on a scheduled air lift basis but they did concur in the use of air lift by armies where the emergency was such that water lift would not meet the situation.

PHASE OF THE "BREAKTHROUGH" (1 Aug - 27 Aug 1944).

20. Twelfth Army Group Opinion. It was the opinion of 12th Army Group[5] that all practicable authority and responsibility connected with normal

supply by air should rest with Communications Zone. ADSEC was advised of this on the first of August 1944 in an attempt to clarify the situation. It was pointed out by 12th Army Group that the normal channel of requisition for all supply was from army to ADSEC; that the army was able to state the degree of urgency of their requirements but that ADSEC, after examination of this urgency, would have to determine the necessity for supply by air; further, ADSEC would be the one to request the air shipment from a rear area to the Combat Zone. Thus, in general, it was undesirable for ADSEC to have to obtain army group approval on demands for supply by air, except for priorities between armies. Twelfth Army Group should retain their responsibility for ground force decisions on such broad matters as priority between tactical and supply movements and set priorities when air supply capabilities would fall short of requirements. However, it was considered that ADSEC should consult the armies for details on points of delivery and unloading; consult Ninth Air Force for deliveries within their own area; and consult 12th Army Group, as desirable, when difficulties arose which could not be solved by direct dealing with the armies and Ninth Air Force. SHAEF had been informally requested[5] to delegate this authority to Communications Zone.

21. Third Army Request for Air Lift. By 15 August 1944, the Third US Army was advancing very rapidly and requested[6] that an air lift of at least 1500 tons daily be allocated to the Third US Army for the movement of critical items of equipment by air. These critical items were signal and ordnance supplies and, in some cases, emergency medical supplies. Third Army requested that an investigation be made of the possibility of these shipments being made directly to airfields in the Third US Army area. This request was approved by 12th Army Group[6] in view of the fact that the reserves of critical items were extremely low in Third Army at the time. ADSEC was requested to make delivery, if possible within the next few days, to an airfield within the vicinity of Third Army area. Twelfth Army Group was urgently attempting to open fields closer to the combat area and had previously bid to CATOR for a large scale air lift directly to Third Army area.

22. Air Lift Suspended. Air lift to the armies was temporarily suspended after 20 August 1944, following 12th Army Group's TWX to Communications Zone requesting the immediate air shipment of 3000 tons of Civil Affairs supply to Paris for their emergency relief.

23. Third Army Request for Air Strips. On 21 August 1944, Third US Army requested[8] 12th Army Group to definitely establish the responsibility for making available air evacuation and supply strips and to give a number one priority to the preparation of the evacuation and supply strips at intervals of approximately 75 miles along the axis of communication of Third US Army, the site of these strips to be as close as practicable to the area to be designated by Third US Army. Twelfth Army Group informed[8] Third US Army that this responsibility for supply and evacuation by air was established by SHAEF directives. Further, that armies were to inform Ninth Air Force of fields uncovered during their advance; that armies were to furnish medical holding units for casualty evacuation until relieved by Communications Zone; that 12th Army Group bid for lift to utilize the maximum capacity of airfields assigned for administrative use; that 12th Army Group always bid for all services requested by armies, in most cases enlarging armies' requests; and that Communications Zone handled all other supply details, calling on the armies to assist in unloading as necessary.

PHASE BEYOND THE SEINE (28 Aug - 30 Sept 1944).

24. Team Work. In the rapid advance of the armies there were times when the smooth unloading by Communications Zone and the armies was not accomplished. In some instances, for example on 5 and 6 September, the pilots and crews of the C-47's unloaded[9] their own planes or performed 90% of the unloading. The cheerful way in which these air crews assisted in the emergency gave great evidence of the team work between air forces and ground forces during this campaign.

25. Proposed Simplified Procedure. By early September 1944 mechanics

for supply by air, such as placing bids, hauling supplies forward, loading, etc, were gradually operating in a smooth condition. It was desirable to keep supply by air functioning even with a few planes so that the organization and mechanics of supply by air could be kept in motion and thus expanded and implemented in case of a sudden emergency. By 10 September, it was apparent that the administrative support of rapidly advancing armies required an extremely simple yet flexible procedure for air supply. It was the opinion[10] of 12th Army Group that the procedure as set forth in SHAEF directives depended for efficiency upon more complete and satisfactory communications than could be expected in the campaign. Twelfth Army Group therefore requested SHAEF to revise and clarify instructions for scheduled supply and evacuation by air. A proposal[10] was prepared which met the requirements of Ninth Air Force, Communications Zone, and 12th Army Group, as follows:

a. Twelfth Army Group would request Ninth Air Force to make a reconnaissance of airfields to determine those available for supply by air purposes. Based on the report of the Ninth Air Force and tactical air requirements, 12th Army Group together with Ninth Air Force would determine which airfields would be utilized for supply by air and, if possible, the duration of such use. If such fields were required for tactical purposes, 12th Army Group and Ninth Air Force would determine the priority of use.

b. Twelfth Army Group would bid to SHAEF (CATOR) for air lift giving the tonnage requirements, the period for which supply by air was required, and the area in which desired. Similar information would be given to Communications Zone.

c. The allocation of air lift would be made by SHAEF (CATOR) and all interested parties informed. When airfield control personnel were present to operate the airfield, the responsible manning agency would notify Communications Zone, CATOR, and 12th Army Group.

d. After the airfields and the air lift had been approved and made ready for operation, Communications Zone and CATOR would arrange the details of loading, dispatching and unloading. Normally, ADSEC would unload and distribute to armies.

e. The armies would constantly report captured airfields to Ninth Air Force, repeating this same information to 12th Army Group. Armies would likewise provide the necessary medical holding units for evacuation of casualties until relieved by Communications Zone.

f. If administrative airfields were established within the Communications Zone area (i.e., in rear of army rear boundaries), Headquarters Communications Zone would perform the functions enumerated above for the 12th Army Group working with the appropriate air force.

g. Twelfth Army Group would establish the priority when the requirement for movement by air exceeded the lift available to the US forces.

26. New SHAEF Procedure. On 15 September 1944, SHAEF Forward sent out a TWX[11] rescinding one of their earlier directives and prescribing a new procedure for supply by air to become effective on 20 September 1944.

a. CATOR was defined[11] as an operating agency of AEAF for coordinating, controlling, and alloting air lift made available by the Supreme Commander in accordance with priorities established by SHAEF.

b. The Communications Zone was made responsible[11] for supplying US Forces on the continent. Where insufficient transport was available to move the required tonnage, the Communications Zone was to inform 12th Army Group of the additional lift required, the period during which the supply by air was required, and the reception area or areas preferred. The 12th Army Group[12] then bid on SHAEF for the additional lift as required.

c. The Ninth Air Force[11] was given control of all airfields

on the continent in the US Zone which had not been released by Ninth Air Force to other commands. Ninth Air Force, upon the request of 12th Army Group, was to make reconnaissance of administrative airfields in designated areas and advise 12th Army Group as to the availability and specifications of such airfields, together with recommendations as to the type and quantities of airplanes which might land on each such airfield. Based on these reports and the tactical air requirements, Ninth Air Force, together with the 12th Army Group, would determine which airfields were to be utilized for supply by air and, where possible, the duration of such use. If the required number of airfields were not available for both tactical and administrative purposes, the Ninth Air Force, in conjunction with the 12th Army Group, would determine the priority of use of available fields in the area. After having received the designation of suitable aerial supply fields from Ninth Air Force, 12th Army Group[11] would forward to CATOR Forward at SHAEF their bids for air lift, including the tonnage required, the date or period, the tonnage to be landed at each field, the type of aircraft suitable for each field, and the justification of the air lift requirement. Later[12] the armies were directed by 12th Army Group to submit recommendations for airfields for administrative use after having obtained the advice of their respective supporting tactical air command.

d. The Ninth Air Force was made responsible[11] for providing control personnel at those fields which it had not released to other commands; for advising flying control AEAF of the name, location and reception capabilities of each airfield suitable for bombers that might be used in transporting supplies by air; for messing and billeting other air force personnel needed to supplement flying control facilities for bomber supply operation or for the survey of fields for bomber supply operations. The furnishing of flying control personnel at airfields released by Ninth Air Force was made the responsibility of the agency to which such airfields had been released. USSTAF and the First Allied Airborne Army (Troop Carrier Command)[11] were to provide liaison with the Ninth Air Force, and the Ninth Air Force, Communications Zone, and USSTAF were to provide liaison with CATOR Forward.

e. The Supreme Commander[11], or such agencies as he might designate, was to periodically direct each command controlling suitable aircraft to furnish such numbers of supply transports as might be deemed necessary. USSTAF was to inform CATOR Forward of US bomber lift that might be available. CATOR Forward in accordance with priorities received from SHAEF would allot available air lift, informing 12th Army Group, Ninth Air Force, and Communications Zone of the air lift provided by type aircraft and period of time. CATOR[11] was also to notify the commands supplying aircraft of the readiness date, numbers of aircraft, and loading and off-loading fields by name and number. CATOR was to advise Communications Zone and Ninth Air Force daily, by the most expeditious means, the number of planes by type which CATOR intended to dispatch the following day from each off-loading airfield. The Communications Zone[11] was responsible for making the detailed arrangements for loading and off-loading of airplanes by direct communication with the carrier. Upon the decision of the Supreme Commander to cancel air lift, CATOR was to advise 12th Army Group, Ninth Air Force, and Communications Zone of such anticipated cancellation as far in advance as the situation would permit.

27. First Army Request for Air Shipment. In September 1944, the First US Army requested[13] the air shipment by 1 October 1944 of approximately 3000 short tons of the initial issue of winter clothing. Twelfth Army Group considered[13] that this request would be followed by similar requests for other items by other armies for winter operations. In view of this, 12th Army Group informed Communications Zone that the delivery of supplies to armies continued in accordance with 12th Army Group tonnage allocations and requisitions and priorities set by the armies. The choice of the means of transportation to meet the delivery dates set by the armies continued to be the responsibility of the Communications Zone. With respect to air delivery, the unloading of the aircraft and the distribution of the supplies to the armies likewise continued to be the responsibility of the Communications Zone. Twelfth Army Group informed[13] the Communications Zone that their bid on SHAEF for air lift, for use by

the Communications Zone in support of the armies, would continue to be the maximum available and that the 12th Army Group's request on Ninth Air Force for administrative airfields in the forward areas would continue to be the maximum that could be spared from the tactical effort.

28. Mechanics of Supply. It was further emphasized by 12th Army Group[14] in September that the mechanics of supplying the armies was a Communications Zone matter. Communications Zone was guided by the policies issued by 12th Army Group but the supplies were delivered to the armies in accordance with 12th Army Group tonnage allocations, whether deliveries were by rail, truck or air. The tonnage to be brought in by air to any army was determined by the Communications Zone, based on the priorities indicated by the army and the status of delivery by rail or truck. The armies submitted their requisitions to meet their needs indicating their priorities, and in the case of emergency, the time of delivery. Communications Zone determined the means of delivery to fill the requisitions in the order of priority and by the time requested by the army. Air tonnages were included in the total allocation to the armies, but, Communications Zone determined what supplies would be brought in by air.

29. Supply of Air Force Units. Later in September 1944, the Ninth Air Force further clarified[15] the supply by air procedure by designating the Ninth Air Force Service Command as the agency responsible for the supply by air of Ninth Air Force units, utilizing aircraft made available to them by US Strategic Air Forces. When demands for supply by air were in excess of available aircraft, Ninth Air Force Service Command was authorized to call on US Strategic Air Forces in Europe for additional aircraft or on CATOR for additional air lift. The Communications Zone was responsible for the supply by air of ground forces on the continent; Ninth Air Force Service Command was responsible for the supply of off-loading personnel and facilities at all airfields utilized by them in supply by air; the Communications Zone was responsible for the supply of off-loading personnel and facilities at all airfields utilized for ground force supply by air; the armies were responsible for providing the necessary medical holding units for the evacuation of casualties from all airfields utilized for this purpose until relieved by the Communications Zone. Ninth Air Force furnished one liaison officer to CATOR and the Communications Zone furnished one liaison officer to Ninth Air Force for the purpose of coordinating supply by air activity. The First Allied Airborne Army and the US Strategic Air Force in Europe furnished liaison officers to Ninth Air Force for the purpose of exchanging information and advising on suitability and capacity of airfields.

PHASE OF RELATIVE INACTIVITY (1 Oct - 7 Nov 1944).

