AIRBORNE AIRTRANSPORTED OPERATIONS

No. 4

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ARMY/AIR OPERATIONS

PAMPHLET No. 4

AIRBORNE AIRTRANSPORTED OPERATIONS

Prepared under the direction of
The Chief of The Imperial General Staff and with the approval of
The Chief of The Air Staff

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ARMY/AIR OPERATIONS PAMPHLETS

This series, when completed, will supersede Army/Air Operations Pamphlets Nos. 1 and 2, 1944, Airborne Operations Pamphlet No. 1, 1943, and Responsibility, Procedure and Ground Organization for Supply and Maintenance of Army Formations by Air, 1944.

No. 1. AIR SUPPORT. GENERAL.

No. 2. AIR TO GROUND ATTACK.

No. 3. AIR RECONNAISSANCE.

Part I—Air Reconnaissance. General.

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No. 4. AIRBORNE/AIRTRANSPORTED OPERATIONS.

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This pamphlet supersedes "Airborne Operations Pamphlet No. 1, 1943 (Prov)." No pamphlet previously existed on the subject of air transported forces.

Definitions

"A centipede was happy quite
until the toad in fun
said 'Pray which leg goes after which
when you begin to run?'
This wrought his mind to such a pitch
he lay distracted in a ditch
uncertain how to run."

1. A list of definitions is at Appendix 1, but a more detailed description of the different types of army units and formations that operate tactically by air are given here. By popular usage anything that can get into the air "becomes airborne". When dealing with military operations, however, the following distinctions in nomenclature and employment within the army must be made to avoid confusion :—

(*a*) *Airborne* is used for those troops, units and their equipment which form part of Airborne Formations and for which specific airborne war establishments exist. They are composed, equipped and trained primarily for the purpose of operating by air and of making assault landings. They include parachute troops and airlanding troops. An airborne formation also includes elements which follow up the assault by land or sea.

(*b*) *Airtransported* is used for units, other than those of Airborne Formations, who can be transported by air and employed in a tactical rôle. They may be part of a light (airportable) division already equipped for movement by air in transport aircraft or they may be part of any other formation whose equipment has been exchanged or modified as necessary for a particular operation and for an approach by air instead of by land or sea.

2. The differences in the employment of airborne and airtransported troops are dictated by the standard of training and the method of approach, that is to say, by parachute, by glider or by powered aircraft :—

(*a*) *Parachute.*—*Parachute troops* form part of airborne formations or they may be specially trained independent parachute units. They are not dependent on airstrips or airfields and are capable of making an assault landing.

(*b*) *Glider.*—Troops in gliders may be
(i) The *airlanding units* of airborne formations.
(ii) Airtransported units of formations or Corps troops.

Airtransported units do not normally operate in gliders and as gliders are usually restricted in numbers and can seldom be used more than once in one operation, these airtransported units are generally engineer units for the preparation of airstrips upon which the build-up of the force can be landed in powered aircraft. The question of whether or not airtransported units in gliders can take part in the initial stages of an assault must depend upon their standard of training, their equipment (which must then require no dismantling for carriage by air) and the tactical situation.

Being also independent of airstrips and airfields troops in gliders can normally be landed simultaneously with paratroops or more quickly after them than troops in powered aircraft.

(c) *Powered transport aircraft.*—This is the normal method of landing airtransported troops and units and HQs required for the ground control, flying control and the organization of the forward landing areas. Transport aircraft depend upon airfields or airstrips, free of enemy fire, for landing. In some cases they may be employed in carrying units and HQs of airborne formations.

Introduction

3. This pamphlet is intended for those concerned in the tactical movement of the army by air. The increase in suitable aircraft has made movement by air the concern of the army as a whole as well as of airborne forces. The increase in number and size, and the improved loading facilities, of aircraft show that movement by air will become an alternative method of approach; army formations must therefore be prepared to substitute movement by air for movement by land or sea at short notice. All staff officers must be competent to deal with the military responsibilities involved in tactical air moves; these must not become the preserve of specialists; they must be regarded as a part of normal Staff Duties and only by a sound knowledge can the effective and essential co-operation with the air force at all levels be achieved.

4. This pamphlet deals specifically with tactical movement by air and the tactical loading of aircraft. It deals only indirectly with administrative air moves for which units and their equipment are loaded as bulk freight for economy in airlift and which cover moves between secure bases and staging airfields. Much of the information is, however, common to both tactical and administrative moves.

5. Lord Fisher once stated, "The British army should be a projectile fired by the British navy". Much the same might be said of the air force and the army in an air movement rôle. The launching of a ground force by air, particularly if it includes airborne and airtransported formations, will always be a major air operation. It requires offensive air support with fighters and bombers as well as the transport air support to provide the lift. For such an operation much of the air effort has to be drawn from strategical air tasks or other tasks in support of the army.

6. The principles and procedure established through experience by airborne forces are largely applicable to the army as a whole in an airtransported rôle though the increased requirements for the latter have introduced a number of new conditions. It is essential, for the sake of speed in planning, flexibility and economy, that the basic organization should, with minimum variations, be capable of handling airborne or airtransported forces or both. Moreover, supply and maintenance by air (Pamphlet No. 5) is normally carried out simultaneously from the same airfields and has claims upon the same aircraft: thus it must form an integral part of the general system of ground movement and organization.

7. Chapter 1 of this pamphlet, therefore, deals with the characteristics and principles of airborne and airtransported forces as a whole including the planning, command and control, army/air responsibilities and ground organization. Chapter 2 deals with the composition and organization of an airborne division and information peculiar to the movement of airborne assault forces. Chapter 3 deals with airtransported forces, the particular problems arising from the use of transport aircraft and the details in which airtransported units differ from airborne. In its supplements, Chapter 3 contains data for the carriage of equipment by air including dismantling, loading and lashing, and also information about transport aircraft.

8. The varying conditions in different theatres have so direct an influence upon the employment of the army by air and the organization required that this pamphlet can only set out the basic principles and data on which operations should be planned and executed. These must be applied and filled in in detail to suit geographic and tactical circumstances.

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CHAPTER 1. — AIRBORNE/AIRTRANSPORTED OPERATIONS

Characteristics

9. Characteristics of airborne and airtransported troops

The factors upon which these characteristics are based are described later in some detail since they affect the planning and execution of all operations.

(*a*) *Dependence on weather*, which may be the deciding factor on both the original assault and subsequent build up and maintenance. If the operation is an essential part of a ground and/or seaborne assault the whole operation becomes directly dependent upon the weather. The plan must therefore allow for postponement. All other characteristics may therefore be dependent upon weather.

(*b*) *Dependence on air superiority* since aircraft used for transport support, particularly gliders and their tugs, are vulnerable to enemy air attack and anti-aircraft fire. The ability to counterbalance this by fighter cover and air to ground attack on enemy airfields and gun emplacements is an essential condition.

(*c*) *Ability to overcome obstacles.* An ability to overcome geographical barriers and hostile areas, at high speed and long range with little warning to the enemy.

(*d*) *Power to effect surprise* by attacking at unexpected times and places in unsuspected strength and by employing deceptions which can be carried out with economy of force.

(*e*) *Flexibility*; an ability to choose from a wide selection of objectives for assault, to change the objective with little delay within the radius of action of the supporting aircraft and to vary the composition of the force at the last moment to suit the changing tactical situation.

(*f*) *Great moral effect* upon own troops; and a demoralizing effect upon the enemy by seizing the initiative, causing confusion by interrupting the enemy's communications and forcing his commanders into an unsound dispersal of reserves.

(*g*) *Restricted mobility after landing.* The difficulty of carrying transport, reconnaissance and gun towing vehicles by air restricts the mobility of the force when landed to that of heavily laden marching troops. Although the ability to land supplies on the forward airstrip may make the force independent of a land L of C, and although forward troops may be maintained by air, the difficulty of getting supplies and reinforcements forward from the airstrip will normally restrict the radius of action of the force.

(*h*) *Restricted fire power* owing to the difficulty of carrying heavier artillery equipment and gun towing vehicles by air and the large airlift required for ammunition. This deficiency in fire power must be counterbalanced by offensive air support in the initial plan and arrangements made for air to ground attacks in support of the forward troops as the ground battle develops.

(*i*) *Ability to operate independently of ground forces* for a time varying with the enemy's fire power and ability to concentrate a superior force and our own ability to reinforce and maintain the force effectively by air. When the operation is an assault in advance of a major offensive against a well-armed and mobile enemy, this time should be limited to 48 hours.

(*j*) *Vulnerability during landing and assembly.* The aim must be to land troops in areas which cannot be covered by enemy fire and which are immune from enemy counter-attack for sufficient time to enable troops to assemble for co-ordinated offensive action. Owing to the restricted size and number of anti-tank guns and anti-tank mines that can be flown in, the troops are particularly vulnerable to tank attack.

(*k*) *Ability to operate at night* under some circumstances if essential to the plan.

(*l*) *Necessity for acting without ground reconnaissance.* For the initial landing there will rarely have been time or opportunity for commanders to reconnoitre. The detailed plan and location of RVs and assembly areas must therefore be decided beforehand on information normally provided by air photographs and models. Briefing must be carried out in great detail in order to familiarize all personnel with the appearance of the ground.

(*m*) *Need for considerable and detailed staff work.* This is analagous to a seaborne assault; it includes detailed briefing of troops.

(*n*) *Need for close army/air co-operation.* The intimate nature of the co-ordination required between the army and the transport and offensive air support makes it essential that planning, training and execution be carried out in the closest co-operation at all times.

10. Additional characteristics peculiar to parachute troops

(*a*) *Dispersed arrival and vulnerability.* Even in the most favourable circumstances parachute troops make a dispersed landing on the dropping zone. A stick of twenty parachute troops normally covers a length of 500 yards. They are very vulnerable while dropping in daylight, while assembling into sub-units and while collecting spare equipment, which may fall some distance away. A brigade or battalion may take up to 60 minutes by day or two hours by night before it can take action as a whole. Errors in locating the dropping zones are to be expected and may lead to such wide dispersal that some parachute troops may not join up for the first phase of the attack.

(*b*) *Lack of supporting weapons.* Parachute troops drop only with weapons that can be carried. As many weapons as possible are dropped in kitbags attached to the men since the collection of weapons from containers takes time and increases the period during which a parachutist is vulnerable. Moreover, all containers may not be recovered. Parachute troops must therefore normally be reinforced with supporting weapons dropped by parachute or with airlanding troops, or both.

(c) *Wide choice of dropping zones.* Parachute troops can be dropped on any open and reasonably flat country, and are not dependent on airstrips and airfields.

(d) *Need for individual initiative and high standard of training.* No paratroop operation can be expected to go exactly according to plan. The need for independent action and individual initiative is great.

(e) *Ability to drop by day or night.*

(f) *Wind.* Paratroops are not normally capable of dropping in winds over 25 mph without sustaining high landing casualties.

(g) *Dependence on satisfactory dropping zone locating devices* for effective concentration.

(h) *Need for a glider element with transport and heavier equipment.*

11. Additional characteristics of troops in gliders and aircraft

(a) *Arrival in tactical sub-units.* Glider and aircraft loads are composed of tactical sub-units sufficiently complete to take offensive action independently if necessary, so that they will not be neutralized by the loss of aircraft containing complementary loads. Their landing is less dispersed than that of parachute troops.

(b) *Ability to carry support weapons and vehicles.* This gives them a greater offensive power than parachute troops and makes them an essential complement to parachute units. Glider troops may be landed simultaneously with parachute troops. Airlanding troops of an airborne formation are normally equipped with guns, jeeps and trailers which can be loaded without dismantling into Horsa or Hadrian gliders and carriers and armoured cars which can be loaded without dismantling into the Hamilcar glider. This permits quick deplaning and speed into action. When time is permissible for assembly in the forward areas, secure from enemy attack, airtransported units can be flown in gliders or aircraft with larger, dismantled, equipment to provide heavier offensive fire power and to increase mobility. The need to reassemble equipment will lengthen the time within which units can get into action.

(c) *Dependence on secure deplaning areas.* Transport aircraft and gliders are particularly vulnerable when landing and during unloading. Troops are vulnerable when deplaning and unloading. The training of airborne units envisages the possibility of deplaning from gliders under fire if it is not an alert and organized opposition. Airtransported troops in gliders (unless trained to airborne standard) and troops in powered aircraft should not be expected to land unless the deplaning area is secure from enemy fire.

(d) *Dependence on weather and landing aids.* The towing of gliders through cloud increases the strain on the glider pilots, owing to the bumpy conditions and the lack of visibility between glider and tug. The need for a visual approach to the landing zone means that a glider should not be released in cloud and that in order to allow the pilot time to locate his landing zone and to calculate his approach the decision to employ a low, medium (1,500 ft) or remote (6,000 ft) release point method may depend entirely upon the height of the cloud base. Artificial aids to locating landing zones are important particularly at night and will increase the number of accurate landings. Such aids can be set up by parachute troops dropped in advance. If absolute surprise is essential and there are good natural landmarks landing aids are not employed. Gliders can be landed by moonlight but not in winds exceeding 40 mph without the likelihood of heavy casualties. Powered aircraft can operate in less favourable weather than gliders or parachute troops. Permissible conditions will depend upon their locating aids and, in the case of the simultaneous movement of a large number of aircraft, upon the need for intervisibility between aircraft during flight, and flying control on arrival.

(e) *Ability of gliders to make a silent approach.* Gliders can be released at a considerable distance from their landing zone. At night or in poor visibility airlanding units in gliders may be able to surprise the enemy more than parachutists owing to the noise of the aircraft carrying the latter. Gliders are not, however, immune from enemy radar detection. They are valuable for "*coup de main*" operations.

(f) *Ability to land gliders in areas unsuitable for powered aircraft.* Gliders do not depend upon airstrips and airfields. They can land under difficult conditions, through hedges, on slopes of up to approximately 1 in 15 and can crash-land without damage to troops and equipment. Landing zones should, however, be as open and level as possible and must have an approach clear of high obstruction. As a guide only, an area of 1,000 yards by 1,000 yards may be expected to accommodate the landing of 100 Horsa gliders at the rate of one per ten seconds.

(g) *Ability to land gliders in tactical formation.* If landing zones permit the landing of gliders in tactical formation, the time in which troops can be ready for co-ordinated action is decreased.

(h) *Necessity for a ground organization when landing powered aircraft.*—When powered aircraft are to operate to and from a forward airstrip an army and air force ground organization needs to be flown in as early as possible in order to control movement in the landing and unloading areas and to control the approach, the landing and the take-off of aircraft.

Types of Tactical Operations

12. The possible variations in the employment of airborne and airtransported forces with or without ground or seaborne forces are endless. The degree of co-operation between parachute troops, airlanding troops, troops in powered aircraft or gliders, ground forces and seaborne forces must vary with every operation. But the main types of tactical operations may be grouped as :—

(a) Airborne troops co-operating closely with a main force.

(b) Airborne and airtransported troops operating together.

(*c*) Airborne troops operating independently.

(*d*) Airtransported troops operating; either as reinforcements to a main ground force or as a means of securing an area where the enemy cannot oppose the actual landing. In the latter case a parachute or airlanding unit may be required to secure or prepare an airstrip if adequate facilities for landing powered aircraft are not already available.

13. Airborne troops co-operating closely with a main force

This is the most common type of operation of which the allied landings in Normandy and the South of France and the allied advance into Holland and Germany are examples. The possible rôles of an airborne force for this type of operation may be :—

(*a*) To attack the enemy rear or lines of communications or HQs and thus assist a break-through by ground forces or a seaborne assault force.

(*b*) To divert the enemy or to delay the arrival of enemy reserves by attacking or blocking his lines of approach.

(*c*) To capture airfields, either to prevent the enemy from using them or for the use, as advanced bases, of our own tactical aircraft; thus helping to gain air superiority.

(*d*) To seize and hold ground on the line of advance of the main force. (The operations at Salerno and in Holland are examples.)

(*e*) To seize and hold a defile essential to the advance of ground troops (operations in Sicily on the Catania Bridge and the Orne bridge in Normandy are examples).

(*f*) To protect an exposed flank (the operation in Normandy is an example).

(*g*) To delay the retreat of the enemy until our ground forces advance.

(*h*) To reinforce ground troops.

14. Airborne and airtransported troops operating together

The follow-up of an airborne assault by airtransported forces is particularly suitable in country where geographical barriers make the movement of normal troops hazardous or costly in time and effort. The requirement in aircraft may be considerable, particularly if the maintenance of the whole force has to be carried out over a long period by air. Such an operation depends largely upon the landing facilities which are required for powered aircraft and upon an adequate ground organization. The employment of powered aircraft is an economical method of building up a force. It can provide the force with greater fire-power and mobility and can provide a more sustained build-up than the employment of gliders. The potential amount of airlift available (*i.e.*, number of sorties) will always be greater from a powered transport aircraft which may in some circumstances make more than one sortie per day than from a glider which can normally provide only one sortie per operation. New methods of recovery from forward areas may, however, increase the total airlift effort of gliders in the future.

As with all operations involving air transport, air superiority and freedom from organized ground opposition are essential conditions.

This type of operation can be launched against enemy opposition only if the initial airborne assault echelon is capable of securing the landing area from enemy fire while engineers prepare the airstrips for transport and offensive support aircraft and during the fly-in. The area secured must be of such a size that aircraft are free from enemy light anti-aircraft fire when approaching the strip and when gaining height after take-off. The ability to fly-in normal troops renders the force independent for a longer period and gives more time for any join-up of land or seaborne forces. This time should, however, always be kept to a minimum.

15. *Example.*—A study of the German invasion of Crete in 1941 provides valuable lessons on this type of assault operation. It shows the vital needs for securing landing areas from enemy fire, for quick build-up and for a smooth forward landing area organization. It shows the limitations of assault by air. German airborne units were followed up by the fly-in of the 5th Mountain Division; about 33,000 German troops were moved by air and a force of approximately 650 JU52 transport aircraft and 500 bombers and 300 fighters for offensive support were employed; and yet, because the essential tactical requirements were not obtained against a comparatively small but determined opposition, the operation succeeded only at a great cost.

16. The possible rôles for an airborne/airtransported force may be :—

(*a*) To secure an area against minor opposition where the nature of the country restricts the enemy's mobility and his ability to reinforce quickly.

(*b*) To build up a stronghold or firm base in lightly held enemy territory from which long range penetration groups can operate, from which maintenance by air can be carried out and from which offensive support aircraft can operate.

(*c*) To support a landing by sea. In such a rôle and if there is enemy opposition the airborne and seaborne echelons might assault simultaneously, but the airtransported echelon could only reinforce when airstrips were available and secured from enemy fire.

(*d*) To carry out the rôles suitable to airtransported troops if minor initial enemy opposition requires to be overcome.

17. Airborne troops operating independently

Like any other force, an airborne force cannot operate indefinitely on its own in areas where the enemy can mass superior forces. The most independent employment of airborne troops is in small detachments operating in support of local partisans, diversions and destructive raids on important objectives such as installations, dumps, centres of communications, bridges, etc., or raids for obtaining information. These detachments may then either be flown out again or disperse without forming a front. Such rôles are not normally undertaken by troops of an airborne division. In larger units or as a formation airborne forces can be used for the capture of areas or islands which are not strongly held and cannot easily be reinforced by the enemy. By the fly-in of an airborne force the armed forces of a country might be encouraged and enabled to resist enemy aggression instead of capitulating.

18. Airtransported troops

An airtransported force cannot land under fire, and requires airstrips and landing facilities. For this reason parachute troops may have to be allotted to the force and dropped in the first flight in order to prepare an airstrip or to open up an area on which engineers in gliders can land for the preparation of the airstrip. It is not fortuitous that airtransported troops have been used in the Eastern theatres of operations. Climate, natural barriers and long distances make movement by land costly or impossible; they impose upon the enemy conditions which delay him concentrating superior forces for a counter-attack upon the assault area; they preclude the employment of concentrated armour against which forces moved by air are particularly vulnerable. Examples of airtransported operations in New Guinea in 1943 and Burma in 1944 are in Chapter 3.

19. The possible rôles for airtransported troops operating independently of an airborne formation may be :—

(*a*) To occupy an area in which the landing and deplaning will not be opposed but from which a diversion can be carried out or threatened in the rear or flank of the enemy.

(*b*) To occupy an area to be used as an "air head," a transit airfield area, a forward maintenance area from which supplies can be transported to forces operating by land, or as a forward base for fighter and bomber aircraft.

(*c*) To reinforce quickly ground troops in the main area of operations.

(*d*) To reinforce isolated bodies of troops or partisans when normal methods are impossible.

(*e*) To relieve or to replace exhausted troops.

(*f*) To maintain internal security in support of civil or military authorities. Such moves are suitable in areas from which the enemy have withdrawn or after an armistice as a method of preventing sabotage, disorder or civil war.

(*g*) Imperial strategic reserves.

(*h*) Post-war security policing.

Factors

20. The following are the main factors upon which the characteristics are based and which have to be taken into consideration during the planning and execution of an operation. Conditions vary so greatly between different operations and different theatres that the following list cannot be complete. They can only indicate the basic required conditions which must be related to the circumstances in any place at any one time.

21. Weather

> "*This most excellent canopy, the air, look you, this brave o'erhanging firmament, this majestical roof fretted with golden fire, why, it appears no other thing to me but a foul and pestilent congregation of vapours*".
>
> (Shakespeare : *Hamlet.*)

Weather conditions may postpone or cancel an operation. The final decision will rest with the air commander. If the launching of

airborne or airtransported forces is a vital part of an operation, the whole operation will depend upon the ability of these forces to operate in various types of weather. After forces have been launched, weather may interrupt the fly-in and maintenance when speed of build-up may be essential. In addition, therefore, to the need for tactical loading of individual aircraft there is also a need for composing each group of loads so that when landed the units are capable of independent action. In Europe the chances of sudden variations in the weather even in summer are greater than in the Far East and the risk of interruptions in fly-in have to be particularly considered. Dependence on weather is affected by the devices employed for locating dropping zones, glider landing zones and airstrips. If such devices are visual, visibility needs to be better than if radio devices are used.

22. Air superiority

Aircraft employed for the transport of troops are vulnerable in flight, particularly tugs and gliders which are not able to take evading action. They are extremely vulnerable when landing, unloading and taking off. Air superiority must therefore be maintained along the flight routes and the forward landing area must be free from enemy air attacks. If, to achieve this, a continual fighter effort has to be maintained over the forward landing area the number of supporting aircraft will be considerable and the acceptable distance of the assault area from base may be affected. Strategic bombing on enemy airfields may be a means to insuring this air superiority. The preparing of airstrips for fighters and ground attack aircraft in the forward area may be essential and will economize the number of fighter aircraft required to provide continual protection. An adequate warning system is an essential requirement for the operation of aircraft from forward bases. The ability to retain air superiority throughout the whole operation and the maintenance by air of the forces is one of the single factors upon which an operation may entirely depend.

23. Offensive air support

Besides the transport support and the fighter cover provided by the air force, offensive air support will be required in order to obtain the conditions necessary for an operation. Three main types of offensive air support will normally be required :—

(*a*) The isolation of the battle area by the bombing of enemy airfields, communications and concentrations ("interdiction").

(*b*) Air attacks on enemy ground targets in the battle area in support of forward troops.

(*c*) Air reconnaissance including Tac/R, Arty/R and Photo/R.

For offensive air support *see* pamphlets Nos. 2 and 3.

24. Surprise and enemy reaction

The wide choice of assault areas for an airborne/airtransported operation and the ability to conceal the choice is a great initial advantage. Strict security, rapid concentration, protection against enemy reconnaissance, diversionary reconnaissance and diversionary operations can ensure the full advantage of surprise. Since parachute troops and airlanding troops should not be committed against an alert, immediate and direct opposition they are equipped

and trained to establish themselves during the period when the enemy are recovering from this surprise. This period must be exploited fully. The first lift should therefore be the biggest, and airborne troops should be employed in concentrated force upon a restricted number of important objectives before the effects of surprise have worn off. Airborne troops must retain the initiative since in defence they are at a disadvantage against an enemy more strongly armed and able to assess quickly their strength.

25. As the enemy recovers from the initial surprise the following reactions may be expected :—

(*a*) Increased enemy air attacks on the transport support aircraft and ground targets ; this will require a compensating increase in air cover.