30. Air Dispatch Letter Service. With the liberation of Paris, a special Air Dispatch Letter Service[16] began operation from Le Bourget, France to Northolt, England. By the end of September, ADLS services were including stops at Evreux, Laval, Verdun and Lyons, France. Considerable difficulty was experienced, especially on the American side, of obtaining and controlling ADLS aircraft services and standards of reliability. This was mainly because special aircraft and personnel were not allotted for this work and because passengers were carried on the flights. At the beginning of October 1944, therefore, CATOR was made responsible for the provision and operation of all ADLS aircraft. In November 1944, CATOR[16] was made responsible for the operation of all ADLS services down to and including army group and air force level to meet the requirements of the Chief Air Signal Officer, SHAEF. ADLS services below army group and air force level were made the responsibility of the respective air forces.

31. Air Lift Requirements. The Communications Zone, in reviewing the air lift requirements[17] in October for the period 9-29 October 1944, stated their requirements between 9 and 15 October were 6800 long tons per day; and between 16 and 29 October, were 5750 long tons per day. It was recognized by the Communications Zone that these requirements were beyond the capacity of the available transport aircraft but the requirements did indicate an urgent necessity for obtaining the maximum possible allocation of air lift during this period. Communications Zone therefore recommended[17]

to 12th Army Group that they obtain the maximum allocation of air lift from the SHAEF Air Priorities Board.

32. Administrative Airfields. The thought[18] in 12th Army Group at this time was that it was necessary that a minimum of four all weather airfields be made available in forward army areas in order to provide satisfactory supply and evacuation by air. Within the 12th Army Group Sector, for purposes of supply by air, the sector was divided roughly into three logistical areas, namely:

a. Northern Area - north of an east-west line through the north tip of the Duchy of Luxembourg.

b. Central Area - the Duchy of Luxembourg projected east and west.

c. Southern Area - south of an east-west line through the southern tip of the Duchy of Luxembourg.

It was recommended[18] that there be developed two airfields in the northern area and one in each of the other areas; or, all future airfield development plans provide for a minimum of one all weather administrative airfield in each army area to be developed by the Ninth Air Force.

33. New SHAEF Directive. The procedure described in the TWX[11] from SHAEF Forward in September was slightly modified when this directive[19] was published by SHAEF the latter part of October, 1944. CATOR was defined[19] at this time as that part of SHAEF Air Staff established to operate and control the employment of all aircraft allocated to supply by air, other than supply by air of airborne forces. In this later directive, it was stated that the Supreme Commander would direct as necessary such organizations as he commanded to provide aircraft for supply by air purposes and, further, upon the request of the Supreme Commander, other organizations not under his command might also provide aircraft for transport purposes. This directive made the Communications Zone responsible[19] for coordinating all U.S. requirements and informing army group of the same; army group coordinated with the associated tactical air force and then submitted the demands to CATOR. CATOR was given the additional responsibility of notifying army group in addition to the Communications Zone and tactical air force of the number of aircraft by types which were being dispatched daily from each off-loading airfield the following day. The organization operating the aerial supply airfield[19] was made responsible for the accomodation and feeding of all air force personnel utilizing such airfields and for maintaining effective liaison with all other interested organizations. All organizations[19] were made responsible for maintaining appropriate liaison with each other, either by the establishment of specific liaison officers or by frequent visits as the situation demanded.

34. Third Army Request for Administrative Airfield. In late October, it was anticipated[20] by the Third US Army that supply by air would be a vital factor in the support of their operations after the initial crossing of the Saar And Rhine Rivers. Third Army therefore requested[20] that at least one administrative airfield between the Saar and Rhine Rivers and at least one administrative airfield across the Rhine River be reserved for the exclusive use of Third Army. Anticipating that considerable damage would be done to captured airfields, Third Army requested that a battalion of aviation engineers be made available to them for the purpose of repairing such administrative airfields as might be allocated to Third Army. Twelfth Army Group referred[20] this information to Ninth Air Force in conjunction with other similar negotiations in progress at that time.

PHASE OF RESUMED OFFENSIVE (8 Nov - 15 Dec 1944).

35. Air Deliveries. Due to the mass delivery of supplies by air, it became apparent early in November that some supplies dispatched by CATOR were not being delivered[21] to administrative airfields. At times tactical airfields, not normally manned by Communications Zone or ADSEC, reported

the arrival of cargo planes which were obviously intended for delivery at administrative airfields. Thus these critically needed supplies in forward areas were diverted from proper supply channels. Twelfth Army Group therefore requested[21] Communications Zone to determine whether any considerable quantity of supplies shipped into forward areas had been diverted from proper channels and what documentation of supplies by air was provided by Communications Zone to insure that deliveries at airfields were properly receipted.

36. Clarification of Responsibilities. At this time it was apparent[22] to 12th Army Group that some confusion still existed as to responsibilities in connection with supply and evacuation by air. Thus the army group G-4 wrote[22] the army G-4s in an attempt to clarify the situation. It was explained that the armies were responsible for working continuously with their respective tactical air commands to insure the proper balance between tactical and administrative airfields within their areas. The army G-4s were cautioned to see that administrative airfields were given full consideration. It was pointed out that the armies did not request the air delivery of specific supplies except in actual combat emergency; that normally the armies stated the date by which these supplies were desired in army depots and that the choice of the means of transportation was a Communications Zone responsibility. Further, that the Communications Zone was responsible for unloading and distributing to armies those supplies delivered by air. The Communications Zone was likewise responsible for the evacuation of casualties by air. However this did not preclude[22] responsibility of the army for arranging with its tactical air force for the use of airfields as far forward as possible nor did it effect in any way the responsibility of the army for assisting Communications Zone in the reception of supplies by air or in the evacuation of casualties by air.

PHASE OF ENEMY COUNTER OFFENSIVE (16 Dec 1944 - 21 Feb 1945).

37. Twelfth Army Group Revised Procedure. Experience gained in the Ardennes offensive called for a revision of the procedure for emergency supply by air to isolated units. So early in February 1945, after obtaining the concurrence[23] of SHAEF and Communications Zone, the 12th Army Group published a revised procedure[24] for emergency supply by air to isolated units, in which all ground combat units down to battalion level were to be fully informed as to the procedure for requesting supplies. This procedure was also applicable to enable breakthrough units to continue an advance. Twelfth Army Group was not to be in the channel of supply or the implementation of emergency supply by air missions, unless a decision was necessary involving priorities between two or more armies. But 12th Army Group was to be kept fully and promptly informed at all stages by the army concerned.

a. This revised procedure[24] provided that the army "warn" and "alert" all agencies involved as early as possible to insure speedy aid to the isolated units pending the army decision to "call" for the supply by air mission.

b. The battalion or larger unit[24] requiring emergency supply by air sent the following information by the most expeditious means to the division: code name of unit and type of unit; exact coordinate of center of drop zone or glider landing zone (higher echelons were to be notified immediately if these coordinates were changed); a list of the prestocked supplies required or such special supplies as were required. The unit making the request was responsible for informing all of its personnel of the possibility of "pathfinder" radio teams being dropped into their area by day or night to facilitate the reception of planes and gliders.

c. After the receipt of this information within the division[24], the G-4 obtained the concurrence of the G-3, in conjunction with its tactical air liaison officer (TALO), and other interested staff sections, and the decision was reached to call for this emergency supply by air mission. The division G-4 then placed this request on the corps G-4. The corps G-4 obtained the concurrence of the G-3, in conjunction with its TALO and other interested staff sections, and the decision made to call for this emergency supply by air mission. From corps level[24], this request went

through the following parallel channels: corps G-4 to army G-4; corps G-3 air to army G-3 air; TALO to Tactical Air Command (TAC).

d. When army[24] received its first information that a unit might require supply by air, a "warning" was telephoned by the army G-4 to CATOR (SHAEF Main) and by TAC to Ninth Air Force (Advance) Combat Operations. A confirmatory "warning" TWX was dispatched by the army G-4 to CATOR with information copies to Ninth Air Force, Communications Zone, First Allied Airborne Army (Troop Carrier Command), and 12th Army Group, indicating that name, size, and type of unit and its approximate location. No action was to be taken on this warning.

e. After receiving the specific requirements of the unit from corps[24] and pending the decision to "call" for an emergency supply by air mission, and "alert" was telephoned by the army G-4 and by TAC and confirmatory "alert" TWX dispatched as for a "warning" with the following additional information: the complete list of specific supplies required; a request for air reconnaissance by Troop Carrier Command or Ninth Air Force, if considered necessary by them; a request to Communications Zone and Troop Carrier Command to assemble and load the supplies and prepare the cargo aircraft to take off with the minimum of delay upon receipt of the "call" for the mission.

f. In the meantime, the army G-4 obtained the concurrence[24] of the G-3, in conjunction with its TAC, and other interested staff sections. Consideration was given to the feasibility and necessity of the mission, the risk involved in view of the tactical air and ground situation, and other projected requirements for tactical air support, or movement of personnel or supplies by air. After a decision was reached to call for this emergency supply by air mission, the "call" was telephoned by the army G-4 and by TAC and a confirmatory "call" TWX dispatched as for an "alert". If the "alert" had been previously given, it was only necessary to "call" for the mission to be flown. However, if an "alert" had not been previously given, it was necessary to give the complete information that would have been given in an "alert". Parallel notification[24] was given by army G-4 to army group G-4, army G-3 air to army Group G-3 air, and by TAC to Ninth Air Force.

g. On the receipt of the "alert" from army, CATOR[24] took the necessary action to arrange for the required number of planes at a designated airfield and, together with the Communications Zone, arranged for the assembly and loading of the required supplies. Upon the receipt of the "call", CATOR dispatched the emergency supplies by air. The technical air data was handled directly between the First Allied Airborne Army (Troop Carrier Command) and the Tactical Air Command furnishing the cover or escort.

h. It was then the responsibility[24] of CATOR to notify the army G-4, by the most expeditious means possible, of the time over target (TOT) and the proportion of supplies ordered which were actually enroute. The army G-4 was responsible for notifying all other interested parties.

i. The unit receiving the supplies[24] marked each dropping zone (DZ) with fluorescent panels in a "T" shape and made maximum use of colored smoke signals. The center of the DZ was indicated by an arrangement of panels giving the sign "OK" to drop here". The unit reported the receipt of the supplies through the same channels as making the request, giving the quantity and class of supplies received in a usable condition so that subsequent deliveries could be changed accordingly. The recovery of the air dropping equipment was a responsibility of the receiving unit and return to Ninth Air Force Service Command was made through Quartermaster channels.

j. The Communications Zone was requested[23] and agreed to pre-stock supplies at loading airfields in accordance with this revised procedure. These pre-stocked supplies were made up in packs, lettered from "A" to "M" and consisting of various items from each of the supply services. The packs were so designed as to resupply units from battalion to division size, both infantry and armored. It was estimated that the average lift available for resupply by air purposes per day was approximately 300 long

or enough for one division and thus the largest packs had a total weight of approximately 300 long tons. Communications Zone[24] provided for the automatic replacement of these supplies at the loading airfields and was charged with constantly reviewing pre-stocked supplies in the light of actual experience.

PHASE OF CLOSING TO THE RHINE (22 Feb - 14 March 1945).

38. Identification of Prepacked Stocks. To assist in the identification of aerial supply bundles, the First Allied Airborne Army issued a directive[25] in March 1945 that all prepacked stocks and all future packets would be properly marked for identification. Colored parachutes were to be used to identify various classes of supply and the bundles were to be properly marked with contrasting colored paints. Miscellaneous items when packed individually were to be marked in such a manner as to facilitate identification.

39. Twelfth Army Group Bid for Air Lift. Early in March 1945, the 12th Army Group submitted[26] to SHAEF a bid for 800 tons per week air lift for the Communications Zone and 12th Army Group for the period 1 March to 15 April 1945. It was requested that the planes assigned for this supply by air mission be made available daily and not subjected to withdrawal at any time for airborne operations, training, or operations of any other kind. This request was based on a carrying capacity of 2 tons per C-47 averaging 58 sorties per day from the UK or continental rear areas. This requirement did not include emergency supply to isolated units or emergency supply to units east of the Rhine River if a crossing was forced. Requirements for evacuation were figured at 1200 per day or 60 sorties of 20 patients per C-47. It was further calculated[26] that after crossing the Rhine, a minimum of 100 sorties per day would be required for evacuation. The Communications Zone had estimated[27] their requirements for this period at 780 long tons per week. This was justified[28] by the Communications Zone by their know requirements and by their average unanticipated requirements. Known requirements were 2 aircraft daily loaded with whole blood and 10 aircraft loaded with blankets and litters for every 50 aircraft evacuating casualties. The unanticipated requirements included items of the various services such as CWS testing equipment for flame throwers, engineer maps and photographic supplies, medical hospital equipment, ordnance repair parts, quartermaster repair parts, signal radio tube parts and such. Due to potential airborne operations[29] and a possible shortage of available aircraft at the time, 12th Army Group requested the Communications Zone to consider other accelerated means of transportation. It was considered inadvisable[29] to accumulate critical supplies at loading air fields which might be moved more rapidly by some other accelerated means of transportation.