(*b*) Increased flak and redeployment of enemy anti-aircraft artillery ; this will require a compensating increase in offensive air support in a ground rôle.

(*c*) Increased ground resistance, counter-attacks and the bringing up of reserves.

(*d*) Attacks upon dropping and glider landing zones, especially by mortars and artillery.

26. In country, therefore, where enemy ground mobility is good and superior weapons can be brought up quickly, airborne troops should be followed up by land or sea and reinforced within about 48 hours. Artillery support should be provided earlier. When the nature of the country and the strength of the enemy make it doubtful whether or not the airborne force can secure the forward airstrip area from enemy interference, reinforcement must be carried out by land or sea and not by airtransported units. The period when reinforcement is required is when the enemy has recovered from his surprise and is able to counter-attack. The preparation of airstrips to receive airtransported units is therefore an urgent requirement so that the force is built up before the enemy can counter-attack the landing area.

In country where ground movement is difficult and where the enemy cannot counter-attack with superior force, an airborne division will be able to secure a landing area. Such an assault can then be reinforced by airtransported forces.

27. **Operational range and radius of action.**—This will depend upon the type of aircraft and gliders, the ability to refuel in the forward area for the return flight, the number of sorties per aircraft to transport the size of force required in the time necessary, and the necessity for, and range of, offensive support aircraft. In the initial stages of a tactical operation it will be unusual for the aircraft to fly their full range and refuel at the forward airfield. " Range " will therefore be the consideration in strategic and administrative moves through staging airfields, but " radius of action " will be the deciding factor in tactical operations when aircraft have to return to base without refuelling. During hostilities 300–450 miles is an average maximum radius of action from base for an airborne/airtransported tactical operation. This would be decreased if a heavy type of glider is employed.

28. **Types of aircraft**

For the sake of simplicity in staff duties and in the preparation of load manifests it is advisable to use as few different types of aircraft as possible. When many different types are used in one operation the problems of air movement and timing, caused by the different performance of different aircraft, are extremely complex. Types of aircraft and combinations of aircraft which may be used for tactical moves include :—

(*a*) *Parachute troop aircraft.*—Bomber type aircraft such as the Lancaster and the Halifax ; aircraft adapted for parachute troops such as the Stirling IV and Halifax (airborne version) ; and the Dakota (C47).

(*b*) *Glider and tug aircraft.*—Horsa and Hadrian (CG4a) gliders towed by the Stirling, Dakota (C47) or Halifax. The Hamilcar glider towed by the Halifax or Lancaster.

(*c*) *Transport aircraft.*—The Dakota (C47) is the present standard transport aircraft. The Stirling V, Commando (C46), Skymaster (C54) may also be used. Four-engined transport aircraft are not normally suitable for tactical landing owing to the landing and take-off facilities required.

Bomber aircraft and bomber aircraft adapted for paratrooping may sometimes be used for carrying airtransported troops if forward airfields are adequate, but loading facilities will restrict their equipment to personal weapons ; such aircraft may include Lancaster, Halifax, Fortress, Liberator and Stirling.

Details of the most common types of transport support aircraft are in Supplement No. 1 to Chapter 3.

29. **Payload of aircraft**

The payload of an aircraft varies directly with the range or radius of action. It will also vary with the anticipated condition of the landing airstrips and airfields. It will vary with metereological conditions and with the height at which the aircraft must fly. This means that the maximum payload available to the army has to be laid down by the air force for each particular operation. This must be done at the earliest possible moment. An estimation of the airlift required by units, load manifests and lashing diagrams for standard or awkward loads need to be prepared before a particular operation is decided upon. A pre-planning average payload for an average radius of action is therefore agreed between the air force and the army for this purpose. In the case of the Dakota (C47) which is the most common " maid-of-all-work " in transport support, 5,500 lb is normally taken as a pre-planning payload. Basic tables are made out for the pre-planning payload of an aircraft and adjustments made in accordance with the payload laid down for the particular operation. The pre-planning payload should be an underestimate rather than overestimate of the operational payload since it is easier to adjust the tables by adding to than by subtracting from the loads.

30. **Number of aircraft and size of force required**

The size and maintenance of the force required for the attainment of the object after landing is related in general to the available airlift when a plan is first considered. Normally, the demands on aircraft will exceed the number available. But in some theatres the base and

forward airfield facilities may restrict the number of aircraft that can be employed. These conflicting factors are considered by the army and the air staffs in close liaison at all stages of the plan and its execution.

The size of the airborne/airtransported force required in the forward area to attain the object is the outcome of normal military considerations for ground operations. Chapters 1 and 3 of this pamphlet deal only with the problems of getting the force into the forward area, adequately equipped and protected, to perform its ground rôle.

31. The total weight of the airlift required for an operation and the number of aircraft required will depend upon :—

(*a*) The size of the force to be carried.

(*b*) The speed of build-up required in the landing area ; the slower the speed the fewer the aircraft.

(*c*) The distance of the landing area from the despatch area ; this will decide the number of loads that an aircraft can deliver per day and will affect the maximum payload permissible for the particular operation.

(*d*) The payload of the aircraft as laid down by the air force for the operation.

(*e*) The ability to move by night as well as by day ; assuming that reserve crews are available, movement by night as well as by day will increase the available airlift effort per aircraft.

(*f*) The scale of maintenance by air required by the army and the air force.

(*g*) The airlift required for engineers for the preparation of airstrips and landing facilities and for ground organization in the landing area both army and air force.

(*h*) The air situation and the anticipated casualties and serviceability.

32. An airborne division may require anything up to 1,000 aircraft sorties and 500 gliders, and a light division anything up to 2,500 Dakota sorties. Approximate airlift requirements for specimen airborne and airtransported units are at Appendix 2 and 3.

33. **Dropping zones and glider landing zones** (*see also* paras 116–122)

The choice of dropping zones and glider landing zones is a joint army/air responsibility. They will be chosen from photographs and maps. The necessary considerations common to both are :—

(*a*) They must be such as to give the troops a reasonable chance of being able to form up before having to fight and not quickly accessible to enemy tanks and SP artillery.

(*b*) They must be as near as possible to the objective in order that the element of surprise is not lost and that the strength of the force is not diverted by obstacles and enemy posts before the objective is reached.

(*c*) They must be close to cover, with covered approaches to the objective if possible.

(*d*) Even if the original zones have to be changed it is essential that the zones for subsequent lifts are so chosen that they can be secured against counter-attack when the enemy have recovered from surprise. This equally refers to supply dropping and landing zones which are dealt with in detail in Pamphlet No. 5.

(*e*) They should, if possible, be easily recognizable from the air and there should be landmarks leading to them. Locating devices may have to be set up by the leading troops.

(*f*) They must be considered in relation to enemy and friendly anti-aircraft gun concentrations so that in the approach the aircraft can avoid anti-aircraft fire or errors in identifications as much as possible.

(*g*) Their location must allow a straight approach with no sharp turns and avoid the necessity for the crossing of flight routes.

(*h*) Glider landing zones on or near captured airfields or areas which are subsequently to be prepared as airstrips may prove very satisfactory. The recovery of the gliders can then be accelerated by aircraft towing them off on their return flight.

34. **Base airfields** (*see* also para 44)

The capacity of base airfields varies very greatly between theatres. The advantages of centralization in the base area are in favour of airfields from which at least 80 aircraft can operate. They should be chosen in areas with the most favourable weather conditions for flying. Airfields, troop locations, and base supply depots should be as centralized as possible (subject to the chances of enemy air attack) in order to aid communications and control and make it possible to divert troops if necessary from one airfield to another. Aircraft servicing facilities, taxi-tracks, aircraft dispersal and emplaning areas and loading facilities all affect the airlift effort that can be obtained from an airfield.

35. **Forward airfields and airstrips** (*see* also paras 45 and 46)

Parachute troops and airlanding troops of airborne formations are not dependent on airstrips or forward airfields. Airtransported troops, unless moving in gliders, cannot operate without them. Where none are already in existence, gliders will therefore be required for the landing of units with mechanical equipment to prepare them. When airstrips are available or when the number of gliders is inadequate units of airborne formations may follow up in transport aircraft ; this may include parts of the formation which cannot for geographical reasons follow by land or sea as is normal in the European theatre.

When transport aircraft are used, the shortage of forward airstrips or airfields is likely to be the main limiting factor. The capacity of an airstrip to receive traffic depends upon the parking and unloading areas that surround it. Equipment which is dismantled for flight may take an hour or more for unloading so that although aircraft might otherwise be able to land every two minutes on an airstrip, delays may be caused by having to wait until the preceding aircraft have unloaded and taken off. If parking areas and perimeter tracks are adequate, approximately 250 aircraft

per day might be expected to operate to one airstrip under average conditions. The considerations for selecting forward airstrips and airfields are :—

(*a*) Existing airfields should be used whenever possible.

(*b*) Immunity from enemy interference.

(*c*) The ability of parachute troops, with the restricted tools that can be dropped with them, to prepare an airstrip sufficient for transport aircraft to land with airfield construction equipment. This will be important where gliders are not available.

(*d*) Adequate parking and unloading areas and perimeter tracks to ensure the speed of build-up required.

(*e*) The engineer force and airlift required for the preparation of those landing and unloading areas and roads with particular reference to the effect of rain on the surface of those areas.

(*f*) The suitability of the surrounding country for the setting up of the organization required, including supply dumps, road circuits, etc. This should include adequate cover.

(*g*) The competing requirements of offensive support squadrons. These occur when the forward area is to become an airhead from which fighter aircraft operate for the maintenance of air superiority and offensive support aircraft operate in support of ground troops. In some cases it will be essential though not advisable, for fighters or bombers to operate off the airstrip that is receiving transport aircraft.

(*h*) The advisability for alternative airstrips in the event of a bombing attack and the need for centralizing the landing areas to facilitate control.

A specimen layout for a forward airstrip area is at Appendix 4.

36. Equipment

The type of operation and its object, and the type of force available for it will be directly affected by the kind of equipment which can be carried by air. The fighting echelons of an airborne division have a limited number of jeeps, trailers, workshop trailers, 6-pr A tk guns (airborne), 75-mm howitzers, 40-mm Bofors (airborne), etc, which can be carried or dropped by air without dismantling. Heavier equipment such as light tanks and 17-pr A tk guns are employed if large gliders are available. All equipment is designed so that the least possible time need be spent in deplaning. Captured enemy vehicles may increase mobility, but offensive air support in a ground attack rôle will be vital to counterbalance the lack of artillery weapons.

Airfield construction equipment will normally be landed in gliders to prepare an initial airstrip and then landed in transport aircraft to increase the landing facilities.

37. When it is possible to land transport aircraft, and to allow time for reassembling equipment, it is possible to employ air-

transported troops with heavier equipment. The greater fire power and mobility of airtransported units is achieved by :—

(*a*) The more sustained airlift per aircraft over a given period in the case of landing powered aircraft than in the case of gliders.

(*b*) The ability to land larger equipment in a dismantled state, and the condition of security from enemy interference while the equipment is reassembled.

Airtransported units in the early stages of the fly-in can carry equipment such as 25-pr gun, 6-pr A tk guns, 40-mm Bofors, jeeps, trailers, 15 cwt trucks, 3 ton lorries, and heavy airfield construction equipment can be carried when the situation allows adequate time for unloading and reassembly.

The airportability of equipment is dealt with in the Supplements to Chapter 3.

38. Anti-aircraft artillery

(*a*) The locations of enemy anti-aircraft fire will influence the choice of landing areas, and the choice of flight routes and targets for ground attack aircraft. This will be taken into consideration during planning. Changes may have to be made during the operation to suit the enemy's redeployment.

(*b*) The location of friendly anti-aircraft artillery concentrations on land or sea must also be avoided by flight routes owing to the difficulties of aircraft identification. In cases when the navy is co-operating in an operation or when flight routes cross the sea or cannot avoid our own anti-aircraft concentrations, specific instructions must be laid down in planning and adjusted during the operation. For this purpose close liaison must be kept with the navy.

Communications

" Evil communications corrupt good manners ".
(St Paul to the Corinthians.)

39. Communications can make or mar an airborne/airtransported operation. The meticulous timing required ; the inevitable necessity for adjusting the order of flight between base and forward airfields at the last moment to suit tactical developments ; the need for immediate information on the hour to hour progress of the fly-in ; the close co-ordination required between the army and the air force ; all these require a fool-proof and enemy-proof system of communications with a high scale of reserves in signal equipment.

The requirements in communications are summarized in this paragraph : in general terms the main arteries of communications must be :—

(*a*) Normal operational communications for the control of the battle.

(*b*) Direct communication between the HQs allotting and controlling the airlift and the HQ controlling all ground movement to airfields.

(*c*) Direct communications between base HQs controlling ground movement and troops, supply dumps, transit areas and airfields.

(*d*) Direct communications between the HQ controlling the despatch and the HQ co-ordinating the reception in the forward area.

(*e*) Direct communication between the HQ co-ordinating reception and all forward airstrips.

(*f*) Communications between receiving airstrips and despatching airfields.

(*g*) Direct communications between airborne/airtransported force and the ground forces in order to unify command for the ground operation as soon as possible and in order to provide the artillery support upon which a force moving by air may depend.

(*h*) Communications for demanding offensive air support.

(*i*) Direct communications for demanding maintenance by air between the force in the field and the base control; and ground to air communications with supply dropping aircraft.

(*j*) Communications for liaison between army and air force HQs.

(*k*) Communications with the navy so that in cases where flight routes are likely to approach our own ships, specific arrangements can be made to avoid the dangers of anti-aircraft fire on friendly aircraft.

(*l*) Light communication aircraft.

Control and Organization for Movement by Air

"I claim not to have controlled events, but confess plainly the events have controlled me."

(Abraham Lincoln.)

40. In this pamphlet the dangers of over simplification are less than those of attempting to lay down in detail an organization which must vary considerably according to local conditions. Only the main essentials for air transport operations are dealt with here. An outline of a system of control is shown in diagram form at Appendix 5.

The control of air movement

41. The familiar principles of centralization, flexibility and army/air co-operation are of particular importance in the organization required for the control of the launching, build-up and maintenance of airborne/airtransported forces, and for all general movement by air in a theatre of operations. Any system for controlling, despatching and receiving such forces must ensure that the following main requirements are covered.

(*a*) The maintenance of air superiority during all stages of the move and the provision of offensive air support in the forward area; and therefore the need for close immediate liaison with commanders of offensive and fighter escort aircraft.

(*b*) The need to allot and control the airlift which is required for both army and air force units and their maintenance, for the forward ground organization, for the preparation of forward airfields and for other simultaneous requirements for airlift.

(*c*) The need to relieve the airborne/airtransported force, units and formations of the burdens of controlling their own movement.

(*d*) The need to co-ordinate the movement of units of the whole force with the movement of their allotted aircraft.

(*e*) The ability to make quick adjustments to priorities and timings which may affect the whole force.

(*f*) The need for ensuring that the air force is briefed on the detailed requirements and the reasons for the requirements.

These requirements can only be covered by a joint army/air transport controlling HQ at the highest level of the forces undertaking the operation.

Army/Air transport controlling HQ

42. This army/air headquarters is the permanent executive controlling centre in the theatre for all army movement by air. It requires the closest possible working between army and air force representatives.

(*a*) *During planning* of airborne/airtransported operations this army/air transport controlling headquarters will work in with the army and air force commanders concerned and with their planning staffs to produce detailed launching and subsequent movement plans. Where appropriate, representatives of offensive support air formations, representatives of the navy and representatives of any ground formation under whose command the force will come after the landing and the link-up, will have to be included in the planning conferences.

(*b*) *During the move* it may be necessary for this headquarters to be augmented by representatives of the force and formations involved. Tactical considerations demand that the assault echelons be flown in in as few lifts as possible; thereafter the build-up with which this headquarters have to deal is largely a "Q" and Movement problem in fulfilment of the overall plan. Where priority of movement, subsequent order of flight and the necessary adjustment to meet tactical changes are concerned this headquarters will follow the general policy which will have been laid down during planning. It is because of inevitable tactical changes that direct communications between the forward landing area and this controlling headquarters are vital. In the build-up phase the duties of this headquarters will therefore include:—

(i) The execution of the air move in accordance with the army/air force plan and in accordance with the subsequent requirements.

(ii) Decisions in cases where sudden changes of conditions affecting movement, particularly in the case of weather, make adjustments to the original plan necessary and when it may be impossible to refer to the senior ground force commander. Such decisions may mean a reallocation of airlift and a redistribution of troops to airfields (the latter should be avoided if possible since the complications of diverting units to a different airfield are considerable).

(iii) The detailed timing of lifts during the build-up which can only be settled as the move progresses.

(iv) Co-ordination between the airfields in the despatching area and co-ordination with those in the receiving area.

(v) Liaison with fighter escort formations throughout the move.

(vi) To ensure that the maximum effort and economy of airlift is maintained.

Base administrative organization

43. On the army side this is a " Q " and Movement organization. The ground organizations required to launch a force by air and by sea are very similar. Both are designed to relieve the fighting formations of the burdens of movement whether in aircraft or ships. The base administrative organization will carry out the decision of the army/air controlling HQ and for this purpose their duties will include :—

(*a*) The organization of air transit dumps including pre-packed stores.

(*b*) The administration of transit camps.

(*c*) The packing and ground transport of stores and the loading of stores into aircraft.

(*d*) Assistance in the dismantling and loading of the larger equipment of tactical units of the formation moving by air.

(*e*) The despatching of stores from aircraft on supply dropping missions.

(*f*) Assistance in evacuating casualties by air.

(*g*) Provision of transport for moving troops to the airfields.

To do this, representatives of all arms of the service may be required from the army under " Q " and Movements direction. A very close working between army and air force units will be required and the respective responsibilities will vary according to the theatre of operation.

Despatching and receiving airfield requirements

44. In addition to the air force requirements for operating aircraft, the requirements on a despatching airfield which will normally be an army responsibility are :—

(*a*) Liaison between the air units providing the airlift and the army units. (These duties are normally provided by air transport liaison officers.)

(*b*) The marking of routes to the emplaning points and possibly the provision of guides.

(*c*) The distribution of parachutes.

(*d*) Arrangements, in conjunction with the air force, for the distribution of loading ramps, lashing gear and loading aids.

(*e*) The calling forward of aircraft loads in correct order in accordance with movement orders. This will be controlled through a Command Post and Report Centres which will include army representatives (*see* para 65).

(*f*) Assistance in unit loading.

(*g*) Assistance in the dismantling of unit equipment.

(*h*) The handling and loading of supplies.

(*i*) Assistance with briefing and interrogation (de-briefing).

(*j*) Last minute petrol replenishments of unit vehicles.

Units and detachments normally provided to fulfil these duties on an airfield or group of airfields will be the RASC, Movement and Traffic Control, Provost, REME and RAOC detachments, air force movement detachments (such as a personnel and freight detachment) and air transport liaison sections.

45. The requirements at a receiving airfield will be those of the despatching airfield in reverse. While the organization must be as economical in airlift as possible, it must be adequate to ensure that the receiving airfield or airstrip is kept clear of stores and equipment and that aircraft are kept for the shortest possible time during unloading. Much the same problem arises in a seaborne assault and the beach group organization is, in principle, analogous to what is necessary in the forward area of a fly-in.

46. A major function, and the one that is the principal difference between a receiving organization and a base despatching organization, is the preparation, improvement and maintenance of airstrips both for the transport aircraft and for offensive support aircraft. In some cases transport and offensive aircraft may for a time have to operate from one airstrip and the requirements of the offensive support squadrons will influence the priorities in the allocation of airlift and the order of flight.

Among the lessons of detail learnt from operations the following points in the forward receiving organization have been particularly evident :—

(*a*) The need to restrict unit transport and to centralize transport in the forward airstrip organization for carrying supplies to forward troops.

(*b*) The need to establish the MDS or CCS, holding casualties for air evacuation, as close as possible to the airstrip.

(*c*) The large requirement in manpower for unloading and moving equipment and supplies, particularly if the fly-in is carried out by day and night.

(*d*) The difficulty of reconciling economy of effort and speed with the need for dispersal against enemy air attack.

(*e*) The need to establish a warning system against enemy air attack.

(For a specimen layout for a forward airstrip area *see* Appendix 4.)

Planning

"Nothing in progress can rest on its original plan. We may as well think of rocking a grown man in the cradle of an infant."—(Edmund Burke.)

47. An airborne/airtransported operation will be a major air operation. It may or may not be part of a larger tactical plan. The initial planning will, however, probably be done by the highest army and air force commanders. The plan must be simple and it must be flexible. Operations involving airlift are subject to many variable factors, particularly weather and the vital and inevitable last minute adjustments or postponements to the fly-in can only be made if the plan is simple.

48. The operation is a closely combined army/air effort. The plan must be an army/air plan throughout. The planning must be a combined effort at all stages by combined HQs and by frequent combined conferences. The closest possible liaison and mutual understanding must be maintained at all levels throughout the operations.

49. The planning stage can be divided broadly into two phases: first, the tactical planning for the employment of the forces on arrival in the battle area; secondly, the planning to launch the forces. Troops will fight the same type of battle as would any other troops, within the limits of airportable transport and weapons. This pamphlet therefore does not deal in detail with the ground employment of troops after landing, with some exceptions in the case of an airborne assault in Chapter 2.

50. Before it can be decided whether or not the plan is practicable certain data is required; for example, the strength of the enemy, geographical information with particular reference to suitable airfield areas and channels of supply, the approximate airlift required to lift and support the estimated force required to attain the object, and the ability to withdraw aircraft from other operations where they may be employed on other tasks in support of the army or to obtain additional aircraft from other theatres if required.

51. Once it has been decided that the general plan is practicable, combined army/air detailed planning begins. The staffs of the airborne/airtransported formations should be brought into the planning as early as possible and strong liaison established with any ground or naval forces that may be concerned. A schedule of planning for airborne/airtransported operations is at Appendix 6.

52. Warning of an air operation should be given to units or formations as early as possible in view of the amount of preparation required.

Preparation for the Move (Paper Work)

Lepidus: "But small to great matters must give way."
Enobarbus: "Not if the small come first."

(Shakespeare—*Antony and Cleopatra.*)

53. The nature of aircraft and the requirements for safety of flight make it necessary for aircraft loads to be compiled in detail. Movement by air of a force involves two services very intimately

and requires a very exact co-ordination of timings. This means considerable staff work which can best be recorded on forms. The following suggested forms are specimens of what is required to cover the necessary information. Variations will occur in different theatres and forms will work as well by any other name so long as the army and the air force concerned in the operation agree and use the same language.

54. **Air transport staff table**

This is the statement of the number of aircraft or glider loads required to lift any unit. On paper the unit is assembled into tactical loads showing the equipment and the number of troops and the weight for each load. Separate tables are required for each type of aircraft which may be employed. These tables may give the maximum number of aircraft loads required by each unit and sub-unit if maximum personnel and equipment are included. This will be "normal scale." A "hard scale" may also be worked out with the minimum essential loads required. Data for both these scales may be required for planning. They subsequently become the basis on which the final tables for the move are prepared. These tables also form the basis for indents for stores.

55. **Air Movement Table** ("Form A") (example at Appendix 7)

When it has been agreed that an operation can take place and that sufficient aircraft are available to lift the loads required, an army/air co-ordinating conference agrees the details of the allocation of army and air units, allocation to airfields and the approximate order of flight and timings. The Air Movement Table is the summary of the points agreed. It is signed by the army and air representatives. It also provides a forecast of requirements of air force equipment and, in the case of airtransported forces, of loading aids and heavy ramps. It is the framework into which units have to fit their parachute, glider or aircraft load tables for the particular operation. When planning the air movement table it is advisable to arrange for all the loads of a unit to be flown from the same airfield. This table also includes the allocation of aircraft for maintenance by air. The Air Movement Table should normally be issued with the Operation Order.

56. **Parachute load table** ("Form AA") (example at Appendix 8)
Glider load table ("Form AB") (example at Appendix 9)
Aircraft load table ("Form AC") (example at Appendix 10)

These are a summary of the detailed air transport staff tables for the particular operation with the number of aircraft loads as allotted by the Air Movement Table. Data, such as airfield and timing, is included from the Air Movement Table. These tables should be completed as soon as possible after the receipt of the Air Movement Table. They also indicate the scale of lashing gear that will be required for the move.