PHASE OF ENCIRCLEMENT OF THE RUHR (15 March - 4 April 1945).

40. SHAEF Conference to Expedite Procedure. Late in March 1945, a meeting was held at SHAEF to review[30] the supply by air picture and to eliminate all unnecessary administrative details and expedite supply by air to the armies.

a. It was decided[30] that bids for supply by air should originate with the army and go direct to CATOR and should include the armies requirements and when and where the items were to be delivered. CATOR was to make arrangements with Communications Zone to coordinate the lift and to notify the requesting army in advance of the estimated time of arrival of the supplies. A parallel request was to be submitted to CATOR through tactical air command channels.

b. Normally administrative air fields were far enough to the rear to permit ADSEC to handle all receipts by air. But during the fast and scattered movements of this phase, ADSEC personnel was not available in the forward areas where supplies were being delivered by air. It would have been wasteful to send ADSEC personnel to these widely scattered forward airfields for this specific purpose in view of the loss of the services of such personnel to ADSEC, the changeability of the weather and the rapid advances of the armies with subsequent changes in air fields.

In addition, truck transportation was pooled to a maximum extent and the control of all movements in the forward areas was in the hands of the armies, with ADSEC assisting where possible. Thus there was a pooling of efforts rather than ADSEC having definite separate functions from the army. In view of this diffuse and fluid situation in the forward areas, it was agreed[30] that the SOP should be changed so that the agency bidding for supply by air would be responsible for receiving these supplies or else for arranging for their receipt. It was agreed that the armies might call upon ADSEC to assist in the receipt of these supplies received at forward airfields to the extent that ADSEC might be able to offer assistance. It was further agreed that when the Communications Zone bid for air lift, it would arrange to have ADSEC receive the supplies or would make arrangements with the armies to receive the supplies for ADSEC.

c. It was pointed out that CATOR was primarily concerned[30] with the delivery of Class I, III, and V only, except upon specific request from Communications Zone. Normally the armies would place their requests upon Communications Zone through normal channels giving the details as to the time and place the supplies must arrive, it would then be up to Communications Zone to determine the means of transportation.

d. It was concluded[30] that SHAEF directives would be changed in accordance with the agreement reached at the meeting.

41. New SHAEF Directive. As a result of this conference, SHAEF issued a directive[31] modifying previous SHAEF directives. This procedure called for the armies to place bids for Class I, III, and V supplies directly to CATOR after first obtaining the designated air field from the tactical air command. The army was to furnish the class of supply, quantity desired, and designated air field with parallel information to tactical air command and Communications Zone. The tactical air command was to advise Ninth Air Force and SHAEF Air Staff Forward through air channels. The army bidding for the supplies would be responsible for receiving and clearing the air shipment from the air field, calling on Communications Zone elements for assistance as required. When Communications Zone was the bidder, it would have the same responsibilities as outlined for the army.

PHASE OF CLOSING WITH THE RUSSIANS (5 April - 9 May 1945).

42. Modification of New SHAEF Directive. Shortly thereafter SHAEF modified[32] this procedure slightly for the delivery of Class I, III, and V supplies and for the evacuation by air of repatriots and wounded from fields east of the Rhine River. The Tactical Air Command designated the air field to the army who was responsible for receiving and clearing the shipment. The Tactical Air Command passed the bid together with the information concerning the field to be used, its operational capacity, the desired items of delivery and the requested time of arrival at the field to CATOR (SHAEF Air Staff Main) advising Ninth Air Force and SHAEF Air Staff Forward. The Tactical Air Command was likewise responsible for providing any necessary air protection. CATOR was responsible that the Tactical Air Command at SHAEF received information of all completed arrangements for supply and evacuation by air. In the event that CONAD (Continental Advance Section) or ADSEC desired to stock pile on administrative air fields east of the Rhine, they were directed[32] to request such authority from the army commander concerned.

43. Aerial Supply Restricted. The advances of the Third Army early in May 1945, together with the urgent demands for the prompt return of allied repatriots (ex-POWS) were such that SHAEF restricted[33] the use of supply by air to emergency only, to all armies except the Third US Army. All other armies were directed[33] to return to normal supply methods in order to allow SHAEF to meet these urgent demands for the use of aircraft.

## SECTION 2

## EVACUATION BY AIR

44. Twelfth Army Group Arrangements. Early in August 1944, the 12th Army Group made arrangements[34] with Ninth Air Force and CATOR for the evacuation by air of up to 500 patients per day starting from Gael, France, and changing to Courtils, France, when this field was ready. Third Army was to coordinate with the XIX Tactical Air Command on all details, particularly with respect to the change over to Courtils. In the event that additional air lift was required, the Third Army was to make a direct request on CATOR. A backlog of wounded patients had accumulated and 12th Army Group confirmed whatever rate of evacuation that could be filled by the armies and supported by the Ninth Air Force until such time as this backlog was cleared. First US Army became interested in this evacuation procedure after the opening of Courtils. Twelfth Army Group then coordinated the requirements of all commands and informed the Communications Zone of the estimated future requirements as a basis for requests on the air forces. All interested agencies were requested[34] to take every possible action to make this evacuation procedure successful until such time as the evacuation by air from the south of Avranches, France, was working smoothly.

45. First Army Request for C-64 Aircraft. During the planning phase of operation NEPTUNE, First US Army had requested that a number of low-landing speed airplanes (C-64) capable of transporting three or four litter casualties be made available for the operation. Information was received from the Ninth Tactical Air Command that approximately 30 planes of this type were present in the UK and would be made available to First Army. Evacuation by air became very acute in September 1944 and wounded were being transported long distances by ambulances. Since none of these planes had been made available to First US Army, a request[35] was submitted for 24 of such planes. Twelfth Army Group informed First Army that only six of these C-64s were available and these six were being used by the Ninth Air Force to transport critical supplies for the Ninth Air Force. The whereabouts of the other 24 was being investigated by Ninth Air Force. Twelfth Army Group[35] did not consider the C-64 as too practicable in operation since it required a landing field almost as large as the C-47, which had a far greater capacity and was being used for evacuation by air. However, in the latter part of September 1944, 12th Army Group advised[36] the First US Army that 20 C-64s were assigned to USSTAF. USSTAF planned to operate these planes as an augmentation to the service of the C-47s from field hospitals at forward airfields. It was believed by USSTAF that the difficulties encountered in the earlier use of C-64s for evacuating casualties had been overcome.

46. ETOUSA Instructions. ETOUSA issued instructions for the evacuation of army medical installations[37] in September 1944, which stated that the evacuation of field army medical installations was a responsibility of the Communications Zone but that, whenever the means at the disposal of the Communications Zone were inadequate, necessary assistance would be furnished by the field armies. Evacuation by air was to be exploited to the maximum possible. To accomplish this, each field army was responsible for the delivery of casualties to a medical holding unit, to be established in the immediate vicinity of each airfield, and for its operation until such time as the Communications Zone was able to perform this function. The field armies and the Communications Zone were authorized to make such deviations as they considered necessary whenever such modifications were mutually considered to be to the best interests of the evacuee and to effect better utilization of available facilities. Field armies were directed[37] to insure that the technical information necessary to the proper evacuation of casualties from the combat zone to the Communications Zone was provided the Surgeon, Communications Zone, in such manner and at such intervals as might be considered necessary to the proper evacuation of casualties.

47. Medical Evacuation of Civilians. In November 1944, 12th Army

Group received a directive from SHAEF stating[38] that wounded civilians of liberated countries and Germany, as well as members of the FFI, (French Forces of the Interior) were being evacuated through medical channels to the UK; (United Kingdom) and that for security and other obvious reasons, steps would have to be taken to insure that this practice was discontinued. Twelfth Army Group directed[38] the armies to take the necessary steps to insure the discontinuance of this practice and to insure that army medical holding units at aerial evacuation fields were properly instructed in this regard.

48. Use of Metz Airfield. In the middle of November 1944, 12th Army Group requested, through the Ninth Air Force, the continued use of the airfield at Metz, France, for the evacuation by air of Third Army casualties. The First TAF (PROV) approved[39] the use of the Metz airfield for the evacuation by air of Third Army casualties, provided that the volume of traffic was limited and that it was scheduled so as not to interfere with tactical operations. The First TAF (PROV) requested[39] that the agency responsible for evacuation by air coordinate the details with the Tactical Air Command.

49. Availability of Aircraft. Late in February 1945, SHAEF advised[40] 12th Army Group that sixty C-47 aircraft would be available for evacuation by air in the US Zone until about 31 March 1945. From that date until such time as the requirements for the operation "VARSITY" (airborne operation to seize Emmerich, Germany, and Wesel, Germany, across the Rhine; carried out on 24 March 1945) were completed, approximately forty C-47 aircraft were to be available for this purpose. Until about the same date, eight additional C-47s were to be available for mail and other incidental purposes.

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## CHAPTER 3

## ACTUAL OPERATIONS

50. General. Supply and evacuation by air can be broken down to the following categories:

a. Supply by Air:

(1) Airborne units.
(2) Air drops to isolated units.
(3) Air landed.
(4) Gliderborne.

b. Evacuation by Air:

(1) Evacuation of wounded.
(2) Evacuation and reinforcements by air.
(3) Evacuation by glider.

c. The employment of aircraft for the movement of supplies, personnel and equipment has fallen into nine (9) general classifications:

(1) Support airborne divisions in combat.
(2) Supply Tactical Air Forces in combat.
(3) Augment seaborne, road and rail traffic.
(4) Expedite movement of units and headquarters.
(5) Provide internal air transport and courier service.
(6) To alleviate emergencies created by weather and enemy action.
(7) Evacuation of wounded
(8) Evacuation of Recovered Allied Military Personnel.
(9) Movement of reinforcements and replacements.

51. Operating Units. (Air) At the opening of the campaign there existed in the theater, as air carriers of supply, the following organizations:

IX Troop Carrier Command
31st Transport Group (Ninth Air Service Command)
27th Transport Group (Eighth Air Service Command)
46th Group (Royal Air Force) Transport Command.
38th Group (Royal Air Force) British Airborne resupply only.

52. Pathfinder Teams. Due to intricate problems of aerial navigation and its effect on aerial delivery, specialized trained pathfinder teams were organized. These teams consisted of highly trained paratroopers from the airborne division and selected air crews of troop carrier command, with all available air navigation aid in aircraft and jump personnel trained and provided with available equipment for marking drop zones. Immediately on the alert that the 101st Airborne Division would need aerial supply,[44a] pathfinder team was sent into Bastogne to mark the dropping zones for arrival of supply laden air carriers. Pathfinder teams were primarily organized to assist the delivery of airborne units, but proved of great value in aerial supply. Development along this line must continue through joint coordination with ground and air forces.

53. Air Carrier Control Team.[45] The requirement for an advance airdrome control party to provide liaison and operational control of Troop Carrier aircraft on advance airdromes was recognized early in the supply operations of this theater. To meet this requirement, teams of approximately twenty-two (22) officers and men were organized and equipped with necessary communications and transportation facilities. Some of these teams were equipped for glider landing, with the thought in mind that they would go into an airborne combat area in which airborne engineers had built a strip, prepared to receive subsequent air landed operations for either additional troops or supplies. They have been flown into airfields or new strips, prior to the completion of repairs or construction. These teams were prepared to establish point to point radio contact with the Command or Wing Headquarters, ground to air contact between control tower and aircraft, simple homing facilities and simple telephone communication on the airfield.

54. Advanced Airdrome Control Party. The normal function of the advanced airdrom control party is as follows:

a. Control air traffic in the immediate vicinity of the airfield.

b. Control traffic of aircraft on the ground.

c. Coordinate movements of trucks and ambulances with movement of aircraft

d. Provide liaison between the incoming airplanes and the supply agencies receiving the supplies.

e. Perform the functions of an advanced command post.

f. Perform the functions of an advanced weather station.

As mentioned above, even though normal control and weather facilities may be established by the Tactical Air Force, it is highly desirable to have a control team of the carrying agency to perform the rest of the functions.

PHASE OF INITIAL OPERATIONS 96 June - 31 July 1944).

55. Recognition of Emergencies. Early in the operations, it was recognized[1] that emergencies would arise and that rigid preloading of supplies would have to be offset by flexibility elsewhere. Thus contemplated aerial delivery, which was initiated on D plus 6, afforded one reasonable solution for expeditiously delivering items of urgent requirement. Upon the completion of the emergency landing strips (ELS) in the Normandy beach area in June 1944, the air landing of supplies, personnel and equipment commenced on a large scale[2]. All of these early missions, whether for airborne, ground or air agencies and evacuation, made use of the C-47 aircraft.

56. Early Difficulties. In the early stages of operation of supply by air, the process underwent serious growing pains and considerable difficulties[3] were involved. Many requests were received without having undergone the necessary screening process to determine the necessity for air lift; many requests were received in duplicate; the supply agency would inform CATOR of the availability of supplies and the arrival time at the loading airfield without determining the availability of truck transportation; in some instances supplies were located at depots at such a distance from the supply loading airfield that the emergency had ceased to exist prior to the arrival of the supplies at the supply loading airfield. These and other difficulties were gradually overcome so that by the time the advance of ground troops became rapid, the mechanics of supply by air was fairly well smoothed out.

a. In an attempt to straighten out the difficulties concerning supply by air, the First US Army Group dispatched a liaison officer[4] on 17 June 1944 to the continent to discuss the difficulties with the First US Army. At this time, difficulties and misunderstandings concerning requisitioning procedure, the use of the "SAD" and other signal forms, coordination with the air forces, the receipt of requisitions in the UK from different sources on the continent and without the knowledge of the G-4 First US Army, and arrangements for unloading planes on the continent were discussed with members of the G-4 Section, First US Army, and representatives of the air force at ELS No. 1, Omaha Beach.

57. The First "SAD". Thus the first "SAD"[5] was sent from First US Army on the far shore to 21 Army Group (Rear) (US Administrative Staff) on 20 June 1944 and requested the delivery of hand grenades. This delivery was made by air on 21 June 1944. Thereafter "SAD's" were almost a daily occurrence[5] and averaged approximately 6,000 pounds each for delivery to ELS No. 1 at St. Laurent in rear of Omaha Beach until the middle of July 1944. Three "SAD's" during this period, namely Nos 8, 10 and 12 called for emergency aerial delivery between 22 and 25 June of approximately 500 tons each of ammunition for delivery to air strips 1, 2, 3, 6, 10 and ELS No. 1. These were called for during the period of the storm, which seriously interfered with the delivery

of supplies at that time. After the middle of July 1944, USAIS averaged[5] 250 tons.

58. Start of Medical Evacuation. Medical evacuation by air started on D + 6 and for the week ending 12 June 1944, 122 patients were evacuated[6] to the UK by air. During the month of June 1944, a total of 5370 patients were evacuated by air. Aerial evacuation continued to increase so that during the month of July 1944, a total of 22,572 patients were evacuated[6] by air.

59. First Deliveries to Isolated Units. During the month of June 1944, there were two occasions on which supplies were delivered by parachute to isolated units[7] other than airborne forces:

a. On the eighth of June 1944, 15 pounds of ether were dropped to a field hospital between the Normandy Beach and Carentan.

b. On the twenty-second of June 1944, during the period of the severe storm which interfered with the delivery of supplies by sea, food and water were delivered to an anti-aircraft artillery unit marooned on St Marcouf Island.

60. Air Movements During Initial Phase. The air movements during this period may be summarized as follows:

| Month | Freight (long tons)[8] | Passengers Carried[8] | Patients Evacuated[6] |
|---|---|---|---|
| June 1944 | 2595 | 6795 | 5370 |
| July 1944 | 4023 | 14873 | 22572 |

PHASE OF THE "BREAKTHROUGH" (1 Aug - 27 Aug 1944)

61. Significance of Supply by Air. During the period 1 August to 27 August 1944, supply by air, though insignificant in comparison with the overall picture, was of particular value[9] in delivering Class I and III supplies in forward areas. During the latter part of this period, aerial deliveries had successively progressed as far as Orleans. However, the threat of interruption for planned airborne operations prevented[9] continued reliance on supply by air. Also from 10 July to 25 August 1944, the IX Troop Carrier Command had 413 aircraft on detached service in Italy[10] for the "DRAGOON" operation. (Invasion of Southern France)

62. Emergency Supply to Isolated Unit. During the battle in the Avranche-Mortain area, an isolated battalion[7] received 24 aircraft loads of supplies by parachute consisting mainly of food, ammunition and medical supplies. Twelve aircraft made successful deliveries on 10 August and twelve of a total of 25 aircraft made successful deliveries on 11 August 1944. Due to poor visibility and the absence of marker panels and a prearranged procedure, 13 plane loads were dropped short of the target area.

63. ADSEC Entered Aerial Supply Picture. ADSEC, Communications Zone, entered the aerial supply picture[11] on 12 August 1944 when they requested the reconnaissance of airfields in the vicinity of LeMans for the purpose of obtaining a landing field for delivery of POL to Third Army. A field was selected and the plan was made for the delivery of approximately 2,000 tons per day for a period of ten days. This was the beginning of supply by air to the armies by ADSEC. Thus the first week ending 2 September 1944, ADSEC delivered 1981 tons of supplies by air to the armies. It was at this same time that ADSEC became involved in the aerial evacuation of the wounded.

64. Air Movements During "Breakthrough". The air movements during this period may be summarized as follows:

| Month | Freight (long tons)[8] | Passengers Carried[8] | Patients Evacuated[6] |
|---|---|---|---|
| August 1944 | 8039 | 15328 | 21473 |

PHASE BEYOND THE SEINE (28 Aug - 30 Sept 1944).

65. Uncertainty of Aircraft. From the latter part of August to the latter part of September 1944, supply by air facilities available were particularly valuable[12] in transporting gasoline to forward fields. The mechanics for supply by air such as placing bids, calling supplies forward, loading, etc was fairly well smoothed out. However, it was during this period that uncertainty of availability of planes was the everday experience. About the middle of September 1944, preparations for the Arnheim, Holland, operation resulted in the removal of cargo planes from supply by air missions. This was an extremely critical time to lose the transport facilities. Bombers were flown on supply missions for ten days of this period but complications arose from lack of training in this particular role and limitations in landing fields. Bulk tanker planes were also experimented with, but due to the necessity of pumping equipment both at the loading and offloading fields, very little advantage resulted from their use. These complications and difficulties nullified any outstanding advantages[12] that might have derived from the use of bombers.

66. Use of B-24 Bombers. By the end of August 1944, it became apparent[13] that the aircraft of the IX Troop Carrier Command could not keep pace with the demands for supply by air, and, at the same time, prepare for other contemplated airborne operations. Therefore, B-24's of the Eighth Air Force were used to carry supplies to areas in which suitable concrete runways were available. These missions included emergency supplies for Paris, France, and rations and fuel for the forward armies. This employment of B-24's was the first experience of this nature for this aircraft in the European Theater. Although the ground organization and air crews were inexperienced in this type of operation, a considerable tonnage was moved in a short period of time. During the period 29 August to 17 September 1944, 1382 tons of food, 434 tons of gasoline and 105 tons of medical supplies, litters and blankets were transported[13] in B-24's. During the period 17 to 30 September 1944, B-24 aircraft[14] delivered 5500 tons, of which 5438 tons was gasoline.

67. Air Movements During Period Beyond the Seine. The air movements during this period may be summarized as follows:

| Month | Freight (long tons) Total Carried[8] | Freight (long tons) Delivered By ADSEC[15] | Passengers Carried[8] | Patients Evacuated[6] |
|---|---|---|---|---|
| Sept 1944 | 28541 | 15731 | 20412 | 12329 |

PHASE OF RELATIVE INACTIVITY (1 Oct - 7 Nov 1944)

68. Use of Heavy Bombers Uneconomical. During the rapid advance through France in the summer of 1944 a considerable amount of air lift[16] not only by troop carrier forces but also by special forces of heavy bombers, which were set aside for the task, was involved in the carrying of gasoline, food, ammunition and other essential supplies to the rapidly advancing spearheads of allied forces. By the beginning of October 1944 the immediate need for this type air lift had disappeared. Experience had proven[17] that the hauling of POL by heavy bombers was uneconomical, therefore the supply of POL to ground forces reverted to normal supply channels and air lift thereafter was limited to the carrying forward of essential, high priority requirements, including medical supplies, blood plasma, special signal equipment, currency, mail, ammunition, rations and a great variety of other commodities. This work was carried out exclusively by troop carrier forces.

69. Administrative Airfields. Airfields to which air supplies were delivered[18] varied from dirt strips 3600 feet long to concrete runways 6000 feet long. Due to the requirements of the tactical air forces, most supplies were delivered to dirt strips or sod fields. During certain phases, supply movements were greatly curtailed due to lack of airfields or air strips on which the tactical air forces would permit supply by air activities.

70. Evacuation by Air Procedure. Since a corollary to the function of supply by air is the function of evacuation by air, it was necessary to closely coordinate[19] the dispatch of supply aircraft with the requirements for evacuation aircraft. To effectively determine the detailed requirements of evacuation aircraft and to effectively control the flow of patients to an airfield for aerial evacuation, the IX Troop Carrier Command attached liaison officers with each of the armies, the army group, the Ninth Air Force, Communications Zone and CATOR. When this liaison officer learned that a forward airfield was being made availalbe for supply by air purposes, he arranged with the agency receiving the supply by air for the establishment of an air holding unit[20] at this airfield for the evacuation of wounded. Such a holding unit was capable of caring for up to 1000 patients. The patients were evacuated to the air holding unit and from there by air to hospitals in the rear. The evacuation officer at CATOR was kept informed of the patients at each of these holding units and he in turn informed the IX Troop Carrier Command of this daily information. In this way, the IX Troop Carrier Command could balance their requirements for evacuation by air against their requirements for supply by air for the following day. When cargo aircraft were dispatched to a field in sufficient numbers, aerial evacuation teams, consisting of a nurse and a surgical technician, were assigned to each supply aircraft for the purpose of caring for the patients on the return flight. When cargo aircraft were not destined for a supply by air mission to an airfield where there was a requirement for evacuation, aerial evacuation personnel were assigned to aircraft on a supply by air mission to an adjacent field and then these aircraft were rerouted to the other field to evacuate the patients. In cases where no supplies were being carried forward by air, empty cargo ships were dispatched to the air holding units to evacuate the casualties. In the early days of the European Campaign, the limited capacity of the air strips were such that only loaded cargo aircraft could be dispatched to airfields. Thus the aerial evacuation needs of the army were completely dependent[20] upon the air movement of supplies.

71. Emergency Supply by Air by Fighter Aircraft. A battalion of the 36th Division, Seventh Army, became isolated in the area of Foret de Champ, France, on 26 October 1944. A request for emergency supply by air was made on this date and on 27 October, ammunition, medical supplies, rations and signal batteries were delivered to this isolated unit. P-47 fighter aircraft[21] were used for this delivery. External fuel-ferrying tanks (belly tanks) were used for loading the rations. Deliveries were made on 27, 28 and 29 October 1944. Contact was made with the isolated battalion early on 31 October.

72. Air Movements During Period of Relative Inactivity. During this period, supply by air averaged[22] approximately 450 tons daily. The air movements may be summarized as follows:

| Month | Freight (long tons) Total Carried[8] | Freight (long tons) Delivered By ADSEC[15] | Passengers Carried[8] | Patients Evacuated[6] |
|---|---|---|---|---|
| October 1944 | 27398 | 8433 | 18945 | 10155 |

In addition to movement of supplies by air, the aircraft of the IX Troop Carrier Command carried 47,743 troops and their equipment on combat missions and 64,362 troops on training missions[10] from 17 September to 10 November 1944. Aircraft of other American transport agencies carried 35,619 patients during this same period. However, all aerial evacuation work employed medical evacuation personnel of the IX Troop Carrier Command.

PHASE OF RESUMED OFFENSIVE (8 Nov - 15 Dec 1944).

73. Emergency Supply by Artillery Liaison Plane. The 95th Division used artillery liaison planes[23] on 10 November 1944 for the first time to supply elements of a battalion that were isolated on the east bank of the Moselle River. These elements constituted the bridgehead over the Moselle and became isolated when the Moselle River reached flood stage; the river became so swift and wide that it was impossible

for boats to cross with supplies to this bridgehead. It was therefore decided within the division to resupply this isolated unit by means of artillery liaison planes. Emergency medical supplies, rations, signal equipment and ammunition were supplied in this manner with excellent results. In a two-day period, 10 and 11 November 1944, a total of 149 round trips were flown with liaison planes. Supplies dropped[23] included 1080 "K" rations, 2 sacks and 500 packages of cigerettes, 66,000 rounds of small arms ammunition, 4000 rounds of cal. .50 ammunition, 36 rounds of 60mm mortar ammunition, 2 SCR-300 radio sets, 600 head units, 4 boxes of medical supplies and other miscellaneous medical items, 350 sleeping bags, 300 pairs of socks, 150 pairs of gloves, 70 blankets and other miscellaneous items.

a. On 14 November 1944, during the attack on Metz, France, a batt of infantry of the 95th Division became isolated from the rest of the division. On this occasion it was likewise decided to drop supplies by means of artillery liaison planes.[23] Thus supplies were successfully dropped to this isolated unit on 14 and 15 November.

b. On 17 November 1944, elements of another infantry regiment of the 95th Division were cut off from the rest of the division and were supplied by air on 17 and 18 November by means of artillery liaison planes.[23] These missions were likewise executed with excellent results.