57. **Load manifests**

A load manifest must be completed and signed for each aircraft before it takes off. It must contain the details, including weight, of the army load carried in the aircraft, the names and rank of the personnel, and the type, permissible payload and identifying number of the aircraft allotted to carry the load. It indicates, preferably by diagram, the correct positioning of the load within

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the aircraft to ensure a correct centre of gravity for the safety of flight of the aircraft. It is an army/air document, and the names of the aircrew are entered at the airfield and the load checked and signed by the captain of the aircraft before the take-off. Units complete their own load manifests as far as the army data is concerned. Basic standard loading data, agreed between army and air force, will already have been recorded on loading and lashing diagrams (*see* below) and will be available to units for guidance. Minor adjustments may be required to the detailed contents of the standard load to suit the particular operation. These diagrams are prepared in advance primarily for loads which contain vehicles and equipment heavier than personal weapons.

Examples of a Load Manifest (Form B—Parachute and Glider) as used by airborne troops are at Appendix 11 and 12. An example of a Load Manifest (Form B—Aircraft) for airtransported troops is at Appendix 13. The completion of load manifests by airtransported units is dealt with in greater detail in chapter 3 (paras 159–166).

58. Aircraft or glider priority form

In the event of aircraft becoming unserviceable, it is important to know without delay the aircraft loads that can best be spared in the forward area. This form records the least important loads which should be left behind if all loads cannot be flown as planned. Similarly a Force Priority Table is prepared in respect of complete units.

59. Standard diagrams

As a result of continuous development in aircraft loading, diagrams are prepared jointly by the army and air force to record the method of loading and lashing army equipment and specimen tactical loads. These provide the basic data on which units are trained and to which adjustments can be made for a particular operation. The object of these diagrams is to show how aircraft and gliders should be loaded in order to get the balance, or centre of gravity, of the aircraft correct for safe flight. The following are the most common types of diagrams although in some cases the information for loading and lashing may be recorded on one combined diagram:—

(*a*) *Loading diagram* (example at Appendix 14).—This records the weight of each item in an aircraft load and its correct positioning within the fuselage. It represents basic data required by units for the preparation of load manifests.

(*b*) *Lashing diagram* (example at Appendix 15).—This records how equipment should be lashed in order to achieve safety in flight.

Diagrams for the loading and lashing of equipment and basic tactical loads suitable for airtransported units are printed in the supplements to chapter 3 of this pamphlet.

Training

60. The primary role of airborne units is assault by air movement; airborne units train accordingly to this standard. For units in an airtransported rôle movement by air is an alternative method of approach to the battle area. The object of training for airtransported troops is to enable them to move by air instead of sea or land possibly at short notice; to achieve as quick a build-up

in the forward area as possible by quick emplaning and deplaning and good movement discipline to and from airfields; and to achieve quick paper work by good staff duties.

Ground and air rehearsals should be carried out by the army and air units together in order to practice that close co-operation that is essential throughout the operation.

Training of airborne forces is dealt with in chapter 2.

Notes on the training of airtransported forces are at Appendix 16.

Division of Responsibilities Between Army and Air Force

61. An outline of army and air force responsibilities is at Appendix 17.

Movement to Emplaning Airfield and After

"It is better to travel than to arrive."

(R. L. Stevenson).

62. The general systems of movement to airfields for an airmove and to ports for a short sea voyage are similar. The airborne/airtransported force should be relieved of as much of the movement responsibility as possible. Arrangements should have been made in planning for all loads of one unit to move to the same airfield. The base movement organization should control the movements and establish control centres for the calling forward of troops. The probability of day to day changes in timings and order of flight requires a first rate system of communications throughout the movement control organization.

63. Concentration area or normal location

(*a*) Administration in the concentration area is normally a unit or formation responsibility.

(*b*) Any readjustments to scales and equipment are carried out as required for the operation.

(*c*) Airtransported units, if not already on light scales are re-equipped with airportable equipment.

(*d*) Proformæ are prepared.

(*e*) Load manifests which contain awkward or non-standard loads are passed for flight by air force representatives.

(*f*) Close liaison at as early a stage as possible must ensure that any ramps or loading aids and lashing gear will be available at an airfield or issued to units.

(*g*) Units may move to transit camps in aircraft load parties, in which case 3-ton lorries will be allotted to assist the move.

(*h*) Units, particularly the initial units may be moved forward to transit area up to three days before estimated time of loading. (The loading of equipment into aircraft may be done the night before, or a considerable time before troop emplaning and take off).

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64. Transit Camp

(*a*) A static staff should be responsible for administration. In some cases advance parties will be required to be sent forward to liaise with the transit camp staff 48 hours before the arrival of the main party.

(*b*) It should be located close to the airfield.

(*c*) One transit camp per airfield is very desirable.

(*d*) Initial units may be in the transit camp up to about three days. Follow up units normally remain from 24 to 48 hours before moving forward to the airfield. It is essential that assault troops have 24 hours rest between loading and emplaning.

(*e*) Final marshalling into aircraft loads is carried out.

(*f*) Unit emplaning officers or representatives report to the appropriate control HQ on the airfield.

(*g*) In cases where airtransported units are taking equipment which requires dismantling for loading as much of the dismantling as possible should be done in the transit camp.

(*h*) Issue is made of any special individual equipment such as Mae Wests, escape aids or airsickness pills.

(*i*) Preparation of any last minute load manifests and their approval by air force representative.

(*j*) Adequate security measures must be taken, in co-operation with the air force, by sealing the camp and searching personnel as necessary to suit the particular operation.

(*k*) Aircraft and glider load parties or sticks of paratroops are called forward (in accordance with the movement table) to a control point from which guides take them to their respective aircraft for emplaning. One lorry should be allotted per aircraft and marked with the appropriate aircraft designation which will also be on the load manifest.

65. Emplaning

The procedure for emplaning paratroops, troops into gliders and troops into transport aircraft varies and is dealt with in chapters 2 and 3. Points common to all are :—

(*a*) Emplaning or loading areas will be laid down by the air force and are normally shown on parking diagrams which are distributed to those concerned, particularly ATLOs. These diagrams should show the number, location and sequence of take-off of the aircraft and the location of reserve aircraft.

(*b*) Movement on an airfield is under air force control and will normally be controlled by a Command Post to which army representatives are attached. This is a fixed Command Post, clearly marked, and should be in direct communication with the Flying Control, the Transit Camp, and the Report Centres in the loading areas, aircraft and glider dispersal and marshalling areas.

(*c*) Movement on an airfield must be restricted to the minimum. Strict track drill must be maintained and routes to and from emplaning areas clearly marked.

(*d*) Speed of emplaning and loading must be achieved by a practised drill.

(*e*) All aircraft will be marked, usually in chalk on both sides of the fuselage, with the numbers which will correspond with the load numbers on the load manifests of the loads to be emplaned (*see* para 64 (*k*) above).

(*f*) Loading should be carried out as far as possible by personnel of the loads themselves. (Loading parties will be required in some cases both for loading and unloading.)

(*g*) The captain of the aircraft checks the load and its lashing, enters the names of the aircrew on all copies of the load manifest and signs it.

(*h*) Army representative in charge of the load also signs the load manifest.

(*i*) In any matters that concern his aircraft during loading and in all matters of flight the captain is in command. He will instruct personnel in the aircraft when to adopt positions for take off, landing and emergencies.

(*j*) There must be no unnecessary movement of troops in aircraft or gliders during flight.

Intelligence, Briefing and Interrogation

" . . . every aircraft which flies over the battle area is a potential source of information."

Field-Marshal B. L. Montgomery.

Intelligence

66. Like seaborne assault troops, airborne/airtransported troops have many opportunities for exercising individual initiative and improvisation. Movement by air enables the deployment of troops to be adapted quickly to the changes in tactical conditions. Information must therefore be up to date and must be quickly and adequately distributed. Just as an operation is a joint army/air effort so must information be " laid on " from a common pool by briefing all army and air force personnel who can use it, and drawn in by interrogation from those who can provide it.

Many of the normal sources of information available to ground troops are not available to a force before being launched by air. The force is launched far from the battle area and the assault area may be a considerable distance behind the enemy lines. Even if the landing is in close co-operation with a ground force the assault area may be beyond the range of its ground patrols. When the operation is in co-operation with ground forces close liaison must be kept so that all advantages can be taken of any available information. When possible an intelligence staff officer should be attached to the headquarters controlling the ground forces in order to pass back to the airborne/airtransported force all relevant intelligence. But whether co-operating or operating independently the main and most immediate information will come, in the early stages, through air channels in the form of air photographs and pilots' reports.

67. The principles of intelligence are the same for all operations. The following points are, however, noted as particularly relevant to operations involving tactical movement by air.

(*a*) *Weather.*—The dependence of an air operation upon weather conditions has already been stressed as an overruling factor. Meteorological intelligence, which is an air force

responsibility, is therefore of very great importance. The increasing radius of action at which operations can be carried out increases its importance, since greater differences in weather conditions may occur between the launching area and the landing area.

(*b*) *Possible enemy air activity* against the flight routes.

(*c*) *Enemy anti-aircraft fire.*—The locating of enemy gun positions and areas before an operation is particularly important. Similarly, careful watch must be maintained for any redeployment of enemy anti-aircraft artillery after the surprise of the initial landing; any such redeployment is of vital concern to subsequent lifts and maintenance missions.

(*d*) *Location and strength of enemy forces*, especially AFVs, mobile formations and units and the time in which the enemy may be expected to be able to bring up reserves.

(*e*) *Topography.*—Knowledge of the ground is no less important to a force advancing by air than to normal troops, but the ground is more accessible to normal troops with patrols and OPs. An elevated feature in the assault area, which may be too small to appear on a map, may yet permit the enemy to overlook the whole airborne deployment. Detailed geographical information of the landing area and the objectives and the approaches to them are therefore essential. The most accurate interpretation of air photographs is therefore required, and the working out of intermediate contours on maps and mosaics will be necessary in the case of an assault landing. From this data models are constructed and gun positions and OPs are chosen in the planning stage.

(*f*) *Landing facilities.*—Information of any obstacles will influence the choice of landing zones and the strength of engineer detachments required to be dropped for their clearance. It will also, in the case of an airtransported operation, show whether engineers in gliders require to be landed in advance of airtransported units in powered aircraft.

(*g*) The possibility of capturing enemy transport and using his line communications.

(*h*) Attitude of local inhabitants and arrangements for co-operating with them.

(*i*) Existence of local supplies, particularly medical, and water.

(*j*) The opportunities of capturing counter-intelligence targets which are greater than in land operations as the enemy should have little time to destroy them.

68. The sources of such information may include :—

(*a*) Normal army channels.

(*b*) Air reconnaissance, visual and photographic; including pilots' observations, and the flying of commanders over the objectives without compromising the element of surprise.

(*c*) Detailed interpretation of photographs.

(*d*) The dropping of parachutists with means of communication may occasionally be used. This may warn the enemy unless appropriate counter-measures are taken.

(*e*) People with local knowledge may provide useful topographical information.

Briefing

69. The need for individual initiative during an assault by air can only be fulfilled if briefing is careful and thorough. The method and substance of briefing must vary with the airborne or airtransported roles to be carried out; build-up units will require less briefing than assault units :—

(*a*) Normally, troops will be briefed in the transit camps and aircrews separately. The briefing of troops must include much that is not of immediate use to the aircraft personnel, but aircrews should be encouraged to attend the briefing in the transit camp as much as possible. Army representatives should also attend aircrew briefing.

(*b*) Troops and their glider pilots should if possible be briefed together. They will land as a team and glider pilots may have to fulfil a ground fighting role.

(*c*) '*Coup de main*' army and air personnel should be briefed together.

(*d*) *Ditching drill, Mae West drill and escape methods.* These subjects are included in the basic training of airborne troops. They will therefore only require to be briefed with any changes which have been made for the particular operation. Airtransported units may have to be briefed in the transit camps; 1½ hours is an average time required to cover the procedure.

(*e*) *Briefing materials* include models, sand tables, photographic enlargements of objectives, DZs, LZs and routes, and mosaics to show the general topographical details and the relative positions of all units taking part. Photographic cover should include an area wider than the assault area so that scattered troops can rejoin their units over familiar ground. Briefing films can be made from models and mosaics to show the landmarks, the run-in, and the release point as they would appear during the approach; they are a valuable aid to briefing. Diagrams of the general flight plan are advisable for the briefing of glider pilots.

Interrogation (De-briefing)

70. In the early stages of an operation only the pilots of the transport support aircraft may know how, where and in what concentrations the troops have landed. In most cases they can provide this information before any photo reconnaissance sorties have been employed.

On subsequent sorties pilots will obtain information which may only appear important when related to information already obtained. Careful interrogation of pilots is therefore important.

CHAPTER 2

Airborne Forces

" I saw young Harry, with his beaver on,
His cuisses on his Thighs, gallantly arm'd,
Rise from the ground like feather'd Mercury,
And vaulted with such ease into his seat,
As if an angel dropp'd down from the clouds,
To turn and wind a fiery Pegasus,
And witch the world with noble horsemanship."

Shakespeare : *King Henry IV*, Part I.

Summary

71. Chapter 1 showed that airborne and airtransported forces are complementary parts of the same air transport support picture. This chapter deals with the points peculiar to the airborne division, which is designed and trained primarily for the assault rôle.

72. The organization and training of an airborne division are designed to suit operational conditions, which are summarized below :—

73. **Surprise.**—Surprise should be regarded as a *weapon* of an airborne force. To make full use of it, the ability to concentrate effort both in time and space is essential. From the moment that airborne troops land they are faced with three conflicting tasks : first, the achievement of the object of the operation, a task which becomes progressively more difficult as the enemy recovers from his initial surprise ; second, the holding off of enemy reserves moving up to interfere ; and third, the continual protection of some dropping or landing zones if there is to be any operational or administrative build-up by air. The simultaneous execution of these tasks demands dispersion, which can only be compensated for by concentrating the full effort of large airborne forces upon a small number of tasks, particularly those which no one else can do. Dispersion of airborne troops is as unsound as is the dispersion of effort of normal land forces. Therefore airborne troops must be used in mass and the rate at which they are built up must be extremely rapid. Not only is this the best means of successfully surprising the enemy but it is also the only means of outwitting the weather which, particularly in Europe, may impose sudden and disastrous interruptions in the vital build-up and support by air of an airborne force. This is the aim to which the organization and procedure of an airborne division is directed.

74. **Communications.**—Communications are vital to a formation that by the nature of its movement by air is dependent upon offensive air support and the support of ground formations for fire power and mobility. For this reason signal facilities between co-operating headquarters must be on a large scale, and spare signal equipment and duplicated signal units and detachments are essential. The degree of inter-service co-ordination required in the preparation and launching, and during the progress, of an airborne operation demands

therefore a large scale and a high standard of signal communications. For the same reason full use must be made of liaison officers between airborne and co-operating ground formations, planning headquarters and air headquarters providing the air transport and the offensive support.

75. **Information.**—A ground assault may be altered at any time after H-hour if, due to unfavourable weather or terrain or a wrong appreciation of enemy strength, such a course is desirable. An airborne operation, however, once launched must be carried through to its end. It is impossible to recall airborne troops when they have landed or to order them to stand firm without continuing to send them supplies. It therefore follows that the planning of an airborne operation must be meticulously correct and every possible source of intelligence fully exploited to ensure that the appreciation on which the plan is made is based on all factors accurately assessed.

76. **Planning.**—The separation of the assault echelons of an airborne division moving by air from its land or seaborne tail calls for careful planning and co-ordination, particularly in relation to the linking up with co-operating land forces.

77. **Link up with ground forces.**—An airborne formation is not organized or equipped to operate independently for long against strong opposition. Where the enemy can counter-attack quickly the link-up by land forces should take place within 48 hours. Moreover, preparations must be made for the leading ground formation to be administratively responsible for the airborne force as soon as the land forces have joined up.

Organization

78. The organization of an airborne division is at Appendix 18. The units, their equipment and rôle, in so far as they differ from ground units, are summarized at Appendix 19.

Administration

79. Although an airborne division is unlikely, save in the most favourable circumstances, to be expected to operate for more than two days before ground forces link up, arrangements must be made beforehand to meet any emergency that may arise by having adequate stocks of commodities available at or near the base airfields.

The administrative problem is a normal one, except that a large loss of small arms and artillery equipment must be expected. After the airborne division has linked up with the ground forces it may have to continue fighting in a ground role for a considerable time. Administrative planning must cater for this contingency. After the initial assault the division relies on the ground formation under which it is operating. Planning with such a formation must therefore take place before the operation is carried out, the system in operation in the theatre being adapted to needs of the division. Special attention should be paid to " A " matters, the most important being the provision for replacements of staff officers and other personnel who become casualties in the initial assault. Other matters requiring particular attention are reporting of casualties, personnel states and Graves Registration.

80. Civil administration

Civil administration is a problem which will be met by all troops. In airborne operations it is a problem which is of greater importance in the initial stages than later on. The very nature of the operations may cause a panic among the civil population in an area that is unlikely to have been cleared by close contact with the fighting line and in which order must be maintained to facilitate the army's communications. The major problems are likely to be control of refugees and the choice of suitable local inhabitants, especially in enemy territory, who can best maintain the administration in our interests. For this purpose full use should be made of the Civil Affairs (or Military Government) staffs attached to higher formations, and of the field security personnel.

81. The importance of flying in supplies early

After the initial period of surprise the enemy will have appreciated the size of force involved and the direction of the main threat, and will have deployed his ground and anti-aircraft defences in an attempt to resist further landings. Maintenance by air will then become increasingly difficult and for this reason every effort must be made to send in supplies as early as possible. There are several methods, such as :

(*a*) By the pre-loading of gliders to be flown in with the initial lift.

(*b*) By all parachute aircraft carrying " jettison " containers. " Jettison " containers are containers which are loaded with the anticipated requirements of units, and are released, either before or after the parachute troops are dropped. They are collected by the formation nearest the " jettison " dropping zone and their contents handed into formation dumps. They can also be a valuable asset to units that are temporarily cut off.

(*c*) By pre-planning the fly in of supplies as early as possible after the initial lift.

(*d*) Bomber aircraft which are not required to take part in the initial assault may be used to drop supplies to the division as soon as possible after the assaulting troops are on the ground.

82. Supplies carried by units

All units land with a full scale of equipment, first line ammunition, petrol and two days rations ; an additional day's rations may be carried, distributed throughout the gliders, for collection and distribution by div RASC if the situation permits. Extra blankets and stretchers should also be carried on every vehicle and in every glider. The scale of equipment carried by parachute troops is restricted by what a man can carry when he jumps. Containers can be used for additional equipment and ammunition, they should however only be used for additional equipment and ammunition as they are difficult to locate on the ground at night and troops are particularly vulnerable while collecting them. Allowance should always be made for weapons and equipment being lost or damaged on landing, and for this reason as many spares as possible should be

taken. Any surplus weight in containers should be made up by additional ammunition. Items such as extra 2-inch mortar bombs may be distributed over men in platoons. Parachute troops should normally be allotted a glider element for carrying minimum transport and any special equipment that may be necessary for the initial operation. As in containers, any spare weight available in gliders should be taken up with spare ammunition, weapons, etc., and particularly signal equipment. Wherever possible units should establish dumps of equipment at or near their rendezvous with a view to collection later.

83. In all theatres of operations water may be short, and in addition to filled water bottles carried by all troops, units should take as many canvas water bags as possible, which should be filled as soon as possible. All troops should carry water purifying tablets.

84. Enemy material and local resources

In any operation it is likely that dumps of enemy material and enemy vehicles will be captured, and full use must be made of these. It is a natural temptation for units to make as much use of such dumps as possible for their own purposes. However, in order to benefit the formation as a whole they should be left intact, and detailed information should be passed at once to formation headquarters. A certain proportion of enemy type rotor arms, plugs, etc., should be carried by units so that captured transport may be made fit for the road without delay.

85. Vehicle maintenance

Until the link-up with the ground forces has been achieved all vehicle maintenance must be carried out with the equipment carried on the vehicle, by REME detachments, or by cannibalization.

86. Medical

To overcome the inevitable shortage of equipment, full use must be made of enemy and civil hospitals for the treatment and evacuation of casualties. Evacuation of casualties by air will normally be possible only when airstrips have been established or enemy airfields or landing grounds captured ; although it may sometimes be possible to evacuate casualties by glider pick-up. Since the number that can be evacuated by air ambulance will be limited, this method should be reserved for serious casualties. On the link-up with the land forces, casualties will be handed over to them for normal ground evacuation.

87. In the early stages casualties will be evacuated by stretcher bearers or by 5-cwt cars carrying a minimum of five days' medical stores. With the arrival of the land element, ambulance cars will become available. In the initial plans full consideration should be given to the possibility of establishing field dressing stations and main dressing stations in buildings so that urgent surgical operations may be carried out as soon as possible. Adequate reserves of medical equipment, especially blood plasma, must be maintained at the base supply airfield under the charge of a medical officer, in addition to that required for automatic maintenance by air.

88. Land element

In all airborne operations there will be a land (or sea) element which will include that portion of a division which it has not been

possible to fly in. This portion will join up with the assault echelon after the link-up with the ground forces has taken place. The land (or sea) element will be composed largely of heavy transport carrying unit first line equipment, and divisional second line requirements. This element may have to leave the concentration area as much as 14 days prior to the operation; therefore detailed plans must be drawn up as early as possible. It is essential that arrangements are made with the ground formation under which the division is operating for this element to join the division as speedily as possible.

89. Maintenance by air

Supply landing or dropping zones will be selected by airborne formation headquarters in conjunction with the air force. It may sometimes be necessary for supplies to be dropped in unit areas, but normally supply dropping zones will be selected on a formation basis. Alternative zones should be selected for use in case those originally chosen should prove to be unsuitable or vulnerable. The normal procedure for the marking of supply dropping zones will be laid down and whenever possible ground to air communication from the supply dropping zone to the maintenance aircraft should be installed to avoid possible mistakes in dropping.

90. Reduction of flying time, by selecting the most forward base airfields, is not so important as having a properly organized group of airfields, with a large area available between them for pre-packed dumps adequate for several days, with accommodation for despatch crews, packers, transport and a fair stock of unpacked material. When possible the base for maintenance and supply by air should be organized to cover the requirements of both ground and airborne formations. (For supply and maintenance by air, *see* Pamphlet No. 5.)

91. The senior administrative staff officer flies with airborne force headquarters. On landing he ensures the suitability of the supply landing and dropping zones and their defence and informs rear headquarters. Supplies are distributed in the maintenance area near the supply dropping or landing zones. They must be protected from air attack by dispersal, concealment, the anti-aircraft weapons of the RASC light composite company, and such additional anti-aircraft protection as allotted by the airborne divisional commander. Mobile reserves should be carried in the 5-cwt cars and trailers of the RASC light composite company.

92. If the tactical situation develops unexpectedly emergency maintenance by air may have to be carried out at short notice. To anticipate this possibility it may be advisable to load aircraft with packed containers as soon as they return from their initial sorties, and to keep them standing by and loaded. It may, however, be possible to stage these aircraft on forward airfields, used by tactical aircraft, where supply dumps may be held. In this way an emergency call for supplies can be answered at short notice, and every advantage can be taken of the weather and tactical air situation immediately the call has been received. It may also be possible to make use of fighters or fighter-bombers for emergency maintenance by air.

Training

"Experience is the child of Thought, and Thought is the child of Action. We cannot learn men by books."

Benjamin Disraeli.

(*See* Appendix 20 for Notes on Exercises.)

93. Standard to be achieved

The standard of the training of airborne troops must be very high. Commanders must ensure that the recognized principles of basic training are applied with great care and forethought, so that the best results are produced with the maximum of interest to the troops and the minimum of strain, bearing in mind the variety of subjects to be covered. It should be stressed during training that the parachute and the glider are merely the means of launching the troops into battle, and that first and foremost airborne troops are highly trained fighting ground troops, able to operate either by themselves or in co-operation with other arms, such as tanks. Sufficient glider or parachute training should be carried out to maintain confidence and ensure rapid action immediately on landing, but otherwise all else must be subordinated to the object of producing physically fit, well organized, efficient, and flexible fighting units of high morale, capable of adapting themselves to any situation after landing.

The following are some of the points of particular importance which should be emphasized during the training of airborne troops.