74. Evacuation by Artillery Liaison Plane. During the attack in the Metz area, it became impossible to evacuate casualties from the 95th Division by means of ambulance. Due to the impracticability of evacuation by ambulances and the necessity for immediate medical aid, it was decided by the division to attempt to evacuate patients by means of artillery liaison planes.[23] The regimental surgeon and a pilot landed in an open field in this area on 19 November 1944. They had painted a large Geneva Convention red cross on the liaison plane but despite this fact, the plane was fired on with no resultant damage. Five casualties were evacuated on 19 November and four casualties on 20 November 1944. With this type of evacuation it was necessary for the patients to be evacuated in a sitting position. However, despite the critical condition of the patients evacuated, no great harm was done to them during this short distance traveled in this position. It was concluded[23] by the division that this method of evacuation was excellent in instances of emergency where normal methods of evacuation were impossible.

75. Air Movements During Resumed Offensive. After resumption of the offensive on 8 November until the beginning of the German counter-offensive on 15 December, air delivery continued at an approximate average of 450 tons daily[24] despite frequent bad weather. It was during this period that the Ninth Air Force agreed to provide an administrative airfield within 50 miles of each army front when tactical priorities permitted. The air movements may be summarized as follows:

| Month | Freight (long tons) Delivered to ADSEC & Armies[25] | Freight (long tons) Delivered By ADSEC[15] | Patients Evacuated[6] |
|---|---|---|---|
| November 1944 | 17003 | 13510 | 5809 |
| December 1944 | 6571 | 3885 | 13513 |

PHASE OF ENEMY COUNTER OFFENSIVE (16 Dec 1944 - 21 Feb 1945)

76. Relief of 101st Airborne Division. When the Ardennes offensive was launched by the Germans of 16 December 1944, the rapid advances made by the German armor against the relatively light held line of the Allies resulted in some allied units being cut off and surrounded. Immediate requests[26] were therefore made to SHAEF for air lift of emergency supplies to be flown into these forces. The first of these missions requested was for a portion of the 106th Infantry Division and for a battalion task force of the 3rd Armored Division which had been cut off in the area south of St Vith, Belgium. On 21 December, SHAEF received an alert from 12th Army Group[27] for an emergency supply by air shipment to the 101st Airborne Division which had been hastily committed in the Bastogne area on 18

December. When the 101st Airborne Division was committed to action, no plans for resupply by air had been formulated[28] and their records of previous aerial resupply missions were left at their home station. Their Division Surgeon, Quartermaster, and Ordnance Sections, together with their respective companies, were cut off from the rest of the division in Bastogne, Belgium, on the night of 19-20 December.

a. On 21 December 1944, the 101st Airborne Division requested[28] their rear echelon and also VIII Corps for resupply by air. VIII Corps notified Third Army and on 22 December the division received word that the resupply by air would be dropped at the designated point that day. This was cancelled due to bad weather. But information was received that thedrop would be made in the darkness of the morning, 23 December. However, nothing was received. The athfinder eam, in charge of a Lieutenant, landed the morning of 23 December and set up the pathfinder equipment for the aerial delivery. Since there were no division supply services available, all units were directed[28] to utilize all available vehicles, pick up all bundles found, and deliver them to unit dumps. This plan worked satisfactorily and an equitable distribution was made.

b. A total of four parachute and two glider deliveries were made and, in addition, one glider load of medical personnel, who had never flown in gliders, landed safely. Reports[28] on the delivery of bundles from the first two drops were sufficiently accurate to tabulate recoveries but the last two parachute deliveries could not be accurately tabulated because units were forced to make distribution of many items immediately upon recovery. However, the overall percentage of recovery on parachute resupply was estimated[28] at approximately 95%. Deliveries were made as follows:

| | |
|---|---|
| 23 December | 241 planes |
| 24 December | 160 planes |
| 25 December | No deliveries due to bad weather |
| 26 December | 289 planes (41 planes dropped their supplies short causing 50% to land in enemy territory) |
| 27 December | 130 planes (considered to have had very high recovery) |
| | 820 planes received |

The overall recovery on glider resupply was 100%. Deliveries[28] were made as follows:

| | |
|---|---|
| 26 December | 10 gliders |
| 27 December | 32 gliders |
| | 42 gliders received |

These deliveries to Bastogne were considered the most successful[28] of any ever made to the 101st Airborne Division. The division attributed the extremely large percentage of recoveries to the fact that practically no "door loads" of bundles were carried, thus enabling the drop patterns to be small enough to assure efficient recovery.

c. The information received from CATOR[29] concerning the air resupply of the 101st Airborne Division was as follows:

| | | |
|---|---|---|
| 23 December | 263 planes dispatched | 8 missing |
| 24 December | 161 planes dispatched | none missing |
| 25 December | no flights | |
| 26 December | 289 planes dispatched (Unconfirmed estimate of up to 25% of loads dropped outside of area) | 1 missing |
| 27 December | 188 planes dispatched | none missing |
| | 901 planes dispatched | 9 missing |

| | | |
|---|---|---|
| 26 December | 10 planes with gliders | none missing |
| 26 December | 1 plane and glider w/2 surgical teams | |
| 27 December | 50 planes with gliders | 14 planes and 8 gliders missing |
| | 61 planes with gliders dispatched | 14 planes and 8 gliders missing |

d. Thus, CATOR dispatched 901 planes, of which 9 were reported missing, but the 101st Airborne Division only reported receiving 820; and 61 planes with gliders were dispatched, of which 14 planes and 8 gliders were reported missing, but the 101st Airborne Division reported the receipt of only 43. This discrepancy of 72 planes and 10 gliders remains unaccounted for.

e. Of the 1000 or more plane loads dispatched to the 101st Airborne Division and attached troops, the losses in aircraft were about three percent. This was not considered expensive[30] in view of the importance of the mission.

77. Emergency Delivery to First U.S. Army Unit. In addition to the major effort of resupplying the 101st Airborne Division in Bastogne, Belgium, troop carrier forces attempted to carry out a similar mission[31] to a unit of the First Army in Marcouray, Belgium, just north of LaRoche, Belgium, on 23 December 1944. It had been estimated that there were approximately 1000 men comprising the remnants of four battalions in this area. Their immediate needs were gasoline and medical supplies. Twenty-nine aircraft were loaded and dispatched but due to inaccurate coordinates, the supplies dropped from 23 aircraft fell outside of the target area. The enemy waited until the supplies were dropped, and then opened fire on the transports destroying three, damaging three, and capturing most of the supplies. Weather prevented resupply the following day and the force was relieved on 25 December so that no more air supply was required.

78. Operation "MIDNIGHT". To further facilitate night delivery of supplies and evacuation by air, an extended program of night flights between the United Kingdom and the Continent for triple purpose of increasing freight hauls, boosting medical evacuation totals and stepping up night proficiency of Troop Carrier crews was instituted. SHAEF approved an establishment of the night route to be installed with navigational aids and so laid out as to be elongated to any extent necessary to assist Army operations. Flood light facilities were required to expedite the work of transferring freight in numerically increased daily capacity for supply commitments. The existance of "Midnight"[46] also proved invaluable in enabling the delivery at night of part of the 17th Airborne Division to tactical reserve positions during the December Battle of Ardennes.

79. Movement of Reserves. Another task undertaken by the transport forces during the emergency of the Ardennes offensive was the movement of reinforcement troops[32] from the UK and from Marseilles, France, to the reinforcement pool in the Reims, France area. The entire SHAEF reserve had been committed to fill the gap in the allied line by the enemy's rapid advances. The 17th Airborne Division which had been in the UK, was flown from the UK to the Reims, France, area between 23 and 29 December the nucleus of the new SHAEF reserve. No less than 1,110 sorties were flown in the performance of this task.

80. Emergency Supply by Air to 6th Army Group Units. On two occasions during January 1945, the 6th Army Group was called upon to deliver emergency supplies to isolated units.

a. On 9 January 1945, a battalion of Ier Division, Marche Infanterie, First French Army , 6th Army Group, became encircled in the vicinity of Gerstsheim, Germany, and Obenheim, Germany. A call for resupply[21] by air was made and on 10 January 1945, the first supplies were flown to the isolated unit. Supplies included primarily rations and ammunition, some of which were dropped in belly tanks from P-47's.

b. On 12 January 1945, a tank destroyer unit of the 79th Division, Seventh Army, became isolated[21] in the town of Rittershoffen, Germany, and requested resupply by air. On 13 January medical supplies, batteries and ammunition were successfully dropped to this unit.

81. Air Movements During Enemy Counter Offensive. During the period of the enemy counter offensive from 16 December 1944 until 1 February 1945, the average daily tonnage delivered by air[33] fell to approximately 50 tons due largely to frequent periods of bad weather. The high spot of aerial delivery for this period was the supply to encircled troops in Bastogne, Belgium, when approximately 850 tons were delivered from 23 to 27 December 1944. The air movements may be summarized as follows:

| Month | Freight (long tons) Delivered to ADSEC & Armies[25] | Freight (long tons) Delivered By ADSEC[15] | Patients Evacuated[6] |
|---|---|---|---|
| January 1945 | 860 | 158 | 5382 |
| February 1945 | 2240 | 571 | 5732 |

PHASE OF CLOSING TO THE RHINE (22 Feb - 14 March 1945).

82. Availability of Aircraft. During the period of final preparation for the drive across the Rhine River from 15 to 23 March 1945 and the coordinated offensive by all the armies which resulted in the complete encirclement of the Ruhr industrial area on 4 April, rail lines were inadequate to support the rapid advances of the armies and consequently more reliance was placed on motor transport and air lift.[34] However, during this period up to 29 March less than 20 planes per day were available to 12th Army Group for transporting supplies. This lift was used almost entirely for transporting blood and other emergency medical supplies. Beginning with 30 March 1945, an average of over 500 planes per day was dispatched[34] for supply and evacuation. This resulted in a substantial contribution to the total supplies moved forward, principally to First and Third Armies, and amounting to a daily average of over 300,000 gallons of gasoline and 500 long tons of rations.

83. Air Movements During Closing to the Rhine. The air movements during this period may be summarized as follows:

| Month | Freight (long tons) Delivered to ADSEC & Armies[25] | Freight (long tons) Delivered By ADSEC[15] | Patients Evacuated[6] |
|---|---|---|---|
| March 1945 | 4370 | 1238 | 28714 |

PHASE OF ENCIRCLEMENT OF THE RUHR (15 March - 4 April 1945).

84. Rations to Isolated French Forces. On 2 March 1945, CATOR was notified through the First Allied Airborne Army that French Forces were isolated[21] near Bonneval in the French Alps and were in need of rations. Early on 4 March 1945, 950 "K" rations were delivered by air to these isolated French troops.

85. Increased Use of Supply by Air. During the latter days of March 1945, when the extremely rapid advances by the American armored columns began to outrun possibility of normal methods of supply, air lift was again in demand[35] to meet the ever increasing gap between level of supplies required and those available through normal supply channels. On 30 March 1945, the troop carrier forces were given the task of flying POL supplies in large quantities to advanced elements of the American armies east of the Rhine. The landing fields to be used by the aircraft in the forward areas were hastily constructed strips usually in the boundaries of otherwise unserviceable German Air Force fields. In many cases[35] these strips were extremely close to the most advanced positions reached by the American armor. Despite this fact, the losses incurred during these operations were not very great. The average number of daily sorties flown during the period 30 March to 30 April 1945 by the IX Troop Carrier Command was 679 sorties. Despite the scale of effort required and the very long flying hours involved, the serviceability of the transport forces throughout this period was never less than 80% of

aircraft available. During this period the IX Troop Carrier Command carried 54,316 long tons of supplies, including 41,460 long tons of POL to the armies. The remainder of the air lift was made up in large part by food and ammunition for the ground forces in the allied spearheads. The fact that on no occasion were the allied armored spearheads forced to halt due to lack of supplies[35] may be said to have contributed very largely to the confusion and chaos which their quick thrusts forced upon the enemy. Thus the work of the troop carrier forces in supplying these requirements by air was of paramount importance to the speed with which the final success was won.

PHASE OF CLOSING WITH THE RUSSIANS (5 April - 9 May 1945).

86. Supply and Evacuation by Air to First and Ninth Armies. During the early part of April 1945 the supply lines of First and Ninth Armies were considerably extended.[36] There was a shortage of truck transportation and with lines under repair these means could not keep up with the fast pace of the advancing armies. So the major part of supply and evacuation by air was given to First and Ninth Armies. Supply by air to the First Army reached its peak during the week ending 14 April 1945, when 6445 long tons were delivered by air. This tonnage consisted primarily of rations and gasoline and relieved the critical shortage of these two classes of supply. The service rendered by CATOR during this period was stated to be "outstanding" by First Army.[36] Additional truck transportation was made available to these armies by ADSEC and truck companies assigned to divisions were called upon to supplement army transportation. As the armies slowed down, the rail facilities were considerably extended east of the Rhine River and rehabilitation of rail lines continued at a rapid pace. The tactical situation stabilized in the First and Ninth Armies in the middle of April 1945 enabling the rail and truck transportation to become stabilized.[36] Thus it became unnecessary for these two armies to continue to receive extensive supply by air and the weight of aerial supply was given to Third Army. The evacuation casualties by air direct to the Communications Zone and the UK continued throughout the period.

87. Third Army Supply and Evacuation Program. Early in March 1945, it became apparent to the Third US Army that the supply lines for the advance into Germany would soon become greatly extended and restricted. It was therefore decided to investigate[37] the possibilities of large scale supply by air. SHAEF had previously promised Third Army sufficient supply by air in the event of a "breakthrough". This was reaffirmed by CATOR and arrangements were made to have the 2d Aviation Engineer Brigade provide engineer troops to follow close behind Third Army armor and infantry to rehabilitate airfield for administrative purposes. This procedure[37] worked very well in that daily reports were received by army through corps on the uncovery, progress of repair, and maintenance of uncovered airfields. When the new field was considered ready and available for administrative purposes, CATOR was contacted and a reconnaissance flight made to check the suitability of the airfield. Frequent conferences were held with XIX Tactical Air Command so that the army was familiar with those airfields being used for tactical purposes and those available for administrative use. Daily negotiations[37] went on between Third Army and CATOR and arrangements for supply by air were confirmed by TWX to the Tactical Air Command and CATOR. Normally, supplies were requested two days in advance but in the case of the evacuation of RAMPS (Recovered Allied Military Personnel) such advance notification was usually impossible. Where possible, CATOR notified Third Army of the number of planes ordered to Third Army airfields each day. Such forecasts were often not reliable due to operations and weather conditions and thus very close liaison was necessary with all operational airfields.

a. The first air shipment of gasoline[37] into the Third Army area in support of the advance into Germany arrived on 30 March 1945. From that date until 9 May, 22% (6,046,530 gallons) of all gasoline issued by the Third Army was delivered by air. It was concluded that the total gasoline reserve on hand at the start of this period would have been completely exhausted early in the advance had it not been for supply by air. To conserve gasoline during this period, Class III supply

points were established at airfields thus eliminating the necessity of trans-shipment from ADSEC supply points to army distributing points.

b. Rations were brought in by air[37] from 3 April to 3 May but were curtailed due to increased requirements for gasoline and the evacuation of RAMPS. The delivery of rations by air was considered secondary. However, during this period 11% (1,571,872 rations) of all rations issued by Third Army were brought in by air. Without supply by air the ration situation would have become critical during the period.

c. As the advance drove deeper into Germany certain items of Class II and IV supplies became critically short[37] in forward areas. Some of these were flown in by air. These included signal field wire and dry cell batteries, ordnance bogie wheels and tracks for medium tanks, and medical blankets, litters, and drugs.

d. During this entire period, all Third Army medical patients (totaling 19,905) were evacuated by air.[37] Hospital planes in most cases were called forward each night by flight surgeons attached to medical units. In addition to medical evacuees, Third US Army evacuated during this period, 134,587 RAMPS by air.

e. As a result of this large scale supply and evacuation by air program, the Third US Army reached the following conclusions:[37]

(1) The armies must be authorized to deal directly with the agency controlling the planes, as the Tactical Air Force is interested only in the use of airfields and in providing air coverage; their main interest is not getting supplies forward.

(2) Only one person in the army should handle all requests for supply and evacuation by air and the location of fields. He should be authorized to contact all interested agencies and conclude all negotiations. He should be an officer of intelligence and experience in staff procedure.

(3) The army should be responsible for all unloading at the airfield in a fast moving situation as the Communications Zone can not know which fields are to be used daily.

(4) There should be an automatic exchange of blankets and litters by evacuation planes.

(5) Since forward airfields are usually limited to the number of planes that can be accomodated, a number of forward airfields should be established.

(6) There should be attached to the army G-4 Air Section a representative of the air transport agency who is qualified to advise the army; he should be provided with a plane to reconnoiter airfields and for liaison purposes if ground communications should be interrupted.

(7) The use of air transport to move hospitals, when hospitals are not being used to capacity, is not an economical use of air transport. Generally, air transport should be used for long distance moves of supplies and casualties due to its high speed and flexibility.

(8) It is essential that there be an understanding on the part of both the army and the air transport agency that the supply by air system is not an accurate system due to weather, poor communications, operational difficulties and tactical requirements.

88. New Task for Air Transport. In the closing stages of the European Campaign, the air lift of the returning transport forces was committed[38] to a new task. As the advancing allied ground forces uncovered German POW camps, many hundreds of liberated allied personnel were required to be transported to base areas in Western Europe or in the UK. The very large air lift, which at this time was employed in hauling gasoline and food to the advancing allied armies, was therefore used to return there allied repatriates and other displaced persons. By the end of April 1945 more than 100,000 repatriates had been flown out from forward areas by these transport forces.

89. Air Movements During Final Phase. From 5 April to 9 May 1945, supply by air established an impressive record.[39] The daily average of more than 500 planes was maintained and at one time the sorties flown averaged 1000 per day. A total of over 9,000,000 gallons of gasoline were flown to forward airfields. Planes returning westward from these missions carried allied ex-POWs at an average daily rate of 3047. G-4 Reports for this period emphasized the importance of supply by air. The air movements during this period may be summarized as follows:

| Month | Freight (long tons) Delivered to ADSEC & Armies[25] | Freight (long tons) Delivered By ADSEC[15] | Patients Evacuated[6] |
|---|---|---|---|
| April 1945 | 45823 | 39077 | 35403 |
| 1-8 May 1945 | 3774 | 2108 | 6002 |

90. Aerial Supply of Food to Holland. During the summer of 1944 it became known that the food situation for the civilian population in Western Holland would be critical, particularly during the winter of 1944 to 1945. In November 1944, the question of supplying food to the Dutch civilian population was discussed at Supreme Headquarters and the possibility of supply by air was considered[40]. Due to tactical operations and available air lift, it was decided that only a token lift could be spared for this purpose. This token lift was to be provided until such time as either a large capacity air lift could be made available or supply could be introduced by sea and road.

a. An agreement[41] to supply food to the Dutch civilian population was reached by the Supreme Commander, Allied Forces, and the German High Command. Air lift was to be used to carry the whole burden of supplying food until ships, road, and rail lift were available. It was estimated that a period of 14 days would elapse before food supplies through service channels could begin to be distributed in Holland. The overriding consideration from the air point of view remained the tactical requirements of the campaign. Two plans were prepared, namely, (a) to provide an air drop of up to 2,000 tons daily for 14 days, and (b) to provide merely a token lift of a few hundred tons daily or whenever marginal efforts of aircraft could be made available.

b. During the winter of 1944-45 the food situation in Western Holland became increasingly worse. In January 1945, the Riechscommissar for Holland proposed opening of negotiations[42] between the Allies and the Germans with a view to arranging a temporary truce while supply of foodstuffs could be introduced into Holland. Meetings for this purpose were arranged by the representatives of the Supreme Commander and the Germans in Holland. At those meetings, the possibility of introducing foodstuffs by sea, road, and air were discussed. The principal difficulty with respect to supply by air was that the Germans insisted on certain zones being observed as danger zones, over which allied supply aircraft could not fly without the danger of being fired upon. The original zones were of such a nature as to practically eliminate the possibility of supply by air. However, three danger zones were eventually agreed upon. By this time the whole of Northwestern Holland had been cut off from the rest of the German held area by the allied drive across the Maas River up to the Zuider-Zee. The food situation which had been critical before was now catastrophic.

c. During the latter part of April 1945, the lack of targets

for heavy bombers made it possible for the Supreme Commander to sanction the use of bombers for the supply by air[43] of Northwestern Holland. While discussions were still being carried out on the plan for relief food to be moved by sea and road, the first drop by air of 560 tons of food took place on 29 April 1945. Supplies were dropped daily over Holland from that date until the terminiation of hostilities. During this period 11,679 tons of food were dropped to the civilian population of Northwestern Holland; of which the US Eighth Air Force dropped 4,156 tons. It is interesting to note the flexibility of air power in that the allied heavy bombers, which contributed so largely to the defeat of the enemy, should have ended the war in Europe on a timely errand of mercy bringing relief food supplies to many hundreds of thousands of starving allied nationals.

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## CHAPTER 4

## EQUIPMENT

91. Delivery Units. Dropping supplies in parachute delivery units[1] is the method best suited to the supply by air of small units. To supply large units over an extended period of time requires large amounts of delivery equipment, many airplanes, and a large number of specially trained personnel. When those three requirements are satisfied, the delivery of supplies by parachute is practical for extended operations. Delivery units differ as to type, construction, and weight-carrying characteristics. They are designated by number.

a. The type A-4 delivery unit[2] is best suited for the dropping of light loads, well padded, small in bulk, and not exceeding 100 pounds in weight. Care must be taken that there are no sharp edges or protruding surfaces upon which the total shock of landing might fall. Brittle or breakable items must be protected by padding. The delivery unit, type A-4, consists of a boxlike container, a 24-foot circular cotton canopy, and a conventional "pull off" pack assembly. The safe load limit is 100 pounds net.

(1) The container is a rectangular bag of duck, 12 x 30 inches, reinforced on the bottom by plywood, and on top by a metal frame which includes rings for suspension on bomb racks. It has a suspension harness of webbing.

(2) The canopy has two risers, connected by a bridle just below the suspension lines, by means of which the container is suspended during descent. The risers are attached to the suspension lines at one end, and by

means of snap fasteners to the V-rings on the container at the other end.

(3) The pack assembly consists of a pack tray and pack cover into which the canopy is packed. The pack is attached to one end of the container by tie strings and is opened by means of a 15-foot static line.

b. The delivery unit, type A-5,[3] can be used for the dropping of arms, ammunition in belts, food, water, and gasoline in standard metal containers. It is an all-purpose unit capable of carrying sturdy items to 175 pounds net weight. The delivery unit, type A-5, consists of a roll type container, a 24-foot circular cotton canopy, and a conventional "pull off" pack assembly. The safe load limit is 175 pounds net.

(1) The container consists of three parts: one felt-padded center section of 22-ounce duck, 56 inches by 180 inches, in which arms and equipment are placed and rolled into a bundle 44 inches long and 18 inches in diameter; and two end caps which fit over the ends of the rolled center section and fasten together by two male and female harness fasteners on opposite sides of the roll. The end caps are equipped with two V-rings for attaching the risers of the canopy and two V-rings for suspending the unit on bomb racks.

(2) The canopy and pack are of the types used with the delivery unit, type A-4.

c. The delivery unit, type A-6,[4] can be used for the dropping of light loads, ammunition, and rations, up to 150 pounds in net weight. Due to the size and shape of the A-6 container, it is easily handled, and several containers can be thrown from the airplane in rapid succession, or at one time. The delivery unit, type A-6, consists of a box-type container, a 24-foot circular cotton canopy, and a conventional "pull off" pack assembly. The safe load limit is 150 pounds net.

(1) The container consists of two parts: a rectangular duck bag with a suspension harness of webbing; and an inner, replaceable, commercial corrugated fiber box, 12 by 12 by 30 inches. (Two of these boxes may be used in packing the type A-4 delivery unit).

(2) The canopy and pack are of the types used with the delivery unit A-4.

d. The type A-7 sling delivery unit[5] is suitable for the dropping of boxes of small-arms ammunition, 37-mm ammunition, or boxes comparable in size and weight, not exceeding 150 pounds in weight. The delivery unit, type A-7, consists of a harness sling, a 24-foot circular cotton canopy, and a conventional "pull off" pack assembly. The safe load limit is 150 pounds net.

(1) The harness is constructed of cotton webbing to fit boxed small-arms ammunition and 37-mm ammunition. It has V-rings for attaching the risers of the canopy.

(2) The canopy and pack are of the types used with the delivery unit, type A-4.

e. The type A-8 delivery unit[6] is suitable for dropping equipment which requires the protection of a rigid container. This unit consists of an octagon shape box, a 24-foot circular cotton canopy, and a conventional "pull off" pack assembly. The safe load limit is 125 pounds net.