94. Physical fitness, initiative, and morale

Airborne formations have not the advantage of heavy weapons or the transport enjoyed by ground formations, but they must be prepared to fight on their own for a period. They must be fit enough to cover long distances with full equipment, to stand up to arduous operations, to seize and maintain the initiative, to take full advantage of the temporary confusion caused by their appearance among the enemy, and to act vigorously at all times in accordance with a general directive in place of detailed orders. Physical fitness and a development of initiative will produce a high morale, and this high morale must be constantly maintained. However well troops are trained in other respects their value will be lost without morale of the highest order, especially in adverse circumstances when the will to resist and maintain the offensive spirit are of the greatest importance. This point cannot be over-stressed during training.

95. Weapon handling

Airborne troops may not have adequate reserves of ammunition available during the initial stages of an operation. It is of the utmost importance that every shot fired finds an enemy target, and that weapons are always in good working order whatever the conditions in the field. During training particular care must be taken to ensure that all troops have a knowledge of their weapons, are expert shots under all conditions, and that thorough care and cleanliness of weapons become automatic. It is not sufficient that knowledge of specialist weapons, such as the 3-inch mortar, Vickers medium machine gun, and Piat should be confined to those troops who have to handle them. In addition to adequate reserves of fully trained men in these weapons, all troops should have a working knowledge of them, so that they can handle them in an emergency.

96. Parachute battalions are not equipped with anti-tank guns. Nevertheless a certain number of troops should be trained in the use of the 6-pounder anti-tank gun within these units—it may be found advisable that personnel of Piat platoon should be so trained.

97. Sniping and fieldcraft (including camouflage)

The importance of seizing and maintaining the initiative has already been stressed. Such initiative can be maintained by the aggressive and patient use of snipers and the skilful application of fieldcraft and camouflage by all ranks. Teams of snipers should be carefully trained, and it should be emphasized that by their skill they can dominate the enemy to such an extent that he will be afraid to show himself.

98. Map reading, photo reading, and compass work

If things do not go exactly according to plan airborne troops are likely to find themselves in isolated positions with only a map, air photograph, or compass to assist them in rejoining their comrades. Therefore it is essential that all ranks reach a high state of training in map reading, the use of air photographs, and compass work. They must be trained in the use of maps of the type produced in the country in which they are likely to operate, and they should be capable of finding their way by the shortest route in a strange country, either by day or by night.

99. Food and water discipline

Airborne troops have initially to exist on the food and water that they can carry on them. A high standard of food and water discipline should therefore be insisted upon. All ranks must be capable of cooking their food in the field under any conditions *without showing smoke*. They must be trained to be able to go for long periods without drinking water.

100. Man management and junior leader training

Man management is most important. All officers and NCOs should be fully familiar with it and should understand the need for it. They must be taught to realize that good management is the sign of good leadership, and that attention to its details in training as well as in battle combined with a firm discipline, will make all the difference to the morale of the unit.

Good junior leaders make a good unit and good junior leaders in airborne forces are vital. A junior leader is not good unless he is trained in every detail to a standard higher than that of his men. It is the responsibility of commanding officers to ensure that their junior leaders reach such a standard, and that the troops realize that no officer or NCO will ever give them an order which he could not, if necessary, carry out himself.

101. Patrolling

Airborne operations provide more opportunities for patrols, especially deep patrols, than almost any other type of operation. There will be many occasions when patrols provide the only means of obtaining information, or the only means of establishing contact with neighbouring units or formations. Similarly, any parties of troops which may become isolated after the initial landing, virtually become in themselves patrols. Realistic training in all types of patrols must therefore be carried out both by day and by night, under all conditions.

102. First aid

The medical resources of airborne formations are limited and all ranks must therefore be trained in the application of first aid to wounded personnel. The number of lives saved may depend on the standard of training achieved.

103. Enemy weapons and vehicles

In airborne operations there is a great opportunity for capturing enemy weapons and vehicles, and every advantage should be taken of this. All ranks should be trained in the use of the more common enemy weapons, and a proportion of men in each unit should be trained to drive and maintain enemy vehicles. It is an advantage if each unit contains a proportion of trained tracked vehicle drivers.

104. Container loading and kitbag packing

All parachute troops must be trained in the correct method of packing containers and kitbags, and the loading of containers and equipment into aircraft. It should be emphasized that by bad packing equipment may be damaged on landing and not available when required.

105. Aircraft drill

In case of emergency all troops should be practised in crash landing and " ditching " drill. In addition parachute troops should be practised in " abandon aircraft " drill, action when attacked by enemy aircraft, and dealing with wounded in aircraft.

Parachute troops must be trained up to as high a speed in " stick " jumping as possible, the emphasis being laid on the fact that the quicker the troops can get out of an aircraft the shorter will be the " stick " and the more concentrated will they be on the ground.

106. Loading and unloading of gliders

All airlanding troops must be carefully trained in the correct methods of loading gliders. They must also be trained to unload gliders with the utmost speed, especially under fire. Should enemy bring fire to bear on the landing zone after landing, speed in unloading will be of the utmost importance if casualties to men and equipment are to be avoided. (For action after landing, *see* para 138 onwards).

All troops must be trained to attain a high speed in clearing landing and dropping zones, assembling at the rendezvous, and reorganizing into fighting sub-units.

107. Rehearsals

Speed is of such importance in the initial operation that every detail of the operation should be rehearsed if time permits. Rehearsals are essential for night operations. The details for rehearsal should include the following :—

(*a*) Construction of a mock-up of the objective, if possible to life-size scale.

(*b*) Day and night rehearsals, on the mock-up, of the task to be carried out both with and without live ammunition.

(*c*) Practice moves, both by day and by night, over the route from the rendezvous to the objective, in country as similar as possible to the country in which the operation will take place. The distance should be slightly longer than the operational distance, but should be completed in the same time.

(*d*) Rendezvous organization should be practised on similar ground until every man knows by instinct where to report.

(*e*) A complete air rehearsal should also be carried out.

108. Glider pilots (including RAF glider pilots)

In addition to their duties as pilots, glider pilots must be soldiers fully trained to the same standard as other airborne troops. Once they are on the ground they must be prepared to forget their rank and take their place in the sub-unit that they have been flying, that is to say, as a member of an infantry section, or as a member of an anti-tank gun crew, etc. Subsequently, although glider pilots should normally be withdrawn from the battle areas as soon as possible, there may be occasions when their withdrawal is not possible. They must then be prepared to take their place in the battle organized as battalions, companies, platoons, etc., under their own officers, and should be trained accordingly. Special glider pilot crews should be trained and maintained for *coup-de-main* tasks, so that any operational commitment for such tasks can be met at short notice.

Glider pilots should be regarded as forming part of the air force unit with which they work and train and should be considered as members of the aircrews.

Forms

" I'll wipe away all trivial —— records,
All saws of books, all forms, all pressures past,
That youth and observation copied there."

Shakespeare : *Hamlet.*

109. In Chapter 1, paragraphs 53–59, descriptions are given of the types of forms required in the preparation for an operation. Points mainly on distribution specific to airborne forces are given below.

(*a*) *Form A. Air movement table* (see *Appendix* 7).—The distribution by the airborne formation will normally be the same as for the formation Operation Order in which it will be included.

(*b*) *Forms AA and AB* (see *Appendices* 8 *and* 9).—As soon as possible after receipt of Form A, and in any case at least four clear days before the operation, units will complete Form AA or AB, or both. These will be included as part of the unit's operation order and will be distributed accordingly.

(*c*) *Air force unit's operation orders.*—One copy of the Air Force unit's operation order will be sent to the airborne control officer (ACO), and he will check this with Forms AA and AB to ensure that there is no discrepancy.

(*d*) *Load manifests. Forms B Parachute and Glider* (see *Appendices* 11 *and* 12).—It will be noted that these two forms are in two parts, the preparation of Part I being an air force responsibility and the preparation of Part II being an Army responsibility. Supplies of Forms B will be held by all army and air force units. A specimen procedure is as follows :—

(i) Army units will prepare two copies of Part II of the appropriate form for *each* parachute stick or glider load taking part.

(ii) Each man's unit will be shown in the last column of one copy *only*.

(iii) Both copies prepared by army units will be taken to the airfield by the stick commander*/senior glider passenger.

(iv) On arrival at the aircraft or glider the stick commander/senior glider passenger will hand the two army copies to the pilot who will complete Part 1 of each copy and return them to the stick commander/senior glider passenger.

(v) The stick commander/senior glider passenger will complete Part II of the pilot's copy, including details of units.

(*e*) After the aircraft or glider has been inspected all copies of the form will be signed by the pilot and stick commander/senior glider passenger, the latter retaining them for the final check of passengers on emplaning. It is important that any last minute alteration is made on all copies.

(*f*) Before take-off the stick commander/senior glider passenger will hand over two copies of Form B complete to the ACO or his representative. The third copy (the copy which does not contain details of units) being retained by the stick commander/senior glider passenger as a check on personnel after landing.

(*g*) One copy of each Form B will be forwarded by the ACO to the air force unit concerned, while the other copy will be forwarded to the airborne control headquarters. This copy is required by the " A " branch of the headquarters.

No aircraft or glider may take off until Form B has been handed over.

Operation Orders

" The heights by great men reached and kept
Were not attained by sudden flight,
But they, while their companions slept,
Were toiling upward in the night."

Longfellow.

110. Experience has shown that plans hastily prepared during the course of operations lead to a serious loss of effort. Therefore detailed orders or instructions must be prepared for the plan a considerable time ahead. These must cater for the original landings, the alternative plan, and for tasks in which airborne troops are likely to be used in subsequent land operations. But airborne troops must also be ready to produce orders and instructions needed for a plan prepared at short notice. In airborne operations, to a greater extent than in any other type of operation, unit staffs must be capable of preparing detailed instructions and forms at short notice.

111. Timings

It is important to settle certain " key timings " early, and this is done at the army/air co-ordinating conference held as soon as a decision has been taken to mount an operation. The results of this

* " Jumpmaster " is the American equivalent.

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conference are recorded on Form A (*see* Chapter 1, paragraph 55). Form A will be the basis on which the various staffs work out all details.

112. "H hour" must be defined. When airborne troops are operating independently "H hour" will be the time that the first wave of parachute troops lands on the dropping zone, or airlanding troops touch-down on the landing zone. When airborne troops are co-operating with land/sea forces, "H hour" will normally be "H hour" for the beginning of the land/sea forces attack. The time of landing of airborne troops must then be specified; this is usually done in terms of a separate letter such as "P hour."

113. Plan

Arrangements for an attack to be carried out after a long move by air must inevitably be rigid to some extent. The plan, however, must not be so rigid that success cannot be reinforced. The original orders will deal in detail only with the initial stages of an operation. Action in the later stages, except in a raid, will depend upon the situation on the ground as in any land battle. In an airborne operation the unexpected is more likely to happen than in a land operation, and therefore commanders should consider the alternative courses that the battle might take. It may be advisable for them to issue an operation instruction covering these various alternatives so that subordinate commanders are fully aware of the higher commander's intention should they meet such a situation.

114. Time of issue of orders

Orders must be issued in time for those who have to carry them out to memorize the country in which they will be operating. In airborne operations it is more dangerous that the troops should know too little than that security should be imperilled by telling them too much. However, on occasions it may be necessary, owing to lack of time, to issue a general directive in place of detailed orders, and any directive must be such that troops will be able to act vigorously in accordance with it at all times.

115. Staff duties involved in an operation order

The staff duties involved in an airborne operation order are, broadly speaking, similar to the staff duties in any other type of operation order. There are, however, points of particular importance and these are shown in Appendix 21. In addition, the following points are emphasized for unit operation orders.

(*a*) *General.*—The selection, marking, and organization of dropping and landing zones and rendezvous, and routing to objectives are a staff responsibility and must be covered in operation orders. The salient points are shown in the sequence of action described below.

(*b*) *Route to objective.*—The route to the initial objective from the rendezvous must be laid down in detail.

(*c*) *Action of troops landing away from the dropping or landing zone.*—Instructions for the action of troops landing away from the dropping or landing zone must be clear. All troops landing within a certain area close to the rendezvous should make for the rendezvous. All troops landing further from the rendezvous should be given an intermediate rendezvous which should be on the route to the objective. All troops who cannot reach the dropping or landing zone rendezvous by the time the unit is due to move off should be instructed to make for the same point on the route to the objective, and wait for the unit. This point should, if possible, be the same as the point chosen for the OC reconnaissance party (if detailed) to meet the unit commander (*see* below).

(*d*) *Reconnaissance of objective.*—Plans for any airborne operation are based on a study of air photographs, models, and information provided by intelligence agents, etc. However good air photographs and intelligence information may be, ground may not always be quite as visualized and enemy defences may not have been depicted accurately. On most occasions, therefore, it will be necessary for a unit commander to obtain confirmation of the enemy defences and of the ground before he attacks, so that he may make any necessary alterations to his plan. Instructions should contain details of any reconnaissance party necessary, its tasks, composition, and the name of the officer in charge. It will normally be advisable for a point on the route to the objective to be given where the officer in command of the reconnaissance party will meet the unit commander to report results. This meeting should, if possible, be the same as the rendezvous for personnel dropped or landed away from the dropping or landing zone. It may be advisable to drop or land reconnaissance parties ahead of the main body.

(*e*) *Duplicate parties.*—When any such special task has to be carried out, that is, the organization of a rendezvous, the reconnaissance of the objective, etc., duplicate parties should be detailed to carry out the tasks should the original parties not be available for any reason.

Landing and Dropping Zones and Locating Aids

116. The general considerations affecting the choice of dropping zones (DZ) and glider landing zones (LZ) are given in Chapter 1, para 33. As they particularly affect airborne forces they are considered in greater detail here. The selection of DZs and LZs forms a very important part of the planning for airborne operation; the responsibility for their final selection rests jointly with the air force and the army.

117. Points affecting the selection of DZs and LZs

(*a*) The overriding consideration is their distance from the base.

(*b*) Their location must be such as to allow airborne units a reasonable chance of being brought under effective control before having to fight.

(*c*) They must satisfy the army tactical plan and be sufficiently close to the objective to ensure surprise.

(*d*) If enemy strong points lie between the landing area and the objective, the terrain should be such that enemy positions can be by-passed.

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(*e*) There should be cover near the landing area, especially in daylight operations, and where possible there should be covered routes to the objective.

(*f*) Recognized features should be available for the rendezvous.

(*g*) Alternative DZs and LZs should be chosen in addition to those initially required.

(*h*) There should be no major obstacles to movement on the ground, and when vehicles are landed the surface must be firm.

(*i*) The number of zones selected may be limited by the number of detachments available for marking within the resources of the division.

(*j*) Their shape and size will be closely related to the need or the possibility of landing gliders tactically, that is to say, in a pattern corresponding to the deployment required of the troops when landed.

(*k*) They must be readily recognizable by pilots from the air and there must be recognizable features up to 25 miles from the zones to act as final check points for navigators.

(*l*) The approach to them must be reasonably free from anti-aircraft defences.

(*m*) The enemy fighter situation will affect selection.

(*n*) The study of photographs plays an important part in their selection.

(*o*) As a guide LZ or DZ should be approximately 1,100 square yards, (*i.e.*, one square on the normal map grid) for 100 gliders or for one parachute brigade.

118. Obstacles

(*a*) The main obstacles of gliders are : Stone walls, strong trees, sunken roads, pylons and HT cables, deep and wet ditches, wet and soft plough land, and minefields.

(*b*) Parachute troops are not so limited by obstacles but in the selection of DZs towns, minefields, ground very broken or covered with boulders and marsh land should be avoided.

119. **Marking of zones and methods.**—Every precaution must be taken to ensure that pilots and navigators cannot fail to recognize the zones, especially by night. An airman's attention is easily distracted by things moving on the ground, for example, flashes of sunlight on water, moving trains, the breaking of surf on a shore ; the marks employed to indicate a zone must, therefore, be very conspicuous and the following are the main requirements :—

(*a*) They must be different from their surroundings.

(*b*) They must not attract the attention of the enemy.

(*c*) They must not be capable of being easily displayed by the enemy to confuse our forces.

(*d*) They must be easily portable and simple in operation and construction.

120. The principal methods of marking zones are by radio aids, smoke generators, lights, panels or ground strips and target indicators

dropped by air. Detachments of the independent parachute company with Pathfinder teams and specially trained air crew are normally employed on marking tasks and are flown in advance of the assault. The time required to set up locating aids should be kept to a minimum in order not to compromise the element of surprise. By day marking may not be necessary.

121. Procedure for marking dropping zones

(*a*) *By day.*—The normal procedure consists of a panel " T ", a code letter, and smoke signals. Both the " T " and the code letter (the code letter is to identify the DZ and distinguish it from others in the same area) will be constructed from panels or ground strips ; each panel measuring 3 ft by about 15 ft. The colour and size of the " T " and of the letter depends upon the size of the area, the vegetation and any trees obstructing the vision and will be agreed upon by the army and air commanders concerned. Coloured smoke, as laid down for the operation, indicates the position of the " T ". The " T " is positioned with due regard to wind speed and direction, the shape and size of the DZ, the formation being flown so that it will readily be observed from aircraft running in from the target RV to the DZ. The identifying letter is placed in any suitable position near the " T ". The radio aids, if used, should be placed within a radius of about 100 yards from the head of the " T ". Smoke signals are placed near the base of the stem of the " T " with due regard to the wind so that smoke will not obscure either the " T " or the identifying letter. The axis of the " T " should be parallel to the line of flight, with the approach up the stem. The jump signal is given when the leader of the formation is over or level with the head of the " T ". Six panel strips are normally used, three across the top of the " T " and three forming the stem. Panels are placed one panel length apart.

(*b*) *By night.*—The normal procedure consists of lights forming a " T " with at least four lights across the top and at least three lights forming the stem, all lights being 25 yards apart. The lights are normally red or green or amber and have a 180 degrees screening. The number and colour of the lights in the " T " must be agreed between the army and air commanders concerned to suit the particular conditions. The tail light of the " T " is the code light and any radio aids are placed within a radius of about 100 yards from the head of the " T ".

122. Procedure for making glider landing zones

(*a*) *By day.*—The normal procedure for making glider landing zones similarly consists of the panel " T ", panel code letter, and coloured smoke. Panels measure 12 to 15 feet by 3 feet. The " T " is laid with the stem parallel to the line of glider landing in order to be readily observed from aircraft running in from the target RV to the LZ. The direction of landing so indicated must not be more than 90 degrees out of wind, the amount depending on wind strength and on configuration and shape of LZ ; the best compromise being adopted. Coloured smoke is placed in

the same manner as for a DZ. The radio aids should be placed in such a position, relative to the direction of the run-in from target RV to the LZ, that gliders can be brought to a point where they can execute a 90 degrees (or not more than 180 degrees turn, preferably left hand) to land into the wind. Code letters marking LZs are prepared from panels similar to those used for marking " Ts ".

(*b*) *By night* (The following marking system for glider LZs by night assumes sufficient light for glider pilots to distinguish individual fields for landing.)—The normal procedure consists of a " T " formed by two lights across the top 50 yards apart and at least five lights forming the stem 25 yards apart. The tail light of the stem is the code light. The position of the " T " and of any radio aids are the same as for the marking of LZs by day.

Loading to Landing

" . . . . *and from the tents*
The armourers, accomplishing the knights,
With busy hammers closing rivets up,
Give dreadful note of preparation ".
Shakespeare : *King Henry V.*

Loading and Emplaning

123. Aircraft inspection card.—This includes the points for inspection of all types of aircraft likely to be used for parachute dropping. A copy is pasted inside every aircraft, and details are checked over carefully by the pilot and stick commander together, before Form B is signed, and before containers are loaded.

124. Loading of containers and aircraft

(*a*) It is an army responsibility to ensure that containers are packed to the correct weight and centre of gravity, and to obtain and fit container parachutes.

(*b*) Cables and shackles are attached to containers before leaving the transit camp.

(*c*) A member of the air crew checks the correct functioning of the container release mechanism before containers are loaded.

(*d*) Container racks and aircraft are loaded by army personnel, but final decisions are the responsibility of the captain of the aircraft. Loads must be evenly distributed to conform with centre of gravity factors.

(*e*) The pilot and a member of the aircrew should be present during loading of containers, and a member of the aircrew checks the time of dropping of containers with the stick commander.

125. Loading of gliders

(*a*) It is an army responsibility to ensure that glider loads are within the officially approved units of weight. All unusual loads are submitted to an air force engineer officer for checking before loading.

(*b*) Gliders are loaded by unit personnel in the presence of the glider crew, and loads must be evenly distributed to conform with centre of gravity factors.

126. Emplaning

(*a*) Thirty minutes before time of emplaning all pilots, including glider pilots, make a final mechanical and loading check of the aircraft or glider. With gliders the first pilot of the tug will give any final decision necessary.

(*b*) If for any reason an aircraft or glider cannot take off on time the pilot immediately reports the fact to his commanding officer and the ACO, and he assists in the transfer of the load to a spare aircraft or glider.

(*c*) It is an army responsibility to obtain and fit parachutes for the troops.

(*d*) When emplaned, all troops assume take-off positions and remain in these positions until otherwise ordered by the pilot when the aircraft is airborne.

(*e*) The senior passenger of each glider must carry out a final inspection with the glider pilot before emplaning and signing Form B glider.

(*f*) All passengers carried in gliders will adjust the safety harness before take-off.

127. Air Force responsibilities (*see* also Appendix 17).—In addition to the points given above, the following are the main air force responsibilities :—

(*a*) In Dakota (C–47) and C–53 aircraft, the taping of the doorway and all projections on the fuselage both inside and outside as laid down in Appendix 22.

(*b*) The proper functioning of lights, accessories, bundle or bomb racks, radio R/E, intercommunication visual signals, etc.

(*c*) Provision of all air force accessories and special equipment required by an airborne unit for a particular operation, for example, long strops where necessary, together with bungle rings, safety pins, and loading ramps for gliders.

Take-Off

128. All troops remain in " take-off " positions until the pilot orders " adopt normal positions ". It is the pilot's responsibility to ensure that this order is enforced. Glider pilots are responsible for ensuring that all glider passengers adjust their safety harness before take-off.

Should any glider be accidentally released during or just after take-off, and be able to land within the airfield, the glider pilot should land off or swing off the runway. The glider pilot and senior passenger must be clearly briefed against this contingency to know whether :—

(*a*) The glider, if undamaged, should be returned immediately to the take-off point.

(*b*) The passengers, or load, or both, should be transferred immediately to a spare glider.

129. **Timings.**—There will normally be an interval of one minute between aircraft during take-off by day. The rate of departure at night must vary according to the visibility, the type of aircraft, and the condition of the airfield. Certain types of aircraft carrying parachute troops can take off at the rate of one a minute from a good airfield, in bright moonlight. Gliders from a good airfield can also take off at the rate of one a minute.

130. The completion of the preparation and the take-off of each unit or party will be reported immediately to the controlling headquarters by the air force station staff.

Flight

131. **Formation.**—Standard flight formations are prescribed in order to expedite training and to simplify procedure. However, special conditions may demand a variation from the standard. Such variations will be mutually agreed by the army and air force formation commanders concerned and approved by the next higher headquarters.

Royal Air Force parachute dropping aircraft normally fly by day in a " stream " and rely on concentrated accurate timing over the dropping zone to achieve concentration. They may, according to conditions, fly in single V formation or in pairs. US aircraft fly in formations of 9 aircraft in a V of Vs with close spacing between formations. Royal Air Force glider-tug combinations do not normally fly in a " stream " but may fly in pairs.

The flight formation to be used should be made known to army unit commanders as soon as possible, as it may affect their order of drop, depending on whether they want to drop certain sub-units at the beginning or end of the dropping zone.

132. **Flight route.**—Along the flight route the air force normally selects a group rendezvous (GRV) upon which aircraft from various airfields converge and at which correct timing is ensured before onward flight. A target rendezvous (TRV) at the forward end of the flight route is also selected. Between these the air force may select a number of check points varying with the length of the route and the geographical conditions. These may be coloured light beacons or unmistakable landmarks, such as isolated lakes. The route and time spent in the air should be as short as possible because, in addition to many other reasons, long flights add to the fatigue of troops, increase the chances of air-sickness, and will result in reducing their fighting vigour. It is particularly important that glider troops should have as short a journey as possible, since they suffer considerable discomfort on long journeys.