(1) The octagon-shaped box is built of fiberboard and metal, and is hinged so that it will open flat to

facilitate loading. The end which is designed to take the shock on impact is cushioned. The box is 50 inches long by 15 inches in diameter.

(2) The canopy and pack are the standard type.

f. The 24-foot circular cotton canopy[7] is capable of carrying loads up to and beyond 200 pounds. However, the strength of containers and the rate of descent at the time of impact are also factors to be considered in load limits.

(1) For dropping heavy equipment and special loads, there are available 36-foot, and 48-foot heavy-duty canopies. Clusters of three standard 24-foot canopies may also be used for heavy loads.

(2) Logistical data and weight tables for various classes and types of supplies are presented in chapter 6, FM 31-40, "Supply of Ground Units by Air".

92. Most Satisfactory Delivery Units. Of the five types of aerial delivery containers[8] used by the American Airborne Forces, the A-4 and A-5 were the only ones found satisfactory and practicable in the European Theater. Of these two, the A-5 was used in 75 percent of all supply drops. The A-4 container could be used satisfactorily for the delivery of rations from the door of the aircraft but could not be used in the pararacks unless modified by increasing the stiffening. The canvas cover of the A-4 container was found to be too light for use on the exterior of the airplane. Neither of these containers could be used with the British type pararack because of no provision on the pararack for streamling or holding the container rigidly in place. The British Mark III container was a cylindrical metal container but was heavy and awkward to handle and required very careful balancing in the pararack. In conjunction with the development of a streamlined universal pararack it was considered highly desirable to have a universal, all purpose, streamlined container. It was also suggested that a suitable web strap harness be developed to lash cartons of rations or cans of liquids together for delivery from pararacks or through the door.

93. Cargo Nets. A standard type cargo net[9] is a net nine by ten feet, with two inch mesh, made from 3/16-inch three-cord cotton rope. For small loads, the net can be folded in half on its long dimension to make an area nine by five feet; for large loads, the net is not folded.

a. After supplies are wrapped in the net, the standard 24-foot equipment parachute and the pack assembly used with delivery unit A-4 are attached to the net by fastening the snaps to five or six cords of the net.

b. The cargo net is strong enough to carry any type of sturdy load which can be dropped on one 24-foot equipment parachute. Maximum load limit of the net alone is 400 pounds. Nets do not afford sufficient protection for the delivery of brittle or breakable items such as weapons and radios.

c. Nets can be used successfully to deliver gasoline, oil, or water in standard metal containers; to deliver engineer tools, ammunition in boxes, rations, and spare parts for tanks and vehicles. Tank tracks and bogy wheels have been dropped in cargo nets without additional protection and without damage to the equipment.

d. In dropping supplies up to 350 pounds, pararacks were used. Supplies weighing more than this were classified as door loads.

94. Roller Conveyor. The use of the roller conveyor[8], in conjunction with panniers (wicker baskets), has made it possible for a greater weight per aircraft to be delivered. The British have successfully used this equipment. However the present roller conveyor is very

heavy, bulky and difficult to install. The conveyor can only be used in conjunction with the pannier since the pannier has a solid wooden bottom which will roll along the conveyor without binding. Canvas covered containers will not roll on the conveyor. The development of a simple, light-weight conveyor which will make possible clean and rapid ejection of containers and a strong lightweight equivalent of a pannier, possibly of plastic, would materially overcome the small payload characteristic of the C-47 or parachute supply operations.

95. Pararack. The present pararack[8] equipped with a B-7 bomb shackle in use on the C-47 is heavy and cumbersome. It materially reduces the speed of the aircraft, particularly when empty. Due to the fact that it cannot be jettisoned and cleared from the aircraft, it becomes a critical factor particularly in cases of single engine operation. It does not permit the use of British type containers. The British bomb rack with which American C-47's have been equipped for work with the British airborne troops, does not have this drag factor. However, the present bomb rack does not incorporate a manual emergency release, requires careful balancing of the container, and is of complex construction. American pararack equipment cannot be used with the British racks, thus it is necessary to change pararack equipment from one to the other if an aircraft is involved with troops of both nationalities in any one operation. A clean, streamlined, universal pararack should be developed.

96. Dropping Supplies Without Parachute. Under favorable conditions of terrain such as soft ground, muskeg, tundra and deep snow, many types of supplies can be dropped without parachute[10] with a minimum of damage. Light bulky packages, such as bundles of blankets, clothing, sleeping bags and other nonbreakable items, do not require padding and need only be compactly tied to avoid scattering on impact. Heavy or breakable items require extensive padding to prevent damage. Free dropping should be practiced only in the absence of parachutes or when conditions or nature of the supplies make the use of parachutes uneconomical.

97. Pathfinder. The aim of "Pathfinder" was to insure that the better part of the airborne supplies, i.e., men and material were dropped, although by separate units, on the same area so as to form a compact, well-supplied force. The most effective device to do this was radar for, unlike radio, it was not subject to freaks of weather, terrain, or enemy jamming. A "Pathfinder" team usually went in shortly before, or with the first run over the dropping zone; then after they had set up their sets, the signals would act as a marker beacon for the other supply or resupply ships coming from different points.

a. With the use of SCR-717 or "Sea Search", as it is called, night drops or drops through an overcast were possible.

b. When the transmitter was set up on the dropping zone, and signals sent, the navigator or radar operator would receive these on his scope. The "blips" were composed of a long 4/5 and a short 2/5 of a second. As the ship approached the set, the signals would move toward the center of the scope which was graduated into scale miles, and by aligning the "blips" with the center line on the scope, the ship flew a perfect course over the set. The actual drop was made with consideration given to the following factors: wind, driftage, and the relative position of the set to the actual dropping zone which was usually an open place. As the ship neared the dropping zone, the radar operator would notify the pilot and when the point of release was reached, the signal was given to the crew chief, who released the para-bundler from the control box in the rear of the ship.

c. No attempt is made to describe all aids to navigation used by pathfinder teams. However we must continue to develop pathfinder teams and continue research to utilize every means possible to be able to deliver supplies of personnel accurately under darkness of instrument weather conditions.

98. Panels. Panels[11] used for identification purposes are normally 12 feet long and 2½ feet wide, made out of a durable white cloth. Any other easily recognizable color from the air may be used. In some situations it was possible to use a prearranged formation of panel-covered vehicles to establish identity or to transmit signals to the air.

99. Pyrotechnics. Pyrotechnic devices[12] furnish a valuable means of visual communications between ground and air units. The most common pyrotechnic devices used are the Very pistol, the ground signal projector, and the pyrotechnic pistol. Pyrotechnic messages are limited to simple signals with prearranged meaning. They may be used for identification, marking drop points and landing fields.

100. Smoke. Smoke grenades, smoke pots, smoke shells, and other smoke devices[13] offer some possibilities for visual communications from ground and air. Smoke pots placed 75 to 100 yards apart may indicate the direction of the drop point or loading field. Smoke used for such purposes should be handled very cautiously in order not to obscure the dropping point or loading area.

101. Communication Requirements. The primary requirements for communications[14] on supply by air operations are as follows:

a. Advance Bases.

(1) Airfield control facilities (HF and VHF).

(2) Navigational aids (Radio Beacons, Marker Beacons).

(3) Radio link with home base headquarters.

(4) Local telephone facilities.

b. Home Bases or Headquarters.

(1) Airfield control facilities.

(2) Navigational aids (Radio Beacons and/or HF or VHF Homers).

(3) Net control station for air-ground liaison and control radio nets.

(4) Net control station for point-to-point radio link with advance bases.

(5) Normal telephone and teletype.

c. Aircraft Equipment.

(1) HF W/T Liaison facilities.

(2) HF R/T control and command facilities.

(3) VHF R/T control and command facilities.

(4) Navigational aids (Radio compass and/or radar facilities such as Gee or Laron).

102. The C-47 Aircraft. From the standpoint of aerial evacuation of patients, the C-47 is highly satisfactory[15] as it is now designed. The installation of litter straps, which was done in the European Theater, proved very feasible and resulted in an estimated 33-1/3 percent increase in the number of litter patients which it was possible to evacuate during the early stages of the European Campaign, when only a limited number of aircraft could load on the advanced strips. The average load was increased to 23.5 patients per airplane. In addition to providing an increase in the number of patients, the litter straps

permitted the airplane to be loaded more rapidly and were much lighter in weight, so that the airplane had a correspondingly increased payload. The airplane could be much more rapidly converted from freight carrier to air ambulance with the use of the litter straps.[15]

a. In the extremely cold weather, some means should be developed to preheat[16] the cabin in order to keep the patients warm before takeoff. Conversely, under hot conditions, a method to cool the cabin should be provided while the airplane is on the ground.

b. The only additional items of equipment[17] necessary on the airplane itself are bepans and urinals. These items could be furnished through normal medical supply channels.

103. Paddle Type Propeller. The paddle type propeller[18], while slightly slower than the tapered blade type, has been found to be very superior because of its engine cooling characteristics. Even in the moderate temperatures of the European Theater, this cooling was necessary when towing heavy gliders.

104. Flame Dampener. The modified type flame dampener[18], with which all C-47 aircraft were equipped, was found to glow excessively while towing gliders at night. The British type flame dampener, while having a slightly higher maintenance factor, was more satisfactory.

105. Static Cable on C-47 Aircraft. All C-47's belonging to the IX Troop Carrier Command were equipped with the British static cable.[18] However, this necessitated the provisioning of an additional set of static lines, nine feet nine inches long, in order to permit the British paratrooper to clear the tail surfaces before the release and development of his parachute. It was also necessary to cover the door handles with a metal cover, in addition to taping the door hinges, in order to avoid fouling the shroud lines and canopy of the British parachute.

106. Floor Matting. Each C-47 in the IX Troop Carrier Command was equipped with a NUMNA floor matting[18] to prevent parachutists from slipping on the smooth metal floor. This was also very helpful to the cargo handlers in jettisoning bundles while in flight. This matting was heavy and bulky, and it was thought that a better solution to this problem could be found. It was suggested that the shiny metal floor be sprayed with some material to which fine sand would adhere. The type of covering referred to would be similar to that which was on the treads of the loading ramps and which proved quite serviceable. The development of a "non-skid" surface on the floor would be much more satisfactory than the removeable NUMNA matting.

107. Safety Lock. The safety lock[18], which was installed on the glider tow release mechanism, and the quick hook-up snap were found to be quite satisfactory.

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# CHAPTER 5

# CONCLUSIONS AND RECOMMENDATIONS

## SECTION 1

## CONCLUSIONS

108. General Conclusions. The following general conclusions are reached:

a. Approximately 95% of all air cargo carriers were under control of IX Troop Carrier Command, which also provided the tactical air lift for the Allied Airborne Army. Troop Carrier Command was a tactical organization and when engaged in movement of supplies and evacuation its efficiency as the air element of airborne divisions is materially impared. To meet the requirement of accurate air delivery and maintain proficiency, continuous combined troop carrier and airborne division training is essential for a period of one month prior to actual commitment into projected airborne operation. The primary mission of Troop Carrier Command was the delivery and support of airborne units if airborne operations were directed. The decisions as to the importance of the need for use of Troop Carrier Command tactical aircraft on supply and evacuation by air as opposed to the employment with airborne units is one that must be made by the responsible commander, in order that the troop carrier tactical force be used most effectively. Early decisions are required.

b. It is unlikely that there will be sufficient aircraft in a theater to meet requirements for airborne operation, resupply and evacuation by air. Air cargo units must be provided in order that supply and evacuation by air can be conducted without interruption throughout all phases of operations. Tactical units of Troop Carrier Command should be used for supply and evacuation by air only when aerial supply and evacuation means are not sufficient to meet requirements, and when not required in connection with airborne operation.

c. With air superiority, the use of transport for supply and evacuation by air is not costly.

d. Supply and evacuation by air is a definite requirement in all operations.

e. A regulating agency set up at theater or GHQ level, as a direct representative of the commander, is necessary to allocated and regulate the use of aircraft for supply and evacuation by air.

f. There is a need for a simplified flexible standard operating procedure (SOP) delineating the responsibilities of each echelon of command, the air forces, the supplying agencies, the evacuating agencies, and the regulating agency. This procedure should involve a minimum number of agencies and headquarters in order to obtain a smooth and efficient operation.

g. The C-47 aircraft was best suited for supply and evacuation by air purposes. However, in an emergency, fighters and bombers, as well as artillery liaison planes, were used for this purpose.

h. For dependable supply and evacuation by air purposes, cargo planes should be designed and used solely for this purpose. Other aircraft should be set aside for airborne operations, airborne resupply, and other purposes.