While the air force and glider pilots are responsible for dropping or landing the troops at the right place at the right time, army commanders should be conversant with the routes, especially during the last stages, and they must be prepared to assist glider pilots to find the landing zones.

133. **Command during flight.**—From the time of take-off to the time of dropping or landing, the senior air force commander is in command of all personnel in aircraft and gliders. Similarly the captains of aircraft, and senior glider pilots, will command all troops in their aircraft or glider.

134. **Height of approach.**—During the approach aircraft, whether parachute or tug, either fly sufficiently high to keep above the enemy light anti-aircraft defences, or at about 50 feet. If the latter, glider combinations will have to begin climbing a considerable time before reaching the landing zone in order to gain sufficient height for gliders to release. When the approach is made at 50 feet it must be on a straight course all the way, and aircraft must drop over a distinct and unmistakable landmark.

135. **Procedure aboard parachute aircraft.**—The detailed procedure aboard parachute aircraft during the approach is given at Appendix 23.

136. **Procedure for release of gliders**

(*a*) Ten minutes before time of release a warning order is given to the glider pilot by the tug pilot.

(*b*) The order to cast off is given by the tug pilot when at the appropriate position on the approach leg.

(*c*) All warnings are given over the intercommunication system and confirmed by Aldis lamp.

(*d*) If, in the opinion of the tug pilot, the glider pilot has not released when he should have done so, the tug pilot releases the glider so that it will land on the landing zone.

(*e*) Gliders are normally released at approximately 1,500 feet fairly close to the landing zone. However, certain tasks may necessitate a longer silent approach to obtain surprise; as an example Horsa gliders might be released 10 miles away at 10,000 feet.

137. **Dropping/landing**

(*a*) Parachute troops are normally dropped at a height of about 500 feet at the minimum safe speed of the aircraft. Aircraft need a run-up of about half a mile.

(*b*) It is the responsibility of the pilot to maintain altitude, direction, and speed as laid down for the operation. Once the troops have received the order to " stand-up " the pilot should not take evasive action unless absolutely necessary, as by doing so troops may be thrown off their feet and a second run may be necessary before all troops are able to jump.

(*c*) A member of the air crew releases containers as laid down, and makes certain that all have gone. He notifies the pilot when all troops have jumped and when containers have been dropped. The pilot then releases the automatic salvo switch.

(*d*) The static lines and bags are pulled up by the air crew. On return to base airfield they will be handed over, together with any equipment left in the aircraft by the parachute troops, to the ACO.

(*e*) All personnel in a glider must adjust safety harness before coming in to land. The senior glider pilot is responsible for issuing the order to do so.

(*f*) As soon as their parachutes are open parachute troops will endeavour to identify their surroundings, and will try to locate the rendezvous. They must not let go their

kit-bags, rifle valises, etc., into a free drop, because not only will the equipment be destroyed but also free dropping equipment may hit and collapse a parachute and cause a fatal accident.

(*g*) Immediately on landing, airlanding troops must take up a position of all-round defence round their glider, while they familiarize themselves with their surroundings.

(*h*) Glider pilots help with the unloading of their gliders, and normally should then be withdrawn from the fighting areas as soon as possible. Should the situation be such that glider pilots cannot be withdrawn they should be organized into units and sub-units to form a local ground reserve for the airlanding formation.

Action after Landing

" In skating on thin ice, our safety is in our speed."
Emerson.

138. On the ground airborne troops operate as any other types of troops, and their tactics are similar in all respects; but there is an interim period between the actual time of landing and the time when troops are ready to move to attack their first objective as an organized body. This is a phase peculiar to airborne troops.

139. Assembly of troops

The time factor is always of the greatest importance in any airborne operation, and therefore all possible means must be used to assist the troops in clearing the dropping/landing zone as quickly as possible. By day the problem is considerably easier than by night, when complete confusion can result in the dropping/landing zone if the assembly organization has not been carefully thought out and thoroughly rehearsed before the operation. This danger is especially marked for parachute troops, who clear the dropping zone individually, but for airlanding troops the problem is simplified in that they leave the landing zone in organized sub-units. The following paragraphs showing the assembly organization are based on a specimen procedure necessary for parachute troops, but they can equally well be applied to airlanding troops.

140. Rendezvous

(*a*) A prominent landmark on the edge of the dropping zone should be chosen as a rendezvous. This should also be easily recognizable in air-photographs, for example, the corner of a wood, or a lone tree. All troops should be ordered to make for this rendezvous as soon as they have landed.

(*b*) The rendezvous should consist of a report centre, which will be unit headquarters, and sub-units rendezvous, which should be laid out in the order of march required for moving off to the objective. The report centre should be in charge of an officer and should be clearly marked—by night by a coloured light which should be visible for at least 800 yards, and by day by coloured smoke. One man should be placed in charge of the light or smoke. He must ensure that the lamp is continually shone in all directions,

so that it will be visible from all parts of the dropping zone, and by day he must ensure that there is always smoke visible, until all troops have reported in, or the unit has left the rendezvous.

(*c*) Guides from each sub-unit should arrive early at the rendezvous and each should mark his position with the letter or number of the sub-unit painted in black on a sheet of white American cloth or calico. Such a marker can be carried easily by the man, can be hung on any tree or bush and can be seen at night. Sub-unit guides will be prepared to direct platoons, etc., to their areas.

(*d*) In view of the importance of the officer in charge of the report centre and his sub-unit guides arriving at the rendezvous sufficiently early to be able to direct the troops, it may be necessary to send this party down with the " pathfinder " party ahead of the main body.

141. Leaving the dropping zone

All troops will be instructed that they must get to the rendezvous as quickly as possible. Generally troops will proceed independently to the rendezvous, carrying all their equipment with them. However, troops whose equipment is in containers will rally by sections on their containers, collect their equipment, and move off to the rendezvous as an organized body. Any troops not carrying heavy equipment will automatically assist any man they may meet who is carrying a heavy load. If troops meet an officer or NCO they will remain with him until the rendezvous is reached.

If troops report to the wrong centre, the officer or NCO in charge must re-direct them immediately. The need should be avoided because it causes delay; troops should be well briefed and should know the way. On arrival at their sub-unit rendezvous troops will inform the guide of the number of their platoons, etc.; the guide will then direct them to their area.

142. Additional locating aids

In addition to the methods already mentioned, there are several other aids to assist troops in reaching the rendezvous as quickly as possible.

(*a*) All personnel should carry a white unit distinguishing mark on the back of their jumping jacket (*not* smock). This mark should be of an easily recognizable shape which should be different for each unit. All personnel within a battalion group, etc., should wear that battalion's distinguishing mark, whatever their arm of the service.

(*b*) The rendezvous can be indicated in a variety of ways, such as bugle, bag-pipes, bird noises, cat calls, but whichever method is used it must be known to all ranks and must be as different as possible from any other rendezvous sign in the vicinity.

143. Action at rendezvous

As soon as troops arrive at the rendezvous they must automatically take up a position of all-round defence.

The senior officer or NCO at any sub-unit rendezvous automatically takes command of that sub-unit immediately on arrival. He must ensure that the defence is adequate, and he will maintain a constant check on his personnel state.

On arrival at the rendezvous, company and equivalent commanders will proceed direct to their company and equivalent rendezvous, and will them report in person to the unit report centre, with the approximate state of their company. They will report subsequently at the times laid down and finally when their sub-unit is complete.

144. Movement between rendezvous and objective

The success of the initial phase must always be maintained as the main object, and nothing should be allowed to interfere with it. Enemy defences, patrols, etc., encountered on the route to the objective should therefore be avoided. If absolutely necessary a detachment should be detailed to engage the enemy, while the main body continues to the objective.

Communications

145. The success of any airborne operation may be entirely dependent on communications. (*See* Chap 1, para 39 and Chap 2, para 74.) The greatest care must therefore be taken to ensure that signal personnel are highly trained in operating and maintenance. After landing communications must be established according to a decided system of priorities with the available resources as they arrive. The normal procedure of wireless procedure and security apply to airborne troops as to any other troops. On the other hand, as compared with a normal signal plan, the airborne signal plan must allow for a greater degree of flexibility, a larger number of spare detachments and greater precautions to avoid compromise of security by individual parties who may be captured by the enemy. Vital staff officers and wireless detachments must be duplicated in separate aircraft as an insurance against non-arrival :—

(*a*) *Means of communication*

(i) *Wireless.* This must be the primary means. Equipment is limited by what can be carried by a man or in a jeep inside a glider. As wireless ranges are in many cases greater than normal the provision of the best possible equipment within these limitations of weight and size is important.

(ii) *Lines.* Owing to the bulk and weight of the equipment only very limited line resources can be carried by air. Spare field cable should be carried on as many jeeps as possible. Lines must be laid as soon as conditions allow in order to reduce the use of wireless, codes and ciphers, and to conserve the dry batteries in the case of the smaller wireless sets.

(iii) *DRs and liaison officers.* The number of DRs and motor cycles (or jeeps) which can be carried by air is limited. As much use as possible should be made of liaison officers for carrying messages between formations and units.

(iv) *Pigeons.* The use of pigeons is limited to certain operations where a few birds can be despatched back to base in emergency.

(*b*) *Signal security*

Codes. Code keys will generally be special for airborne operations to avoid carrying by air the normal keys employed within the ground forces. These keys must be distributed to the ground formations co-operating with the airborne force.

Code signs and frequencies. The distribution of complete ground forces code sign and frequency extracts must be very limited. Except for immediate requirements extracts should be carried by air in cipher and deciphered and distributed after landing.

Ciphers. Only ciphers which cannot compromise the ground forces ciphers may be carried by air.

(*c*) *Artillery communications.* The communication system must provide for direct communications between the airborne FOOs and the supporting artillery of the ground forces.

(*d*) *Offensive air support communications.* Special air force parties with VHF equipment and airborne tentacles are necessary for offensive air support.

(*e*) *Ground rôle.* In order to provide adequate communications for a prolonged period after the link-up with the ground forces, heavy command and rear link wireless vehicles, and terminal equipment vehicles for line and signal officer requirements must be brought in by land as soon as possible.

(*f*) *Enemy communcations.* Owing to the limited cable resources in an airborne force, enemy communications must be utilized as far as possible. At the same time the enemy must be prevented from using fixed communications in the area occupied by the airborne force. Disconnecting of enemy circuits and neutralizing of telephone switchboards and signal apparatus must be very carefully controlled by the senior signals officer in order to prevent irreparable damage.

(*g*) *Base communications.* A very extensive common user army/air force line system connecting airfields, transit camps, supply dumps and launching headquarters must be arranged in the base area. This can only be supplemented by wireless to a very limited extent for reasons of security.

(*h*) Examples of communications for an airborne operation are included as a guide in the Appendices as follows :—

Normal Airborne Division. Wireless Communications (less Offensive Air Support and RA)	Appendix 24.
Normal Airborne Division. RA Communications	Appendix 25.
Normal Airborne Division. Offensive Air Support Communications	Appendix 26.
Airborne Base Communications ...	Appendix 27.

CHAPTER 3.—AIRTRANSPORTED FORCES

" The best thing about travel is that it teaches what are the places that are not worth seeing."

(M. Pierre Benoit.)

Summary

146. Chapter 1 deals with the principles, the factors and the planning for the tactical employment of airtransported and airborne forces and features common to their movement by air.

This Chapter 3 deals with the points peculiarly applicable to the army (less airborne formations) in an airtransported role. Though the principles of air movement are similar for both airborne and airtransported forces, additional requirements are introduced when a tactical airtransported formation is flown by air. These are :—

(*a*) The equipping of units with airportable equipment.

(*b*) The training of troops in movement by air. In addition to staff duties and movement discipline this includes dismantling, loading, lashing, unloading and reassembly of equipment at maximum speed. Notes on training are in Appendix 16.

(*c*) An increased ground organization to control the fly-in and fly-out of a large number of transport aircraft and to deal with the loading and unloading of supplies and equipment which may require dismantling and which may be beyond the unit or sub-unit resources.

147. The increasing ability to move by air troops and equipment in tactical units is giving to the army a new rôle and new responsibilities. A third method of approach to the battle area has become available. It entails duties which become as much a part of Staff Duties as movement by land or sea. Training and intelligent interest must prevent movement by air from becoming a mystery to be interpreted only by a specialized headquarters " high priest." Although the working out of the details for a move is largely the responsibility of the Q Staff, the handling and employment of airtransported troops is an essential basic duty of all staff officers. In the division of army Staff Duties there is little difference between a move by road or sea with its order of move and a move by air with its order of flight. The principal differences between a tactical move by sea and by air lie in the restricted loading capacities of aircraft and the greater dependence on weather. The possibilities for independent initiative and improvisation on the part of airtransported units make it particularly necessary that general information on matters of air transport support must be the concern of all personnel ; in this way the real and essential co-operation with the air force at all levels can be achieved. Training and combined rehearsals are important means to this end (*see* Appendix 16).

148. *The supplements* to this chapter 3 contain the data required for carrying units and their equipment by air and for training :—

Supplement 1 contains the details of aircraft affecting the carriage of all army loads, and the technical principles of loading and lashing.

Supplement 2 deals with vehicles and gives information on modifications, dismantling, loading and lashing into aircraft and unloading and reassembly after arrival.

Supplement 3 deals with the carriage of artillery equipment by air.

Supplement 4 deals with the carriage of engineer equipment by air.

Other supplements will be added as required.

Aircraft

149. **Transport aircraft** (*see* Supplement No. 1 for details of aircraft)

(*a*) The two-engined Dakota (C-47) is the transport aircraft with which the army as a whole is primarily concerned in an airtransported role. The equipment with which an airtransported formation or the airtransported echelon of a normal infantry division can be equipped is at present, therefore, mainly controlled by the loading capacity of the Dakota with its average payload of 5,500 lbs. Other aircraft such as the American Commando (C-46) transport aircraft (9,000 lbs payload) have increased payload, but these are normally available only for special units under special circumstances.

For a tactical role airtransported forces require a tactical transport aircraft having a maximum loading capacity for awkward loads such as vehicles and requiring the minimum landing facilities in the forward areas. The Dakota is at present the nearest approach to these requirements and in addition is the best all purpose aircraft for the roles of a glider tug and a parachute aircraft.

(*b*) Some four-engined transport aircraft are capable of carrying larger equipment with less need for dismantling than the Dakota (C-47) as well as a larger payload. The increased requirements, however, in landing facilities such as surface and length of runway make their tactical employment in the forward areas unlikely unless good airfields are captured in the early stages of an operation. They are therefore normally employed for strategic and administrative moves.

150. The employment of gliders

Normally airtransported units travel in powered aircraft, but gliders will have to be employed for landing in areas where airstrips or airfields are not already available. They will be employed only when powered aircraft cannot land since they are normally an extravagant use of airlift. They are used mainly for the airlanding units of an airborne formation in air assault and follow-up roles. Their employment with airtransported forces will usually be for lifting engineer units for the purpose of preparing airstrips for powered transport aircraft.

Assuming adequate landing facilities, it is practicable for gliders to land on landing zones while their transport tugs land simultaneously on airstrips. This will increase the speed of build-up, but will increase the complexity of the plan and the ground organization required since their respective landing areas may be separated by several miles. Moreover, the payload of the aircraft as a tug will probably be less than its normal payload and may be entirely sacrificed.

The Horsa and Hadrian (CG4A) are the most common types of gliders. They have a payload of 6,900 lbs and approximately 4,000 lbs respectively and for awkward sized equipment the Horsa has slightly worse and the Hadrian slightly better loading characteristics than the Dakota (C47).

The Hamilcar has both an increased payload (about 17,000 lbs) and a considerable increased loading aperture. The allotment of Hamilcars to airtransported units will, however, be exceptional.

Airtransported Units and Airportable Equipment

151. Broadly, there are two main categories of airtransported units :—

(*a*) Units whose normal equipment is airportable.

(*b*) Units whose equipment has been modified or exchanged to make them airportable for a particular airtransported operation.

152. Equipment is airportable in varying degrees. Its degree of airportability represents the time taken in loading and unloading, and affects the time of turn-round of the aircraft over a given period. It affects the speed with which units can get into action after landing, and it affects the size of the ground organization required to load and unload and to dismantle and reassemble if this work is beyond unit or sub-unit resources.

153. The word airportable may be misleading unless related to the particular aircraft concerned and the number of man-hours required for loading and unloading. For tactical employment there is a limit of time and effort which can be accepted, above which movement by air becomes administrative or freight transportation.

The degrees of airportability may be distinguished as :—

(*a*) Equipment which can be loaded without dismantling and without loading aids by unit personnel. For the Dakota (C47) examples are jeeps, trailers, mortars and artillery such as 3·7-how, 75-mm hows, 25-pr Mk 3 carriage.

(*b*) Equipment which requires to be dismantled for loading but which requires no lifting aids and which in the case of vehicles can, when dismantled, be driven into the aircraft. For such equipment units can normally carry out their own loading. Examples in the case of the Dakota (C47) are the 25-pr Mk 1 carriage, 40-mm Bofors, the airportable 15-cwt truck 4 × 4 and the ¼-ton weapon carrier 4 × 4.

(*c*) Equipment which requires dismantling and lifting aids for unloading and reassembly in the forward area, and may require more than one aircraft. Vehicles which require wheel dismantling, such as 3-ton lorries and the larger tractors for airfield construction are examples. Normally, the handling of this type of equipment is beyond unit resources. The transport by air of such equipment increases the organization required for air movement.

Since the airfields must be kept clear at all times, equipment in a dismantled state will have to be transported some distance between the aircraft and the areas where dismantling and reassembly can be carried out. Special detachments may also be required at both base and forward airfields to handle such equipment. The need for quick dismantling makes it essential that particular care is taken to keep the joints and bolts of such equipment free from corrosion and rust.

154. To render equipment airportable in any of these categories, modifications may be required either to enable it to be loaded without dismantling or to simplify dismantling. Such modifications have to be done as long before the move as possible. In as many cases as possible the modifications will eventually be included by manufacturers in production.

155. Formations in an airtransported role inevitably divide into a light element which can move by air with comparative ease and heavier elements, which if possible follow by land or sea or some parts of which may follow by air when greater airlift and landing facilities are available. The loading and weight restrictions particularly affect tracked and armoured vehicles ; unless aircraft are available into which they can be loaded without dismantling they are unsuited to an airtransported role.

Examples of Airtransported Operations

" Experience is never limited, and it is never complete ; it has an immense sensibility, a kind of huge spider web of the finest silken threads suspended . . . and catching every airborne particle in its tissue."

(Henry James)

156. The restrictions in mobility, artillery fire power and armour which are imposed by air transport have made airtransported formations particularly suitable for operations in the Far East where geographical conditions and long distances impose similar restrictions upon the enemy and prevent him from concentrating superior or armoured forces against the landing areas without considerable delay. Initial experience in the employment of airtransported forces comes, therefore, from operations in the Pacific and South East Asia. The salient points of two operations are noted here in order to illustrate the principles and problems of airtransported operations and to emphasize that the method of their employment must vary to suit the particular conditions.

157. New Guinea, Markham Valley, 1943

The intention of the fly-in of the 7th Australian Division was to secure the Nadzab area from which an offensive could be carried

out against Lae from the north-west simultaneously with an offensive from the east by the 9th Australian Division after a seaborne assault. The intention was also to prevent the enemy reinforcing Lae along the Markham Valley.

(*a*) The enemy dispositions were such that the first minor contact with the Japanese during the advance to Lae took place seven days after the landing started. The fly-in was unopposed by land and by air two minor enemy attacks did not prevent the use of floodlights for airstrip repair during darkness.

(*b*) The nature of the country and lack of roads in the Markham Valley area restricted mobility and the use of vehicles. About 200 jeeps were allotted to the division, a large percentage of which were required for transporting supplies from aircraft.

(*c*) The force was despatched from base airfields at Port Moresby. Owing to the difficulty of landing on the Nadzab airstrip the force was staged through Tsili-Tsili in the initial stages and only experienced pilots were used on the Tsili-Tsili–Nadzab flight.

(*d*) Fighter cover was provided from Tsili-Tsili.

(*e*) *Phase I* of the operation was the capture of the Nadzab landing area by American parachute troops and the clearance of an airstrip for transport aircraft with the assistance of a pioneer battalion and a company of engineers who had been moved forward overland.

Phase II was the fly-in of the 1st airtransported echelon of the division comprising approximately a brigade group plus advance Div HQ and additional engineer units. This required about 455 Dakota sorties and took about 15 days to fly-in. The role of this echelon was to develop the landing area into two airstrips and to advance on Lae. Units of this echelon entered Lae simultaneously with units of the 9th Australian Division before the fly-in of the 1st echelon was complete.

Phase III was the fly-in of the 2nd airtransported echelon which comprised further elements of the division less their heavy equipment. The complete fly-in for the whole division, as originally planned, represented about 1,900 Dakota loads of an average of 5,000 lb each and about 130 Dakotas were employed. Tactical circumstances permitted a slow build-up.

(*f*) The airstrip for the first landings of transport aircraft (loaded with equipment for airfield construction) was prepared with hand tools. The original plan was to land the heavier equipment by glider, this was not, however, carried out.

(*g*) Many changes from the original plan were made during the move to suit tactical circumstances and the absence of opposition, as for example the withholding of the A tk and AA units for Phase II and later the fly-in of infantry to an airstrip 27 miles north of Nadzab to co-operate in the advance on and capture of Kaiapit.

(*h*) The force was maintained by air, 28 aircraft per day being required for Phase II and 54 aircraft per day planned for Phase III though subsequently reduced.

(*i*) The airstrips were used so continuously by day that much of their repair and development had to be carried out by night.

(*j*) The preparation of airstrips for fighter aircraft was started very soon after the initial landing.

(*k*) The requirements for labour in the Nadzab area were considerable ; some manpower was available locally and some moved by land. Had this not been so the increased requirement in airlift in the early stages would have been heavy. Besides the construction of airstrips for transport and fighter aircraft labour was required for the unloading and moving of army and air force supplies to the maintenance area, the construction of huts and shelters in the maintenance area, the clearing of undergrowth, and the preparation and maintenance of aircraft dispersal areas, roads, tracks and bridges.

158. Burma 1944

The intention of the fly-in of two brigades of the 3rd Indian Division was to secure territory in Japanese occupied Burma and to do it by choosing an area where the enemy were not in force and an area inaccessible to enemy counter-attack for long enough to allow airfields to be established and a stronghold formed from which penetration groups could disrupt the enemy's communications and thereby reduce the enemy's ability to resist the advance of Allied land forces.

(*a*) The area chosen North and East of Katha was over 100 miles inside Japanese held territory and a radius of air action from the despatching airfields of an average of 260 miles.

(*b*) The enemy dispositions were such that the landing took place without ground opposition. The enemy reaction in the air was delayed for more than a week after the first landing by which time the fly-in was completed. This delay was the result of the bombing attacks carried out in advance and in support of the operation, and of the fly-in being carried out by night.

(*c*) Essential and effective offensive and reconnaissance support was provided by the American No. 1 Air Commando Force.

(*d*) No parachute troops were employed on the landing zones

(*e*) Originally, airtransported troops with airfield construction equipment in gliders were to land simultaneously on two landing zones on which airstrips were to be prepared. Just before take off air reconnaissance revealed recent obstructions on one of the landing zones. Only one landing zone was therefore used for the first flight. An alternative landing zone was used and gliders flown in on the following night. The fact that this was possible and that the changed circumstances did not delay the operation shows the flexibility of air operations.

(*f*) The first prepared airstrip of about 1,600 yards was ready to receive Dakota aircraft by the night following the landing.

(*g*) The fly-in was carried out at night in moonlight without fighter escort.

(*h*) The airtransported units were equipped with animal transport.

(*i*) Direct communications between airstrip and the despatching control proved essential for arranging the speed of despatching to suit the speed of turn round at the airstrip, and the ability of the airstrip to receive aircraft.

(*j*) Over some periods one aircraft was landing and one taking off every three minutes.

(*k*) By about D+6 fighter aircraft were able to operate from one of the airstrips.

Preparation of Load Manifests and Proformæ

159. The detailed preparation necessary makes it essential that the longest warning possible be given of an impending move by air. Chapter 1 dealt in general with the paper work required. In principle the requirements are similar for airborne and airtransported units. But since airtransported forces may operate with more elaborate equipment and equipment requiring dismantling, the preparation of the load manifests may be correspondingly more complex. And as the army as a whole is less familiar with the problems of transport support than airborne formations, reference is here made to load manifests in greater detail.

160. The Aircraft Load Table (*see* Appendix 10) shows the unit split into aircraft loads. The load manifest is the detail for each aircraft.

161. The Load Manifest. Form B—Aircraft (*see* Appendix 13) is in effect a statement of the complete load that the army has asked and the air force has agreed shall be carried in one aircraft. It is also a statement of how it shall be loaded in order to maintain safety of flight. And it is subsequently a complete documentary record of what has been flown.

162. The final approval of the load and its loading is the responsibility of the captain of the aircraft, but since it is the army's responsibility to prepare load manifests it is the responsibility of the army to ensure that the captain of the aircraft has no occasion to raise objections at the last moment. The technical conditions for loading which the air force require to be satisfied are :—

(*a*) That the load is within the maximum weight laid down by the air force for the particular operation.

(*b*) That the load is so balanced within the aircraft that the centre of gravity of the aircraft when in flight will be within the safety limits.

(*c*) That the load is correctly distributed to avoid excessive weight concentrations on any part of the floor of the fuselage.

(*d*) That the load is adequately lashed within the fuselage to avoid any movement during take off, flight or landing that might endanger the aircraft or personnel.

163. A correctly prepared load manifest covers the first three conditions. Guidance for lashing is recorded on lashing diagrams which are prepared jointly by the air force and the army. Precise pre-planning instructions for the correct loading and lashing could not be prepared to cover all the possible variations of loads that may need to be flown. For this reason army personnel require to know the principles of aircraft loading and lashing so that they can adjust the basic data to suit the particular loads required for the particular operation and are capable of preparing manifests for loads which may be required at short notice. This information is contained in the supplements to chapter 3 of this pamphlet.

164. During the preparation steps must be taken to ensure that the load manifests are correct and conform to air force requirements. Particular care must be taken to arrange for any doubtful loads and their method of loading to be passed by the air force as early as possible in order to prevent any delay on the airfield during the move.

165 The specimen load manifest proforma at Appendix 13 indicates the data required to be entered. The following are additional points which should be considered during the preparation of load manifests and aircraft load tables. Their application in minor respects may vary with each operation and with the degree of experience of the force in airtransport.

(*a*) Key personnel and equipment, particularly signals, must be dispersed between two or more aircraft.

(*b*) Each aircraft load should be compiled so that it is as independent as possible after arrival. Tactical loading should aim at each aircraft load, and each block of aircraft loads moving at the same time, being capable of taking action as tactical sub-units and units. Where an equipment requires to be dismantled and loaded into more than one aircraft its tactical role is unavoidably dependent on the safe arrival of all its aircraft.

(*c*) For economy in aircraft it is essential for each load to reach the maximum payload permissible. It is usually convenient to leave a small margin of payload to provide for essential additions. Any margin still available before take-off can then be filled with additional supplies or ammunition. Such additions must be added to the load manifest and correctly loaded.

(*d*) The weight of each item must be recorded, and the position of the items within the fuselage recorded on the diagram on the back of the manifest. The knowledge of the weight of each item is required in order to assess the total weight, but also in the case of dismantled equipment the knowledge of the weight of each component makes it possible to know immediately how to keep the centre of gravity of the loaded aircraft correct if last-minute adjustments have to be made.

(*e*) A responsible army representative must be detailed to be in charge of the army load (normally the senior officer or NCO in the aircraft). In all matters affecting the aircraft he is under the direction of the captain of the aircraft.

(*f*) The names and appointments of all personnel travelling in the aircraft must be entered on the load manifest, and it is normally the only source of documentation for movement and casualty records.

(*g*) An average weight is normally taken for each man, complete with his personal equipment, as it will rarely be possible to weigh each man individually. This figure will vary according to the type of operation. About 210 lb per man is normal.

(*h*) Unit commanders should be given as much latitude as possible in distributing their own personnel between aircraft.

(*i*) A note must be made for the force priority list of the least essential load manifests so that if it is found necessary to leave some loads behind it can be known without delay which can best be spared in the forward area.

(*j*) Particular care must be taken in entering on the load manifest and aircraft load table the amount of lashings required for securing the load and in indicating any requirements in loading aids which do not form part of the aircraft equipment. If, for example, the equipment requires heavy ramps for loading, it indicates to those responsible not only what equipment is required at the despatching airfield but also what requires to be flown forward in in advance for unloading.

(*k*) The captain of the aircraft must enter the names of the crew on the load manifest and signs his acceptance of the load. The army representative in charge of the load also signs.

For those unfamiliar with movement by air the amount of detail involved appears confusing. The procedure is only common sense, but common sense often appears confusing when described in writing.

166. The distribution of the proformæ must be laid down for the particular operation and cannot be usefully laid down here.

Emplaning and Deplaning

167. The basic procedure for emplaning is at para 65 of chapter 1. Certain considerations are, however, particularly relevant to air-transported units. The main purpose must be speed in emplaning and deplaning and take-off so that the maximum rate of build-up and economy in aircraft can be achieved. Varying with each operation the following are some of the points requiring consideration. They do not cover equipment loading and unloading drills which are in the supplements to this chapter.

(*a*) Routes to and from aircraft or emplaning bays for the use of army personnel and equipment must be clearly indicated. This will normally be done by army base staff under the direction of the air force.

(*b*) Track discipline on airfields and airstrips must be strict.

(*c*) The army are normally responsible for emplaning and the loading of equipment for a tactical move by air under the direction of the air force, the captain of the aircraft having the final decision on matters affecting his aircraft.

(*d*) The ideal is for the personnel of each aircraft to be capable of loading and unloading equipment for that aircraft, alternatively for units to provide from within their resources parties to assist units loading. In the latter case similar parties will be required to be flown in the first sorties of the unit to assist the unloading. In many cases this system will not be possible for tactical reasons or because the dismantling and loading of the equipment such as 3-ton lorries is beyond the ability of the unit. Loading parties, strong in REME personnel may have to be provided and trained to handle all types of equipment and these may be provided from the resources of the air-transported force or from outside.

(*e*) Aircrews must not be expected to assist in loading or unloading.

(*f*) Particular care must be taken in the early stages to ensure that any necessary lashing gear and loading aids such as heavy ramps (in cases where the aircraft's own ramp is inadequate), shear legs, gantries, transport, etc., are available on the right airfield at the right time and that similar essential equipment is flown forward for unloading.

(*g*) Although the provisions of chain lashing gear, and load spreaders is an air force responsibility, the responsibilities for issuing the gear to aircraft or to units will be laid down for a particular operation. In some theatres and in some cases of less heavy equipment rope lashings are used instead of chain lashings in spite of their disadvantages of stretching and reduced strength. Care must be taken by the captain of the aircraft and by the troops that after deplaning all lashing gear remains in the aircraft.

(*h*) In the case of the Dakota the light ramp which is part of the aircraft equipment is normally adequate for the loading of jeeps, 10 cwt trailers, 3·7-in hows, 75-mm hows and in an emergency 6-pr A tk guns and the dismantled 25-pr gun. Heavier equipment and animals require larger ramps.

(*i*) Except in very special cases and with specific agreement with the air force water trailers must be loaded empty.

(*j*) When large quantities of supplies and stores and equipment requiring breakdown are being flown the requirement in jeeps and 3-ton category lorries is considerable. If it is found practicable to follow a Loading Bay system, economy in transport can be made ; although this system decreases the turn-round time of ground transport it increases the organization required for ground control of aircraft.

(*k*) Precautions must be taken against items additional to those shown on the load manifest being put by the army into the aircraft at the last moment.

(*l*) Those controlling the emplaning must be in constant touch with the progress at the deplaning end. Direct communications are essential.

(*m*) In the case of two or more complementary aircraft loads such as the two Dakota loads required for a 3-ton lorry care must be taken when planning the move to ensure that these complementary loads arrive together and are parked together for unloading whenever possible.

Unit Emplaning and Deplaning Officers

" So I took the chief of your tribes, wise men and known and made them heads over you, captains over thousands, captains over hundreds, captains over fifties and captains over tens . . ."

(*Deuteronomy I.* 15)

168. Officers will normally be nominated by commanders of airtransported units and be responsible for the details peculiar to movements by air. They will require NCO reliefs, orderlies and some form of transport preferably a jeep, depending on circumstances. Their duties include :—

(*a*) Training duties within the unit and the duties of instructing on movement procedure, loading and lashing.

(*b*) To have detailed knowledge of the technicalities peculiar to air movement.

(*c*) To ensure that unit load manifests and proforma are correctly completed.

(*d*) To supervise the unit emplaning and deplaning with special reference to speed and quick clearance of airfields.

(*e*) To liaise with the Air Transport Liaison Officer on all matters concerning the air force or with air force representatives in the absence of the ATLO.

(*f*) To ensure that arrangements have been made for loading and lashing equipment or any loading assistance required.

Airtransport Liaison Officer

" . . . Captains . . . clothed most gorgeously . . . all of them desirable young men."

(*Ezekiel XXIII.* 12)

169. One army Air Transport Liaison Officer is normally and permanently attached to each transport group and squadron RAF or to each airfield from which transport aircraft operate. They are trained in all details of airtransport supply and they will :—

(*a*) I iaise between the army and air units concerned.

(*b*) Assist as required in the execution of the move.

(*c*) Assist in briefing and interrogation.

Notes on the Order of Flight

170. The tactical order of flight is stated in the air movement table (Form A) and the aircraft load table (Form AC). Particularly in an airtransported operation the order of flight presents the problem of reconciling the conflicting claims of airlift priorities. The following are some of the requirements for airlift in the early stages of a fly-in, many of which occur simultaneously :—

(*a*) Fighting troops and HQs to carry out a ground operation and to secure the landing area against ground attack.

(*b*) Engineers and mechanical equipment to prepare and develop airstrips so that the rate of build-up can be increased and so that offensive support aircraft can operate from the forward area.

(*c*) Air force units for flying control, ground organization and forward servicing of aircraft including fighter aircraft.

(*d*) Signal units for essential communications.

(*e*) Units with vehicles and unloading aids for the unloading and the transporting of supplies and equipment.

(*f*) Labour equipment for the construction of the maintenance area which may include roads, huts, shelters, etc.

(*g*) Anti-aircraft units for defence against air attacks.

(*h*) Maintenance of the force.

(*i*) Medical units to handle air evacuation.

The impossibility of fulfilling the simultaneous requirements simultaneously, and the ability to alter the order of arrival at short notice make it vital that those controlling the move should be kept informed with the very latest information from the forward area so that adjustments can be made without delay and accurate hour to hour requirements can be assessed.

APPENDIX 1

Definitions for Air Transport (Provisional)

Airborne Forces.—This term covers parachute troops and airlanding troops and personnel, units and equipment which form part of airborne divisions and for which an assault by air is a primary role.

Aircraft dispersal point.—The point, generally a hardstanding, where aircraft may be parked and where it is normally serviced and loaded. It may be connected to a taxi track by a dispersal track.

Aircraft marshalling area.—An area at each end of a runway or strip to enable aircraft to form up before take off.

Airlanded.—Personnel and/or freight landed in aircraft or gliders, as opposed to being dropped.

Airlanding troops.—Units of an airborne division which land either in aircraft or gliders but are trained to travel primarily in gliders.

Airlift.—Total weight of stores or personnel that is, or can be, carried by air, or that is offered for carriage by air. Hence airlift :—1, Created and available ; 2, Required ; 3, Offered ; 4, Used ; 5, Unused.

Airportable.—Equipment suitable for carriage by air.

Air Strip.—An area specially cleared and levelled where an aircraft can land and take off.

Airtransit dump.—A dump formed near a supply loading airfield at which stores are held while awaiting packing into panniers, containers or aircraft loads or where pre-packed stores may be held for a definite operation.

Air Transport liaison officer (ATLO).—An army staff officer attached to each Group HQ and RAF Transport Squadron.

Airtransported.—Army, Navy or Air Force units (other than airborne), with or without appropriate airportable equipment, carried tactically by air.

Assembly area.—The area in which forces moving by air rally after deplaning. This should be outside the perimeter of the airfield or landing zone.

Base.—

(*a*) *Main base* is the term used when a force is maintained from a base outside the actual theatre of operations, *e.g.*, UK for Western Europe or Mideast for Italy.

(*b*) *Base or advanced base.*—A base in the actual theatre of operations will be called :—

(i) a " base " when the force is wholly maintained from within the theatre of operations ;

(ii) " Advanced base " when there is a main base.

(*c*) *Forward base* is the term used when it is necessary to establish a second base in a theatre of operations, because the distance between the base or advanced base and the forward troops becomes so great that deliveries cannot be made punctually to forward formations.

Capacity.—

(i) *Aircraft.*—The space available in the fuselage of an aircraft for the stowage of loads within the prescribed weight limitations.

(ii) *Airfield.*—The number of aircraft that an airfield can accommodate for refuelling and servicing, and for handling of freight.

(iii) *Air routes.*—The number of aircraft that can fly along a predetermined route, using the same staging posts without overloading the airfields.

Centre of gravity (CG).—The point of balance within the fuselage which, for safe conditions of flight, has to be kept within specified limits from a datum point by correct disposition of fuel and payload.

Container.—A specially constructed holder for equipment which is to be dropped by parachute from an aircraft.

Datum point.—An arbitrary point in an aircraft from which calculations of moment are made ; it is chosen and laid down by the makers of the aircraft.

Dropping.—

(i) *Free.*—The dropping of equipment or supplies from aircraft without the use of parachutes.

(ii) *Parachuted.*—The dropping of equipment or supplies from aircraft by parachute.

Dropping Zone (DZ).—An area on to which paratroops are dropped and where stores are delivered to a formation by dropping either free or using parachutes. The term supply dropping zone is used when a distinction has to be made between zones for dropping supplies and those for dropping parachute troops.

Force air transport officer.—An officer nominated by the formation or force to be transported as its representative on all matters pertaining to the preparation for a move by air, emplaning and deplaning. If more than one airfield is used, there must be one officer per airfield and one co-ordinating officer.

Glider pick-up.—The towing of a glider off the ground by an aircraft in flight.

Landing Zone (LZ).—An area chosen for landing gliders, but not necessarily suitable for subsequent take-off.

Lashings.—Ropes, hooks, strainers, tackles, etc., required for securing freight to the fuselage of an aircraft to prevent the shifting of loads during flight.

Load adjuster.— A type of slide rule provided with certain aircraft by which the location of the centre of gravity of an aircraft can be ascertained according to the freight loaded. The correct load stations for freight can also be ascertained in order to get the centre of gravity of the aircraft within the safety limits.

Load manifest.—The form prepared for each individual aircraft. It records the details of the load.

Load spreaders.—Wooden blocks required in certain aircraft to distribute the weight of a heavy concentrated load over a larger area of the aircraft floor.

Load stations.—Areas marked inside the fuselage of an aircraft so that the correct positioning of each item of load can be indicated in order to keep the centre of gravity within the safety limits.

Loading.—

Area.—An area at an airfield within which there are a number of loading points, to and from which aircraft and MT will be fed for the purpose of loading and unloading and clearing freight and personnel.

Point.—The point on an airfield at which an aircraft is loaded with stores.

Maintenance by air.—The term is used to cover the carriage by air of all commodities required by a formation to enable it to fight. This may include the carriage forward of reinforcements and the evacuation of casualties, material and selected prisoners of war.

Moment.—The product of the weight of an item and its distance from the datum point of an aircraft.

Movement control.—Organization set up to control ground movement of personnel and freight.

Packing area.—The area comprising the Air Transit Dump and the Packing Points. This area must be outside the airfield perimeter.

Packing point.—The point at which stores are sorted into aircraft loads, or are packed into panniers or containers. When CLE containers are being used the parachute will be attached at the packing point.

Pannier airborne supply.—A basket like container for dropping supplies from aircraft.

Paratroops.—Troops specially trained to jump with parachutes from aircraft and immediately go into action.

Passenger and freight section.—The section of an air force station or staging post trained and equipped to handle all traffic transported by air.

Payload.—The maximum load (excluding the crew, equipment and fuel) which can be carried for a given distance.

Pick-up.—A method whereby gliders, mail, freight or men may be picked up by an aircraft in flight.

Radius of action.—The distance from the point of take-off to the point where an aircraft delivers its load, having sufficient fuel left to return to base without refuelling.

Range.—The distance from the point where an aircraft takes off to the point at which it must land in order to refuel before further flight is possible.

Roller conveyor.—A device which can be fitted to a transport aircraft to facilitate the movement of stores within the aircraft and to accelerate the rate of discharge.

Runway.—A metalled strip usually into the prevailing wind on which aircraft can land or take off.

Sortie.—An operational flight completed by one aircraft.

Staging post.—The nomenclature of staging posts is now under active consideration, and, subject to final approval, the following types will be standardized :—

(i) *Basic definition.*—A staging post is an RAF unit equipped to receive and despatch transport and delivery aircraft at either end of, or along an air route, and handle the resultant traffic. (Both passengers and freight).

(ii) *Standard staging post.*—This is a static staging post on strategic routes. Capable of refuelling and daily servicing and Grade I inspections.

(iii) *Intermediate staging post.*—Provides facilities as for standard staging posts, and in addition can undertake Grade II inspections, engine changes and minor repairs.

(iv) *Major staging post.*—Provides facilities as for standard and intermediate and can also undertake Grade III inspections.

Static line.—Parachute rip-cord when of the type attached to the aircraft.

Strategic aircraft loading.—A method of loading aircraft when it is not necessary for units or sub-units to operate tactically on arrival.

Supply by air.—The term used to cover carriage by air of stores from a main base to an advanced or forward base, or from an advanced base to a forward base.

Tactical aircraft loading.—A method of loading aircraft when it is necessary for units or sub-units to operate tactically on arrival.

Taxi.—Movement of an aircraft on the ground under its own power.

Taxi track.—A track connecting the ends of the runways to dispersal points.

Transit camp.—The area in which units may be marshalled into final aircraft load parties and in which they wait to be called forward to emplaning points on the airfield.

Transport aircraft.—An aircraft which is designed or adapted for the carriage of personnel, equipment or supplies, irrespective of whether they are unloaded by landing or dropping.

Transport support.—An inclusive description of all air transport missions into or within a theatre of operations undertaken in support of naval, army or air forces.

Unit emplaning officer.—An officer (of an airtransported unit) responsible for the preparation of tables and emplaning and particularly concerned with training.

Unit deplaning officer.—As above, but responsible for deplaning.

Weight, aircraft.—

All-up or gross.—The maximum flying weight of an aircraft permissible under the regulations obtaining.

Basic.—The weight of an aircraft operationally ready to fly with crew and all equipment necessary, but without fuel or payload.

Landing.—The weight of an aircraft at which it is permissible to land under the regulations obtaining.

Tare.—The weight of an aircraft with all removable fittings removed, and without crew, fuel or oil.

APPENDIX 2

Airlift for a Specimen Fighting Echelon of an Airborne Division

(Figures are a guide only)

Unit	Number in division	Dakota (Parachute)	Horsa Combination (each)	Hamilcar Combination (each)	Remarks
Para Bn (incl Sigs and Sec Fd Amb	6	35	2	—	Some bns may use more gliders.
Para Bde HQ (incl Sigs, FOU 1, REME, etc.	2	10	4	—	—
Para Fd Amb (less 3 secs with bns)	2	2	2	—	—
Para Sqn RE	2	9	?	—	Some gliders normally required.
Lt Comp Coy RASC	1	10	—	—	Para Pl dets only
Div HQ (incl Sigs, HQ RA, HQ RE, Def Pl)	1	—	27	—	—
Airldg Bde HQ (incl Sigs, FOU Def Pl, etc.)	1	—	15	—	—
Airldg Bn	3	—	63	—	—
Armd Recce Regt or (Recce Sqn)	1 (1)	— —	36 (20)	29 —	— —
Airldg Lt Regt RA	1	—	87	—	—
RHQ Airldg A tk Regt RA	1	—	3	—	
Airldg A tk Bty	3	—	27 (38)	— (16)	6-pr basis (17-pr basis)
Fd Coy	1	—	17	—	—
Air Landing Fd Amb	1	—	8	—	—
Administrative RASC REME, etc.	1	—	40	—	—
Approximate total for the division	—	262 [2]	527	29	With 6-pr A tk guns

NOTE 1.—The new establishment of a FOU (A), including mortar det has not been included in this table.

NOTE 2.—If Stirling aircraft are used for parachute troops, only 216 parachute aircraft are required.

APPENDIX 3

Approximate Dakota (C47) airlift for units of a sample light scale Division

EQUIPPED ON A JEEP BASIS FOR MOVEMENT BY AIR IN AN AIRTRANSPORTED RÔLE

Serial number	Unit	Personnel (all ranks)	Jeeps	Trailers GS	Technical trailers	Other vehicles	Weapons (excl personnel weapons LMGs and PIATs)	Approx wt (lb) of stores in excess of those in jeeps and trailers	No of aircraft loads	No of units in division	Total aircraft loads for division	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Div HQ	178	17	15	2 (water)				21	1	21	*General Note.*—The estimated airlift is based on a *C47* pre-planning pay-load of 5,500 lb. 210 lb has been allowed per man fully equipped though this may be increased up to perhaps 250 lb according to the particular operation. All jeeps and trailers are estimated as being fully loaded. A minimum number of three ton lorries have been included as they are extravagant in airlift and unloading. It would be exceptional for a complete division to move by air. The following are only examples of how each unit might be lifted. This does not represent a "Hard Scale."
2	Div HQ Def and Emp Pl	63	3	3			1 mortar 2"		5	1	5	
3	Div FS Sec	13	4	4					4	1	4	
4	Inf Bde HQ	81	10	10					12	3	36	
5	Inf Bde HQ Def Pl	36	1	1			1 mortar 2"		2	3	6	
6	Inf Bde HQ LAD Type J	12	3	3				1100	3	3	9	
7	Inf Bn	884	23	17	6 (water)		(16 mortars 2") (6 mortars 3")		53	12	636	
8	MG Bn	735	94	89	5 (water)		16 mortars 4·2"		105	1	105	
9	MG Bn LAD	12	3	3				1100	3	1	3	
10	HQ Div RA	49	10	7					9	1	9	
	Survey Det	57	9	7					9	1	9	

APPENDIX 3 (*continued*)

Serial number	Unit	Personnel (all ranks)	Jeeps	Trailers GS	Technical trailers	Other vehicles	Weapons (excl personnel weapons LMGs and PIATs)	Approx wt (lb) of stores in excess of those in jeeps and trailers	No of aircraft loads	No. of units in division	Total aircraft loads for division	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
11	Fd Regt RHQ	68	8	5		1 D4 tractor			13			12 of the jeeps in a tp are tractors, lt arty (car, 5 cwt, 4×4), 1st line amn 40 rpg carried in jeeps and trailers.
	Bty HQ	96	6	4		1 D4 tractor			12			
	Tp	89	16	8			4 lt 25 prs		19			
	Total Fd Regt	890	56	61		4 D4 tractors	24 lt 25 prs		163	2	326	
	Lt Regt RHQ	65	8	5					9			12 of the jeeps in a bty are as above. 1st line amn 56 rpg carried in jeeps and trailers.
	Bty	150	21	15		1 D4 tractor	4 hows 3·7"		32			
	Total Regt	665	92	65		4 D4 tractors	16 hows 3·7"		137	1	137	
12	RA Regt LAD type J	12	3	3				1100	3	3	9	
13	Lt AA Bty	368	41	45	5 (water)	36 trucks 15 cwt 4×4	18 guns 40 mm 8 guns 20 mm		104	1	104	40 mm are 2 wh Cdn model. Trucks with winch.
14	LAA Bty Wksp	7	3	3					3	1	3	
15	Div HQ RE	31	10	10					10	1	10	
16	RE LAD, Type J	12	3	3				1100	3	1	3	
17	Fd Coy RE	256	49	39	10	7 Lorries 3-ton 4×4 tipping with winch	4 guns 20 mm	13440	68	3	204	
18	Fd Pk Coy RR (Basic Element)	116	35	25	10	7 ditto	ditto	33600 † 252 lb 560 lb	68	1	68	Other major items of equipment 3 D4 tractors with angledozer (12). 4 lighting sets 4 KW 5 Petter engines 1 paint spray plant 1 machine grinding dry 12" 110 volts crated. 1 machine saw hack 6"×6", 110 volts crated. † Excl D4 tractors with angledozers.
18a	Br Pl RE	41	18	13	5	7 ditto	2 gun 20 mm	8400	49	1	49	Other major items of equipment 80 ft D/S Bailey br
19	Div Sigs	761	117	160	13				200	1	200	
20	Div Sigs LAD	12	3	3				1100	3	1	3	
21	Recce Regt	41	60	40	4 (water)	1 trailer 4 wheel medical	9 mortars 2"		72	1	72	
22	HQ CRASC	32	5	5					5	1	5	
23	Bde and Div Coys RASC	202	57	41	13				56	4	224	Each containing one HQ MT Coy, lt tpt pl, lt comp pl, lt wksp pl.
24	Air Comp Coy	255	48	42	3	2 lorries 3-ton			54	1	54	
25	Native Porter Coy	625	1	1					25	1	25	
26	[illegible]	237	38	35	3 (water)				40	3	120	
27	[illegible]	28	8	8					8	1	8	
28	Inf Div Ord Fd Pk	138	106	52	54				106	1	106	
29	HQ CREME	17	5	5					5	1	5	
30	Inf Bde Wksp	190	59	47	10/2(water)			5500	60	3	180	
31	Div Pro Coy	115	25	25					25	1	25	
32	Div Postal Unit	25	12	12					12	1	12	
	APPROXIMATE TOTAL										2795	