i. There is a need for all weather administrative airfields as far forward as possible in army areas along the axis of communications, and consideration must be given to airfields with accessible roads thereto. There should be at least one such administrative airfield in each army area with a capacity of 72 planes per hour. The air force, in consultation with the armies, should have the responsibility of developing such administrative airfields.

j. The maximum capacity of an administrative airfield located in an army area should be allocated to that army solely for supply and evacuation purposes.

k. The team work required between air forces and ground forces, the supplying agency, and the regulating agency, cannot be overemphasized.

l. It is most important that liaison be established between all agencies and headquarters concerned with supply and evacuation by air.

m. It is necessary that armies report, through ground and air channels, the immediate capture of airfields so that a determination can be made of their use.

n. Based on the recommendations of the army and its tactical air command, the army group and air force headquarters should determine which airfields should be utilized for administrative purposes and, if possible, the duration of such use.

o. Flying control personnel are required at administrative airfields and the provision of such flying personnel should be the responsibility of the air forces or the agency to which the administrative airfield has been released.

p. To make the evacuation procedure successful, it is necessary that all interested agencies and headquarters coordinate all details, particularly with respect to the changeover of airfields.

q. It is sometimes necessary to use tactical airfields for evacuation purposes by arrangement between the army and its tactical air command. The volume of such aerial evacuation traffic should be limited and scheduled so as not to interfere with tactical operations.

r. Air transport may be used for many purposes in addition to supply by air, for example, repatriation of RAMPS (Recovered Allied Military Personnel), movement of DP's (Displaced Persons), etc.

s. Maximum payload is obtained when supplies by air are moved forward and evacuees returned to the rear on each flight. Every effort should be made to maintain maximum payloads.

t. Supplies and personnel can be delivered successfully by glider as well as by transport and parachute.

u. The rehabilitation of administrative airfields can be expedited by the assignment of aviation engineer units to follow closely behind armor and infantry units.

v. Forward landing fields may be hastily constructed strips on the boundaries of otherwise unserviceable enemy airfields. Despite these extremely advanced positions, aircraft losses may be considered

light, provided air superiority is maintained.

w. Conclusions reached by Third Army (Par. 87e, page 37) are sound and are the result of observations and operations.

x. Radar is the most effective device for "pathfinder" since it is not subject to freaks of weather, terrain, or enemy jamming.

y. The C-47 is highly satisfactory as now designed. However, the future troop carrier-cargo aircraft should retain the favorable flying and handling characteristics of the C-47 but should have a capacity of from 10,000 to 12,000 pounds, it should be capable of delivering a parachute load in 15 seconds, it should be armored and equipped to withstand enemy fire, it should be capable of dropping at least one jeep and one gun comparable in size and weight to the 57mm anti-tank gun; it should have some means of preheating the cabin in cold weather in order to keep the evacuees warm, it should have some means of air-conditioning and cooling the cabin in hot weather in order to keep the evacuees cool; it should have some type of light floor matting or other means to prevent personnel from slipping; it should be provided with some type of external signalling device which could be readily seen by other planes in the formation.

109. Supply by Air Conclusions. The following conclusions concerning supply by air are reached.

a. The automatic shipment by the supplying agency to the outloading airfield of shortages of emergency supplies may cause the unnecessary stocking at these airfields of critical items of supply after the emergency need for such supplies has ceased to exist. Thus critical supplies should not be accumulated at loading airfields.

b. It is important that the requesting agency indicate the degree of urgency and the priority of their requirements so that the supplying agency can adequately determine the necessity for supply by air.

c. The requisitioning procedure for delivery of supplies by air should be the same as for supplies to be delivered by other means, except for emergency supply by air. The delivery date as shown by the army on the requisitioning form should be sufficient guide to the supplying agency to determine the means of transportation required.

d. It is necessary for the army group to retain responsibility for ground force decisions where a priority between tactical and supply movements between armies are concerned or where supply by air capabilities fall short of requirements. Likewise, higher headquarters must retain such responsibility for similar decisions between army groups.

e. The supplying agency should have all practicable authority and responsibility connected with normal supply by air.

f. The supplying agency should be responsible for loading the aircraft and the receiving agency should be responsible for unloading and distributing the supplies from the aircraft. The details of loading and dispatching should be worked out between the supplying agency and the air carrier.

g. At times supplies are erroneously delivered to tactical airfields. The carrier should make every effort to prevent this. Communications should be so set up that upon prompt notification by the carrier that erroneous delivery has been made, the shipping agency or the receiving agency can take the necessary steps to move the supplies to the required destination.

h. Emergency supply by air should involve as few agencies or headquarters as possible in order to expedite delivery. However, it is important that all interested agencies and headquarters be kept fully informed of such emergency requests and the progress made on delivery.

i. It is necessary that all echelons of command down to battalion level be familiar with the proper method for obtaining emergency supply by air.

j. There is a requirement for a system of marking and accounting of supplies delivered by air to facilitate easy and quick identification and to avoid pilferage. Colored parachutes and markings with contrasting paints facilitate such identification.

k. Requests for supply by air must be screened by army and the supplying agency to determine the necessity for air lift and to prevent duplication of requests.

l. It is necessary that supplies for delivery by air be located at or near the supply loading airfields.

m. Poor visibility and the absence of marker panels or prearranged procedure results in sizeable losses of supplies dropped by parachute to isolated units.

n. B-24 bombers can be used to transport considerable tonnage to forward areas in which suitable concrete runways are available but the limitations in landing fields and lack of training in this particular aerial supply role reduces the efficiency of their use. The use of heavy bombers for hauling POL (Petroleum, Oil and Lubricants) is uneconomical.

o. Aerial supply movements are greatly curtailed by the lack of administrative airfields or air strips due to tactical requirements.

p. The use of "pathfinder" teams greatly facilitates the delivery of supplies by air particularly when dropped by parachute.

q. Supply by air to forward areas can be maintained at a high average daily rate despite frequent bad weather.

r. Supply by air can make a substantial contribution to the total supplies moved forward to armies and relieve or eliminate critical supply situations; armored spearheads may be maintained by aerial supply and not forced to halt due to lack of supplies. Thus supply by air may be considered of great importance to the speed with which final success is won.

s. The establishment of army class III supply points at airfields eliminates the necessity of trans-shipment to army distributing points and conserves supplies.

t. The A-4 and A-5 type of delivery units were the only ones found satisfactory and practicable in the European Campaign. Of these, the type A-5 delivery unit was used in 75 percent of all supply drops.

u. The canvas cover of the A-4 delivery unit was found to be too light for use on the exterior of the aircraft.

v. There is a need for a clean, streamlined, universal pararack provided with an appropriate streamlined all-purpose universal container. This container should be capable of use with fighter and bomber aircraft as well as with the C-47.

w. There is a need for a suitable web strap harness for lashing cartons of rations or cans of liquids together for delivery from pararacks or from the open door.

x. There is a need for a simple light-weight roller conveyor to be used in conjunction with a strong but light-weight equivalent of the pannier, both possibly made of plastic.

y. Emergency provision should be made to deliver supplies with fighter-bomber aircraft. There is a need for specific groups to be so trained, equipped, and organized as to facilitate their use for cargo carrying purposes.

110. Evacuation by Air Conclusions. The following conclusions concerning evacuation by air are reached.

a. Casualties must be evacuated by air even though supplies are not being moved forward by air and thus aerial evacuation must not be dependent upon aerial supply by air transport.

b. Medical holding units are required to be established at each administrative airfield for the evacuation of casualties and it is necessary for the armies to provide such holding units until relieved by the Communications Zone. The personnel at such medical holding units must be properly instructed on all policies, procedures and plans concerning evacuation by air.

c. Evacuation by air is speedy and is especially desirable when long distances are involved. All casualties can normally be evacuated by air. Large numbers of casualties can be evacuated great distances by air. Facilities are available for treatment and nursing care enroute.

d. The greatest disadvantage of aerial evacuation is its uncertainty due to weather, availability of air strips and planes, and poor communications.

e. There is a requirement for a system of automatic exchange of medical property, such as litters, blankets, splints, etc., between the planes evacuating the patients and the medical holding unit at the forward airfield.

f. The procedure for air evacuation must be so flexible that the field armies and Communications Zone may make such modifications as they mutually consider to be the best interests of the evacuee and to effect better utilization of available facilities.

g. It is necessary that the technical information required for the proper evacuation of casualties from the combat zone to the Communications Zone be furnished the surgeon, Communications Zone, by the armies in such manner and at such intervals as are considered necessary for the proper evacuation of casualties.

h. Medical aerial evacuation teams engaged in aerial evacuation duties should be assigned to the carrier.

i. Smooth evacuation by air procedure is obtained when air transport planes are called forward nightly by the flight surgeon of each medical holding unit through theater regulating agency.

j. Evacuation by air must be directed by theater regulating agency directing movement of supplies by air.

## SECTION 2

## RECOMMENDATIONS

111. General Recommendations. It is recommended that:

a. Supply and evacuation by air be considered a definite requirement in all operations and that air cargo units be provided.

b. Tactical units of Troop Carrier Command should be used

for supply and evacuation by air only when other aerial supply and evacuation means are not sufficient to meet requirements and when not required in connection with airborne operations.

c. The theater commander should make early decisions as to the importance of the need for use of Troop Carrier Command tactical aircraft for supply and evacuation by air as opposed to the employment with airborne units, in order that the Troop Carrier tactical force may be used most effectively. This decision should be made at least one month prior to actual commitment in projected airborne operations.

d. All available air transport in any theater be allocated and regulated by a regulating agency set up in the theater headquarters or GHQ.

e. Air cargo units be assigned to supply and evacuation by air activities solely for that purpose and not used for airborne operations or other missions.

f. A simple, flexible, standard operating procedure (SOP) governing supply and evacuation by air be devloped and published for future guidance; such SOP clearly delineate the responsibilities of each echelon of command and involve as few agencies and headquarters as possible; the SOP outlined in paragraph 37, page 20, be used as a guide.

g. All agencies and headquarters concerned with supply and evacuation by air established liaison with each other and that provision be made in specific T/O's (Table of Organization) for such liaison personnel.

h. All future operational plans of the air forces make provision for the development and operation of at least one administrative airfield as far forward as possible in each army area and along an axis of communication; such administrative airfields to have a minimum capacity of 72 planes per hour and a good roadnet thereto.

i. The army group and its air force headquarters determine which forward airfields should be utilized for administrative purposes and, if possible, the duration of such use; such determinations to be based upon the recommendations of an army and its tactical air command.

j. Every effort be made by all concerned to maintain maximum payloads.

k. Aviation engineer units be attached to armies for the specific purpose of following closely behind armored and infantry elements to initiate the rehabilitation of administrative airfields as soon as possible.

l. Development be continued on cargo evacuation aircraft and accessory equipment.

m. Personnel and equipment be provided by air force for advance airfield control teams on all administrative airfields.

n. Combined air force, airborne, study and research be continued for development of technique, aids to navigation and procedure of pathfinder teams for accurate location and marking of dropping zones (DZ), for supply by air.

o. Trained quartermaster companies to perform packing, loading and ejection duties as specially trained teams be provided.

p. Pertinent doctrines, techniques, T/O's and T/E's be amended by appropriate agencies of the War Department.

112. Supply by Air Recommendations. It is recommended that:

a. All echelons of command down to battalion level be familiar with the proper procedure to be used for obtaining emergency supply by air.

b. A simple but complete system of documentation and accounting of supplies by air be devloped so as to facilitate easy and rapid identification and eliminate pilferage.

c. Administrative outloading airfields be located in close proximity to supply installations; such supply installations be stocked with prepacked supplies, except critical items, for emergency air shipment.

d. The requisitioning procedure for the delivery of supplies by air, except for emergency supply by air, be the same as for supplies delivered by other means of transport; the army assist the supplying agency by indicating on the requisition the desired delivery date; the supplying agency retain responsibility for the determination of the means of transport.

e. Bomber aircraft be considered for supply by air missions and that their personnel be trained accordingly.

f. Operations plans include the delivery of supplies and personnel by glider, as well as by aircraft and parachute.

g. The use of "pathfinder" teams and radar equipment be considered SOP for facilitating the delivery of supplies by air, particularly when supplies are dropped by parachute.

113. Evacuation by Air Recommendations. It is recommended that:

a. A system of automatic exchange of medical property, such as litters, blankets, splints, etc., between evacuating aircraft and medical holding units be established and made SOP.

b. A system of proper and timely exchange of technical information between the armies and the Communications Zone be established to facilitate the evacuation of casualties; and that such a system be made SOP.

c. The procedure established for the evacuation of casualties be so flexible that the armies and the Communications Zone may make such temporary modifications as are mutually considered to be the best interests of the evacuee and to effect better utilization of the available facilities.

d. The theater regulating agency directing supply by air should also direct evacuation by air.