APPENDIX 3 *(continued)*

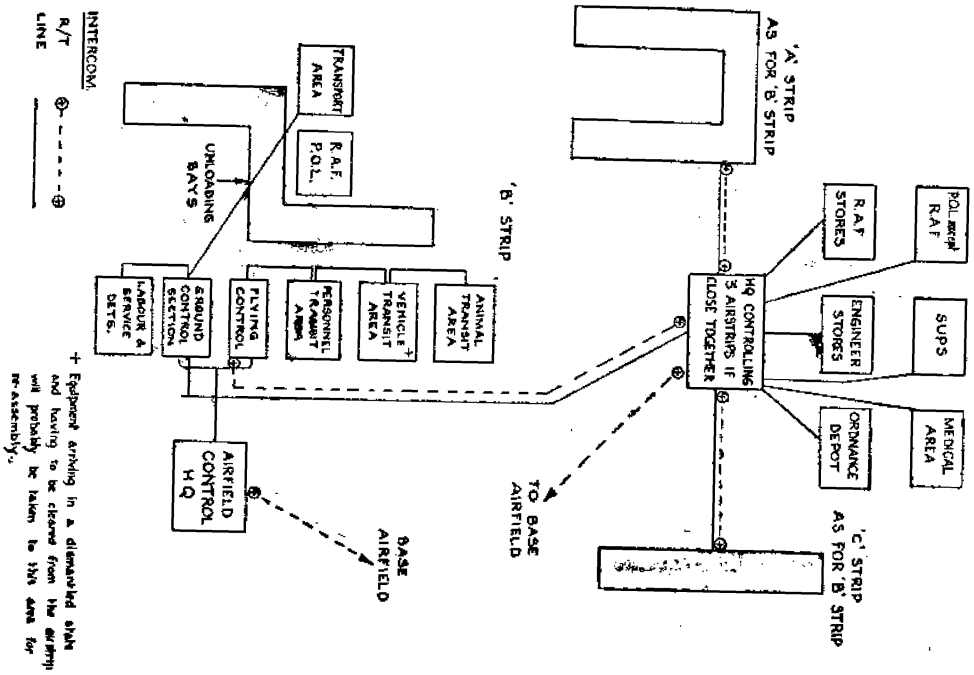
SAMPLE ADDITIONAL UNITS WHICH MIGHT BE REQUIRED BY AN AIRTRANSPORTED FORCE

Serial number	Unit	Personnel (all ranks)	Jeeps	Trailers GS	Technical trailers	Other vehicles	Weapons (excl personnel weapons LMGs and PIATs)	Approx wt (lb) of stores in excess of those in jeeps and trailers	No of aircraft loads	No. of units in division	Total aircraft loads for division	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Light Corps HQ Signals	135	54	28	1	2×3 ton, 4×4 GS			46	1	46	
	A tk Bty HQ	39	4	2					4	1	4	6 of the tp jeeps are tractors. Lt arty 4×4, 5-cwt 96 rpg first line amn.
	Tp	51	3	2		6 trucks 15 cwt 4×4	4 A tk guns, 6 pr 2 mortars 2"		13	3	39	Trucks with winch.
	Total	192	13	8		18 trucks 15 cwt 4×4	12 A tk guns, 6 pr 6 mortars 2"		43	1	43	ditto
	Mob Dental Unit	4	1	1					1	2	2	
	FDS	95	16	14	2 (water)				17	2	34	
	Malaria Control Unit	250	60	60					60	1	60	
	FTU	5	2	2				560	2	2	4	Other major items of equipment Refrigerator, Kerosene, 4 cu ft
	FSU	11	3	3					3	2	6	
	Stretcher Bearer Coy RAMC	232	4	4					13	1	13	

General Note.—The estimated airlift is based on a C47 pre-planning pay-load of 5,500 lb. 210 lb has been allowed per man fully equipped though this may be increased up to perhaps 250 lb according to the particular operation. All jeeps and trailers are estimated as being fully loaded. A minimum number of three ton lorries have been included as they are extravagant in airlift and unloading. It would be exceptional for a complete division to move by air. The following are only examples of how each unit might be lifted. This does not represent a "Hard Scale."

APPENDIX 4

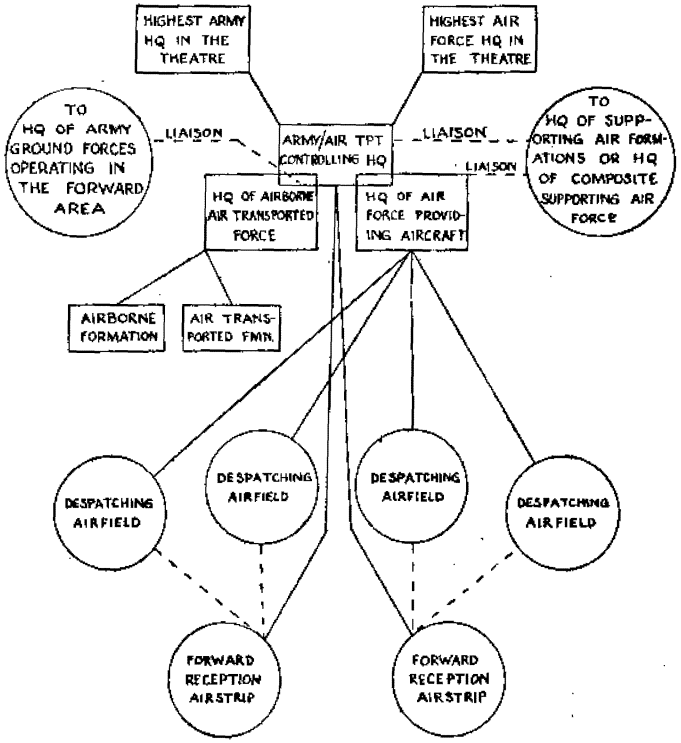
Specimen Layout for Forward Airfield or Airstrip Area (on Three Airstrips)



+ Equipment arriving in a dismantled state and having to be cleared from the airstrip will probably be taken to this area for re-assembly.

APPENDIX 5

Outline of Control of a Tactical Move by Air (in the Early Stages)



APPENDIX 6

Schedule of Planning

DIRECTIVE FROM HIGHEST ARMY/AIR H.Q. IN THE THEATRE → CONFERENCE H.Q. CONTROLLING THE OPERATION WITH APPROPRIATE ARMY GROUP ON OUTLINE PLAN → ISSUE AND DISTRIBUTION OF A PLANNING STUDY BY H.Q. CONTROLLING THE OPERATION

A.1

INITIAL PLANNING CONFERENCE by H.Q. controlling operation with army and air Commanders involved.

(*a*) General plan of whole operation.
(*b*) Mission of the army units to include general destination, date and approximate hour of landing.
(*c*) Command and composition of army units.
(*d*) Command of and composition and equipment of Air Force units to provide lift.
(*e*) Operational control.
(*f*) Outline plan for supply and maintenance.
(*g*) Air support plan for convoy and for ground operations.
(*h*) Airfields available for operation and route limitations.
(*i*) Plan for co-ordination with other forces.
(*j*) Cover plan.
(*k*) Security plan.
(*l*) Planning and responsibility for rehearsal.
(*m*) Intelligence and sources of intelligence including photographs, maps, models and priorities for obtaining them.
(*n*) Signals and communications arrangements.
(*o*) Special equipment and administration arrangements including Air/Sea rescue equipment.
(*p*) Navigational aids.
(*q*) Arrangements for altering or cancelling operation.
(*r*) Allotment, command and composition of communications aircraft squadrons.

B.1

INITIAL STUDIES— ARMY COMMANDER

(*a*) Mission and plan of action of unit upon landing.
(*b*) Strength and composition of unit.
(*c*) Equipment and weapons to be taken within weight limitations.
(*d*) Composition and equipment of all subordinate units and their commitment priority.
(*e*) Lift requirements of subordinate units.
(*f*) Training and rehearsal requirements.
(*g*) Supply and maintenance requirements.
(*h*) Amphibious lift requirements.
(*j*) Intelligence requirements, reconnaissance.
(*k*) Movements and bivouac requirements.

B.2

INITIAL STUDIES— AIR (TRANSPORT SUPPORT) COMMANDER

(*a*) Availability and status of aircraft, equipment and crews.
(*b*) Condition and equipment of available airfields.
(*c*) Intelligence information and further intelligence requirements reconnaissance.
(*d*) Meteorological astronomical information.
(*e*) Restrictions imposed by plans for co-ordinating with other Services.
(*f*) Tentative flight plans.
(*g*) Air support plan and requirements.
(*h*) Arrangements at departure airfields to include traffic control and service facilities.
(*j*) Provision of pathfinder aircraft to include system for marking landing, and dropping grounds.

C.1

CONFERENCE BETWEEN THE ARMY AND AIR (TRANSPORT SUPPORT) COMMANDER

(*a*) Number and types of available aircraft.
(*b*) Load capacity of each type of aircraft.
(*c*) Definite selection of LZs and DZs.
(*d*) Pathfinder methods and requirements.
(*e*) Size and shape of aerial formations.
(*f*) Order of arrival at DZs and LZs.
(*g*) Air Movement Tables.
(*h*) Allotment of Aircraft and airfields to each army unit.
(*j*) Communications arrangements in departure areas.
(*k*) Maintenance plans.
(*l*) Plans for movements to and billeting at airfields.
(*m*) Plans for loading to include parking diagrams, timing, and motor transport traffic control.
(*n*) Disposition of glider pilots, parachutes and containers after landing in combat zone.
(*o*) Training and rehearsals.
(*p*) Briefing arrangements.
(*q*) Reconnaissance arrangements.
(*r*) Signals arrangements.
(*s*) Security arrangements.

D.1

PLANS AND ORDERS OF ARMY COMMANDER.

(*a*) Training progress.
(*b*) Rehearsal plans.
(*c*) Initiating of steps necessary to obtain special equipment required.
(*d*) Movement to departure bases and occupation of base bivouacs.
(*e*) Loading plans.
(*f*) Air Movement Table.
(*g*) Field (operation) orders for operation to be conducted immediately upon landing.
(*h*) Maintenance plan.
(*j*) Final briefing, issue countersign, exact destination made known to all ranks.

D.2

PLANS AND ORDERS OF AIR (TRANSPORT SUPPORT) COMMANDER

(*a*) Training programme.
(*b*) Rehearsal programme.
(*c*) Procurement of rehearsal facilities.
(*d*) Procurement of additional service facilities.
(*e*) Loading plans.
(*f*) Air Movement Table.
(*g*) Intelligence.
(*h*) Flight plan.
(*j*) Preliminary briefing of key personnel.
(*k*) Traffic control, air and ground.
(*l*) Plan for servicing and replacement.
(*m*) Field (Operation) Orders.
(*n*) Security arrangements.
(*o*) Final briefing.
(*p*) Forced landing and air/sea rescue procedure.
(*q*) Escape procedure.

Air Movement Table

APPENDIX 7

FORM A

Airfield/LZ/DZ.....

Airfield/LZ/DZ.....

Airfield/LZ/DZ.....

Airfield/LZ/DZ.....

Exercise/Operation.....

Date .....

Headquarters.....

Ref. Map.....

Serial	Army Block No.	Army unit (include designation of Serial CO)	Air Force Unit	Chalk Nos. of A/c or gliders	Nos. of A/c or gliders	Take-off. air-field	Air-field or DZ or LZ	A/c and gliders avail-able for loading	Equip-ment loading com-pleted by	Chutes issued by	A/c and gliders ready for em-planing	Em-planing com-pleted	Time of take off	Time of drop or land-ing	Remarks

NOTE.—This specimen proforma includes all the headings required for the movement of parachute troops, troops in gliders and troops in powered aircraft.

Parachute Load Table

APPENDIX 8

Exercise/Operation.....

FORM A A (Parachute)

Sheet No.....

(*a*) Date..... (*b*) Army Formation..... (*c*) Army Unit.....

(*d*) Air Formation..... (*e*) Air Corps Unit..... (*f*) Block Number..... (*g*) No. of A/C in Block.....

(*h*) Airfield..... (*i*) D.Z..... (*j*) Direction of Run In.....

(*k*) Troops Arrive.....hrs. (*l*) Container Loading Commences.....hrs. (*m*) Parachutes Issued by.....hrs. (*n*) Troops Emplaned by.....hrs.

1	2	3	4										5	6	7
			Containers												
A/C No.	Stick Commander	No. of Troops	(*a*) S.A.	(*b*) W.T. 18	(*b*) W.T. 22	(*c*) Pigeon	(*d*) Trol-ley	(*e*) Bi-cycle	(*f*) Pan-nier	(*g*) Spare Arms	(*h*)	(*i*) Chute Light/ Colour	Time of Take-off	Time of Drop	Remarks (including appointment of Senior Officer in load)

[redacted] ARMY COMMANDER.

Glider Load Table

APPENDIX 9

FORM A B (Glider) Sheet No. .....

Date..... Army Unit..... Air Unit..... Exercise/Operation.....

Block No..... No. of Gliders in Block..... Airfield..... Release Height..... L.Z. No. 1.....

L.Z. No. 2.....

L.Z. No. 3.....

Glider Loading Commences.....Loading Completed by..... L.Z. No. 4.....

1	2	3	4	5	6	7	8	9			10
Serial No.	Type of glider	Army Sub-Unit	Seats to be removed	No. of troops	Weight equipment	Total payload	L.Z.	TIMES			Remarks (include appointment of Senior Officer in load)
								Emplaned by	Take off	Land	

Aircraft Load Table

APPENDIX 10

FORM A C (AIRCRAFT) SHEET NO.....

Date..... Army Unit..... Air Unit..... Exercise/Operation.....

Block No..... No. of a/c in Block..... Airfield..... Troops arrive.....

Loading commences..... Loading completed by.....

1	2	3	4	5	6	7	8	9	10			10
A/c No. (chalk)	Type of a/c	Army Sub-Unit	Summary of load (vehicles, etc.)	Scale of lashing gear required	No. of troops	Weight Equipment	Total payload	Landing airfield	TIMES			Remarks (include appointment of senior officer in load and loading and unloading aids required)
									Emplaned by	Take off	Land	

Signed.....Commander

Load Manifest. Form B—Parachute

PART II

Exercise/Operation..... Date.....

A/c No. (Tail No.)..... Chalk No.....

PERSONNEL

Drop Order	Army Serial Number	Rank	Name and Initials	Remarks	Weight
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

CONTAINERS

Rack No.	Type	Contents (General)	Gross Weight	Parachute colour/light
				Total Weight

KITBAGS

No.	Contents	Weight
	Total Weight	

Inspection completed..... Signed.....

Load Manifest. Form B—Parachute

PART I

Exercise/Operation ..... Date .....

DETAILS OF AIRCRAFT

Squadron..... A/c Type..... Tail No..... Chalk No.....

AIRCREW

....

....

....

....

....

....

APPENDIX 12

Load Manifest. Form B—Glider

PART II

Exercise/Operation.....

Date..... Unit.....

GLIDER NUMBER..... TUG AIRCRAFT NUMBER.....

Number	Rank	Name (or) Item of Equipment	Seat Number (or) Bulkhead number (port or starboard to be stated)	Weight	Remarks

DELETE THOSE NOT APPLICABLE.

(1) The following seats to be removed.....

(2) All seats to be left in position.

(3) Freight carrying only.

Signed.....(Senior Passenger)

Load Checked.....(Glider Pilot)

Countersigned.....(Tug Pilot)

Load Manifest. Form B—Glider

PART I

Exercise/Operation ..... Date .....

DETAILS OF TUG AIRCRAFT

Squadron ..... A/C Type ..... Tail No. ..... Chalk No. .....

AIRCREW (TUG)

....

....

....

....

....

....

GLIDER PILOTS

....

APPENDIX 13

Army Form W.5260

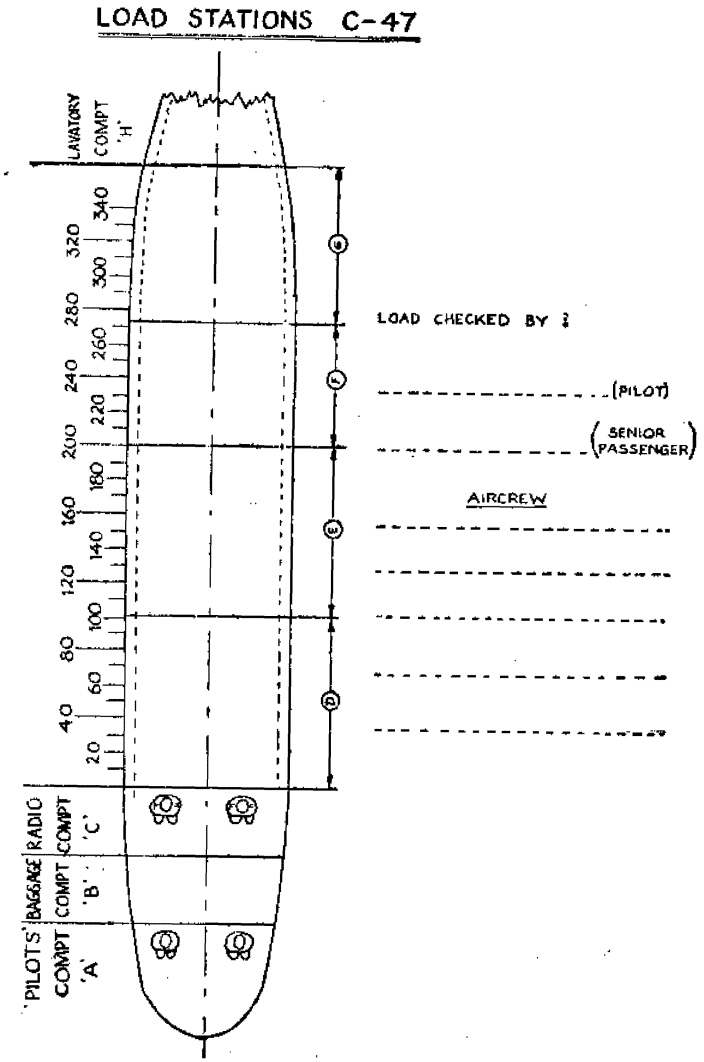
Load Manifest. Form B—Aircraft

UNIT SERIAL No..... AIRCRAFT CHALK No.....

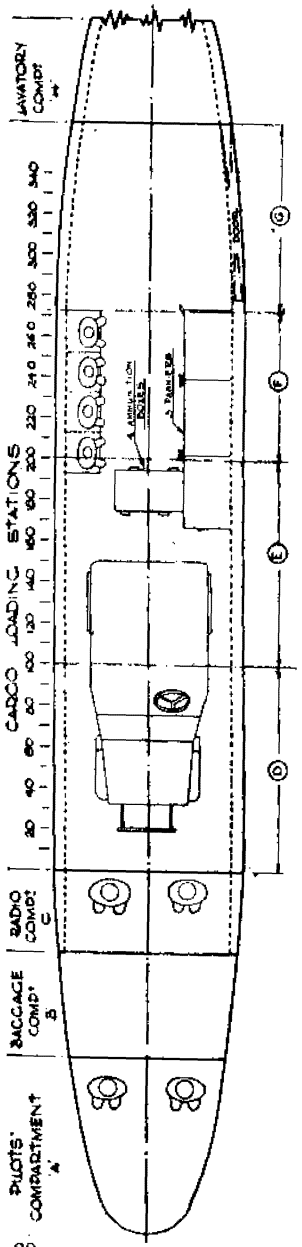
TYPE OF AIRCRAFT...Dakota (C47) UNIT .....

PERMISSIBLE PAYLOAD.....

Sub-Unit	LOAD DETAILS (to include personnel with name, rank and appointment, vehicles, all weapons and stores and loading and lashing gear required)	Weight in lb.	Load station	Remarks
	Total weight =			Balance permissible payload :—



Specimen Loading Diagram

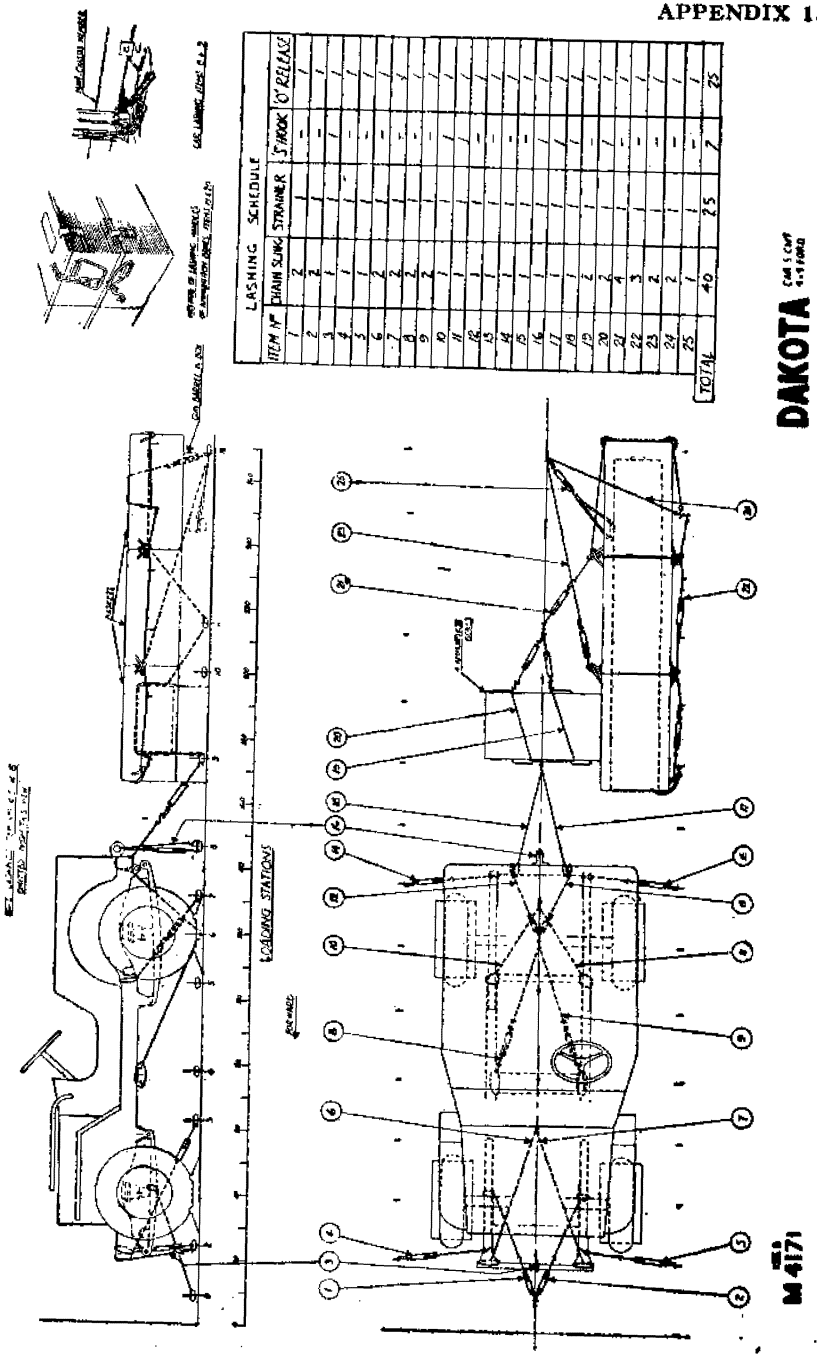


REF	Load Item	Load Stn	Weight lbs	Arm ins	Moment 10,000
	Equipment				
	Car 5 cwt 4×4 Ford:—				
	Front Axle ...	40	1,225	217	26·6
	Rear Axle ...	120	1,125	297	33·4
	4x boxes, amn, 40mm (Box No. C216)—filled	185	666	362	24·1
	4 men seated stbd side, seats 11–14... ...	235	840	412	34·6
	3 panniers, airborne supply, and stores ...	220	336	397	13·3
	Removable Military Load				
	Lashing Car ...		110		·06
	" Amn ...		16		
	" Panniers		36		
	Wheel load spreaders ...		40		
	Total Load ..		4,394		138·0

DAKOTA III
LOADING DIAGRAM No. D1

Load No. 1 Standard 40mm. Bofors Sub-Section

FOR LASHINGS OF THIS LOAD SEE AIRSPEED LASHING DIAGRAM No. M 4171 ISSUE B



APPENDIX 16

Notes on the Training of Airtransported Forces

General

1. The movement of a formation by air does not differ greatly from movement by road or sea and is, in fact, very similar to the use of craft in a seaborne operation.

2. Flexibility in the composition of an airtransported force is essential and this will vary according to the tactical situation; thus it will be impossible to design a force to cover all circumstances. Despite this, however, all ranks must understand the problems which are peculiar to this type of force.

3. Types of training

Training can be divided into:—

(*a*) Individual training.
(*b*) Staff training.
(*c*) Collective training.

4. Individual training

(*a*) The object of individual training is to teach certain officers and other ranks of a formation:—

(i) To reach a high standard of speed in emplaning and deplaning.
(ii) The correct modifications, break-down, stowing and lashing of equipment and stores in aircraft (or gliders).
(iii) To understand the necessity for distribution of weight in aircraft in accordance with RAF requirements.
(iv) To avoid damage to aircraft (or gliders).
(v) To become accustomed to the limitations of equipment imposed by air transport.

(*b*) In each unit of a formation selected officers and NCOs will be trained either at a War Office School or by a special training team as instructors and will in their own turn be responsible for the training of the unit personnel.

5. Staff training

(*a*) The object of staff training is to make commanders and staffs of formations, and certain officers of units, familiar with the problems connected with the move of a formation by air.

(*b*) The subjects include the following:—

(i) Characteristics of the transport aircraft (or gliders) concerned, including details of centre of gravity, payload and range.
(ii) Preparation of Aircraft load tables, load manifests and other tables.
(iii) Base Airfield organization, *i.e.*, methods of calling troops forward from concentration and transit areas, organizing into aircraft (or gliders) loads, emplaning and deplaning airfields organizations.
(iv) Problems peculiar to planning airtransported operations, airborne operations, and supply and maintenance by air.
(v) Air Force organization.

6. Collective training

(*a*) The object of collective training is to combine the lessons learned during individual and staff training so that the division may be launched into battle by air efficiently, with full co-operation between the army and the RAF, and may be supplied and maintained by air in its battle area for a limited period.

(*b*) Collective training should include study periods and ground and flying exercises at which the following points should be covered:—

Briefing
Concentration
Marshalling
Loading and emplaning
Flying
Deplaning and rendezvous of units
Supply and maintenance (from a unit of formation point of view).

7. Fitness

Owing to the conditions under which airtransported operations may take place, and small scale of vehicles that can be flown, particular attention should be paid to the physical fitness of the troops. They should be trained to march long distances carrying heavy loads (*i.e.*, 50 miles in 24 hours) and be able to fight at the end. They must be able to endure damp and cold without greatcoats, and know how to economize in the use of rations and water.

8. Briefing

Troops must be trained in the correct use of briefing material, *i.e.*, how to read an air photograph, make the best use of a model, and by a combination of the two recognize the airstrip and surrounding features and the layout of the forward landing areas as soon as they land. Full briefing material is wasted if officers and NCOs do not know how to make the best use of it.

9. Unit emplaning/deplaning officers

It is essential that these officers have a complete knowledge of all details of individual training as far as it concerns their particular arms of the service, in addition to being thoroughly conversant with the problems of movement of a unit.

10. Training stores

Training stores such as lashing gear, load spreaders, ramps, etc., will be required for training units in an airtransported role.

In addition to the use of fuselages, mock-ups, etc., useful training can be obtained by marking out on any floor or piece of hard ground the dimensions of the fuselage floor space of an aircraft. Positions of door and strong points should be clearly shown.

11. Technical data

Instructions on the methods of modification and breakdown of vehicles and equipment and construction of mock-ups, fuselages and loading ramps will be found in the supplements to chapter 8 of this pamphlet. A list of supplements is given on the cover.

12. Films

Films of transport aircraft operating and of movement of troops by air are a valuable means of instruction.

13. Air experience

If possible, all personnel of the formation should be given air experience at least once. Because an individual is not air-sick on a fine day with perfect flying conditions, it is unwise to assume that he will not be air-sick during bad conditions. Air-sickness may cause a considerable loss in a man's efficiency immediately after landing.

APPENDIX 17

Outline of Army and Air Force Responsibilities

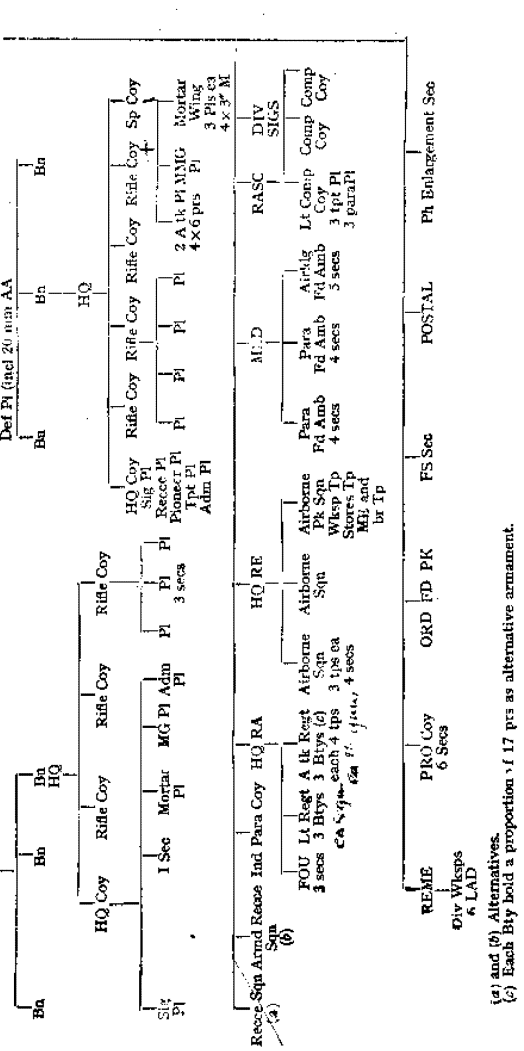
Serial	*Army*	*RAF*
1	(*a*) Provision of troops, their arms and equipment suitable for airtransport.	(*a*) Provision of aircraft for airlift and offensive support.
	(*b*) Command of all army detachments.	(*b*) Command and control of all RAF detachments.
		(*c*) Control of all army personnel on airfield and in aircraft.
		(*d*) Decision on all matters affecting operational safety of aircraft.
2	**Provision of personnel for**	
	(*a*) Receiving, sorting, packing, loading and unloading troops, their stores and equipment.	(*a*) Operation and maintenance of aircraft.
	(*b*) Ground control and movement of troops, their stores and equipment to and from airfields.	(*b*) Control of movement on airfields and of loading and unloading of troops and equipment in aircraft.
	(*c*) Army staff and liaison officers and army increments as required on airfields.	(*c*) Communications between airfields.
	(*d*) Ground to ground communications required for the movement of troops with the exception of communications between rear and forward airfields.	
3	**Stores and miscellaneous**	
	(*a*) Preparation of load manifests.	(*a*) Statement of maximum payload permissible for the particular operation.

Serial	*Army*	*RAF*
	(*b*) Provision of accommodation and administrative services in transit camps for all personnel including RAF personnel accompanying force.	(*b*) Clearance of load manifests for flight.
		(*c*) Preparation of aircraft for loading.
		(*d*) Approval of the loading of aircraft loads (normally by the captain of the aircraft).
		(*e*) Provision of RAF stores such as parachutes, containers, lashing gear, load spreaders, aircraft ramps, air/sea rescue equipments, sick bags, urine receptacles, etc. The method of distribution will be stated in Orders for the Operation.
		(*f*) Instruction in air/sea rescue drill and ditching procedure.

Joint Responsibilities

Selection of dropping and glider landing zones and airstrips.

Approximate Organization of an Airborne Division



(a) and (b) Alternatives.
(c) Each Bty hold a proportion of 17 prs as alternative armament.

Notes on Units of an Airborne Division

1. Reconnaissance

There are two types of airborne reconnaissance unit :—

(*a*) *Armoured reconnaissance regiment* which is equipped with light tanks, carriers universal, and 5-cwt cars. It also contains a cruiser tank element which joins the regiment as soon as possible after the link-up with the land forces. Besides being a reconnaissance force, an armoured reconnaissance regiment may act as a mobile reserve anti-tank gun, machine gun, and heavy mortar fire power, and as protection to communications and to supply vehicles providing a link with the land forces that join up with an airborne formation. The light tanks will not normally be able to operate beyond 25 miles from the perimeter of an airborne formation. Hamilcar gliders are required for the tanks and the Bren carriers. The remainder can move in Horsa gliders.

(*b*) *Reconnaissance squadron* which is equipped with 5-cwt cars and is armed with medium machine guns and Piats. It is well equipped with wireless. If enemy tanks are expected it must be reinforced with anti-tank guns.

2. Infantry

(*a*) *Parachute battalion* has a jumping strength of about 550 men. Each man drops with his full equipment, containers being dropped with spares which can be collected when troops are less vulnerable. A battalion has 3-inch mortars with limited ammunition for close support. Parachute troops carry out normal infantry roles. They are particularly suited to landing at night but cannot hold a position for long against heavy attack without being reinforced with heavy weapons and ammunition.

(*b*) *Airlanding battalion* has a strength of between 800 and 850 men ; its weapons include 6 pounder anti-tank guns, medium machine guns, and a high proportion of 3-inch mortars and Bren guns ; its transport is 5-cwt cars, trailers, and hand-carts ; and it normally lands in gliders. It provides the main striking power in attack and a firm base in defence.

(*c*) *Independent parachute company* is a divisional unit organized into rifle platoons, mortar and anti-tank detachments. Its main task is the marking and protection of landing zones. If necessary it can provide defence for the divisional headquarters, and forms a reserve.

3. Artillery

(*a*) *Airlanding light regiment RA* is equipped with 75 mm pack howitzers ; one howitzer and its gun-towing vehicle (5-cwt car) to a Horsa glider.

(*b*) *Anti-tank regiment RA* is equipped with either 6-pr or 17-pr guns loaded in Horsa or Hamilcar gliders respectively ; in addition the 6-pr and its detachment can be dropped by

parachute, if desired. The 6-pr guns are towed by 5-cwt cars. The gun towet for the 17-pr varies, but is normally some form of modified 4 × 4 field tractor.

(*c*) *Forward observation unit RA (FOU).*—This is a unit of forward observation officers (FOO) normally deployed with brigades. Its role is to control the fire of supporting artillery linking up by land or naval guns, and to organize counter-mortar measures.

After the enemy have recovered from surprise, the artillery fire power of an airborne division is inadequate. Immediately the ground forces link up, additional regiments must be placed in support or under command to provide a minimum fire power equivalent to that likely to be available to an infantry division. The interval before the link-up must be bridged by offensive air support for which direct wireless communications must be available.

4. Engineers

(*a*) The engineers are divisional troops and, whenever possible, used under the CRE's direct command. For the fly-in and for special tasks part may, however, be placed either in support or under command of other arms. If this is done they should revert at the earliest moment to command of the CRE.

(*b*) *The airborne squadron RE* is equipped and trained to perform all the tasks normally performed by the field company of an infantry division. The whole unit except for a small "tail" of non-airportable vehicles is gliderborne. For special tasks all officers, a proportion of HQ and half of each troop are trained to parachute.

The troops are self-contained and therefore considerable flexibility in battle organization is possible.

When used in a parachute role the quantity of tools and stores available for work is small and therefore it is essential at the earliest possible moment to reinforce the parachute element with the remainder of its equipment and vehicles.

(*c*) *The airborne park squadron RE* is equipped and trained to perform all the tasks normally performed by the field park company of an infantry division.

It contains a workshop, mechanical equipment, stores troop and a small assault bridging element, all of which are transportable by glider. All officers, a proportion of tradesmen and the personnel of the stores troop are trained to parachute.

(*d*) Engineer stores required either by the divisional engineers themselves or by other arms are flown in by glider or dropped by parachute. This requires considerable forethought during planning to ensure that both urgent needs are quickly satisfied and no air effort is wasted in carriage of excessive or unwanted stores.

(*e*) The airborne divisional engineer units have in their armament a higher proportion of automatic weapons than corresponding units of normal divisions. They are armed with 2-inch mortars and trained in the use of all the weapons of an infantry battalion. They form therefore a useful reserve for the divisional commander if the situation has so deteriorated that no useful engineering tasks can be carried out.

5. Signals (*see* also Appendices 24–27)

The divisional signals provides signal sections for divisional HQ, each brigade, CRA, light regiment, independent company and a special wireless section for base.

6. Medical

RAMC in airborne operations must be prepared to treat and hold casualties for a number of days before evacuation can occur. Enough special equipment and specialized personnel are taken to ensure that all emergencies can be met. Each battalion has one medical officer and a number of RAMC personnel. All ranks must be trained to a high standard in first aid.

(*a*) *Airlanding field ambulance.*—The field ambulance consists of a HQ, which includes a complete operating room equipment, two surgical teams, a dental officer and five sections. When the brigade operates as a whole, a section is attached to each unit, coming under command of the unit medical officer. The remainder of the field ambulance with both surgical teams and all sections forms a central MDS.

(*b*) *Parachute field ambulance.*—A parachute field ambulance consists of a HQ, including complete operating room equipment, two surgical teams, a dental officer and four sections. Their operational distribution is on the same principle as for an airlanding field ambulance. A gliderborne element may be attached with transport and heavy medical stores for the initial stages of an operation.

7. RASC

(*a*) The *light composite company RASC*, of which there is one in a division, is equipped with jeeps and trailers. It deals with all supplies delivered by air in the forward area. It contains :—

(i) A parachute element of 3 platoons normally attached to a bde for dropping purposes, but reverting at the earliest possible moment to control of CRASC or comd lt coy whichever arrives first. The tasks of these platoons include the recce, layout and defence plan of SDPs incl traffic circuits ; provision of labour for clearing SDPs ; "spotting" during supply dropping periods ; and provision of labour guards, etc., at dumping areas.

(ii) A glider element of 3 air landing platoons. These provide all transport for clearance of SDPs, stocking of dump areas, and distribution of all maintenance stores to units which are through lack of transport unable to collect. These 3 platoons form the sole transport available for all 2nd line duties until the link-up with ground forces takes place. Wherever possible, they must be reinforced by the attachment of 1st line vehicles from other arms.

(*b*) The *composite company, RASC,* of which there are two in a division has a normal RASC organization and equipment. Its role is primarily with the land (or sea-borne) element to bring up the divisional 2nd line maintenance requirements. Each coy has 3 transport platoons. After link-up they take over normal 2nd line duties for the division while the latter is employed in a ground role. It is most improbable that these companies will be available for employment on air despatch or to assist with the base organization, since they will be required to move forward by road (or sea) to be as near as possible to the division when it lands.

8. RAOC

The *ordnance field park* comprises one MT stores section and one technical (sigs and wireless) section. It is normally a part of the administrative land or seaborne element though advanced ordnance representatives move by air. The unit however contains an airborne element equipped with jeeps and trailers. The ord fd pk also has a proportion (25 per cent) of parachutists who are trained for duty on the DZ to receive, collect and issue ord stores supplied by air.

9. REME

(*a*) REME unit personnel, *i.e.*, armourers, fitters, vehicle mechanics, etc., attached to para bns are trained parachutists and " jump " with their respective companies.

(*b*) Each parachute brigade has an airlanding LAD type " B " attached and an EME. All these personnel are trained parachutists and drop with brigade headquarters.

Their primary role in the early stages is to capture and repair for immediate use enemy transport. They carry with them expendable spares and kits of hand tools. When the battle is stabilized and they link up with ground forces they operate recovery.

(*c*) The LAD attached airlanding brigade travels in a glider and is normally given a " jeep " and trailer for mobility.

(*d*) The airborne division, REME workshops, is equipped with " jeeps " and machinery trailers fitted with identical equipment as issued to infantry brigade workshops. It is capable of undertaking all 2nd echelon repairs of the division for a period of 21 days. It comprises a headquarters and three sections. Sections can be glider borne complete with " jeeps " and machinery trailers or drop as parachutists to form an advanced workshop detachment. The ground element has recovery equipment.

10. Provost

The *provost company* land with both the parachute and air landing troops and is equipped accordingly with six sections. Its duties closely resemble those of the provost personnel of an infantry division. In the early stages of the assault it is responsible principally for the collection and guarding of prisoners.

11. Airborne control sections

An *airborne control section,* consisting of an air liaison section and a small staff, is established on each airfield from which airborne troops operate. The duties of an airborne control officer (ACO) are similar in principle and parallel to those of any ALO or ATLO on airfields, with certain additions peculiar to airborne operations. These duties are at Appendix 28.

Notes on exercises for airborne troops

1. Safety

Owing to variable weather conditions and other factors there are certain rules for the safety of personnel which must be observed on all airborne exercises. They are as follows :—

(*a*) *Responsibility for cancellation.*—Responsibility for decisions as to whether or not it is safe to carry out an exercise is as follows :—

(i) Whether flying can take place—Air Force.

(ii) Before emplaning; whether to drop—Parachute formation or unit commander at airfield.

(iii) After emplaning; whether to drop—Officer in charge of the dropping zone.

(*b*) *Dropping zone procedure (parachute).*—An officer in charge of the dropping zone will be detailed for every exercise by the parachute formation or unit concerned. He will have with him the following equipment :—

(i) Velometer.

(ii) Verey pistol and RED cartridge or 2-inch mortar and RED flares.

(iii) Smoke candles—RED and WHITE.

Jumping will not take place if the velometer records that the mean wind speed is over 15 mph gusting to 20 mph.

(*c*) *Signals " NOT TO DROP " ground to air.*—These will be given by the officer in charge of the dropping zone who will fire RED Verey lights or flares in the path of the approaching aircraft, at the same time lighting a RED smoke candle in the dropping zone. On seeing these signals pilots will NOT drop troops.

2. Medical

Whenever any airborne exercise takes place it is the responsibility of the formation or unit concerned to arrange for a medical officer and ambulance to be present on the dropping or landing zones during dropping or landing. Provision must also be made for the rescue of troops dropping into trees or water.

3. Warnings

(*a*) Before any airborne exercise is carried out it is the responsibility of the formation or unit concerned to warn the headquarters of the district in whose area the exercise is being carried out. The district headquarters is responsible for warning all local military (including anti-aircraft units), police and civil authorities.

(*b*) Warnings will include :—

(i) Boundaries of the area within which the dropping/landing will take place.

(ii) Hour at which the dropping/landing will take place.

(iii) Types and approximate numbers of troops taking part.

(*c*) Warning to all air force formations concerned will be given by the air force formation carrying out the exercise.

4. **Reports**

(*a*) *A report on each exercise* will be made by the airborne unit to the higher HQ as soon after the exercise as possible. It should be made out by an officer who either took part in or witnessed the exercise (*see* Appendix 20B).

(*b*) *A Parachute Equipment Failure Report* will be made out after each exercise in accordance with the proforma at Appendix 20C. They will be forwarded within 12 hours of the exercise as follows :—

Division HQ—Two copies (to be forwarded direct from unit).
Brigade HQ—One copy (for information).
Air Force unit concerned—One copy (for information).

5. Disposal of troops unable to take off

Unit commanders will issue instructions regarding the disposal of troops who are left behind at an airfield after take-off on an exercise. owing to non-availability of aircraft. In such cases troops will normally either return to barracks or be sent to the scene of the exercise by road or rail transport. A copy of these instructions will be sent to ALOs concerned.

6. Army equipment left in aircraft or gliders

Airborne units concerned will be responsible for the collection of any of their equipment left behind in aircraft or gliders. Should any equipment be missing, units will notify the ALO concerned, who will endeavour to trace it.

APPENDIX 20B

Form for Reports on Exercises

REPORT ON EXERCISE.....

Time of Drop.....hrs Date..... DZ.....

Unit and Sub-unit..... No. of Tps..... Unit/Sub-unit Comd.....

Group..... Sqn..... No. of A/C..... Sqn Comd.....

Direction of Wind on DZ..... Mean Wind Speed..... Max Gust.....

1. Casualties

Fatal..... Major..... Minor.....

(*Brief description of major casualties (including No., Rank and Name)*

2. Defects in Parachutes or Container Release

State if Report already forwarded as shewn for Failure of Equipment

3. Any Unusual Behaviour of A/C

Remarks concerning A/C No. Height Speed
Remarks on line of approach and accuracy in finding DZ and dropping.

4. Remarks—Preliminary Adm Arrangements

5. General Remarks

Date..... *Signature*.....

Form for Reports on Failures of Parachute Equipment

(*a*) Unit..... (*b*) Place .....

(*c*) Date..... (*d*) Time.....

(*e*) Name ..... (*f*) Rank..... (*g*) No.....

(*h*) Position in Stick..... (*i*) Injury .....

(*j*) Name of next in Stick.....

(*k*) No. of container..... (*l*) Load in container.....

(*m*) Premature release ..... (*n*) Delayed release .....

(*o*) Parachute No. ..... (*p*) A/C Number on take off.....

(*q*) Probable cause .....

(*r*) Names of two army witnesses (if possible).....

1. .....

2. .....

(*s*) Statements by observers on the ground (if possible) :—

NOTES.—(*k*), (*l*), (*m*) and (*n*) only apply to container failures. In case of (*m*) state position in stick when containers dropped. In case of (*n*) state if possible where dropped.

APPENDIX 21

Specimen Headings for Inclusion in an Airborne Brigade Operation Order

INFORMATION

Enemy

Outline only referring to Intelligence Summaries for the detail.

Own troops

General plan of ground troops.
Plan for other airborne troops.
Local resistance troops.
Air forces co-operating.
Outline air plan.
Troops under command.

Topography

Met.

INTENTION

METHOD

Division of a plan into phases.
Tasks for each unit, including the following details :—

Troops.
Tasks.
Line of flight of aircraft.
DZ or LZ.
Time of drop.
RV, including marking.
Route to objective.
Subsequent action (in general terms).
Allotment of aircraft and timings.
(Referring to air movement table Form A.)
Arty :—
Allotment of Arty and FOOs.
Rate of RA build-up and areas of fire.
DF tasks.
Anti-tank allotment and lay-out.
RE :—
Allotment of tasks.
Independent Parachute Coy :—
Role of glider pilots after landing.
Offensive air support :—
Timings.
Tasks.
Anti-flak and searchlights.
Dispersion.
Bomb-line.
Allotment of tentacles.

ADMINISTRATION

Orders are normally issued under two main parts :—

Part I

The Base Administrative Instruction, including :—

Allotment of transit camps.
Transport for move to transit camps and from transit camps to airfields.

Composition of land (or sea) element, including nomination of comd and staff.
Move of land (or sea) element.
Arrangements for disposal of personnel refusing to jump.
Arrangements for administration and command of details remaining at base.

Part II

The Operational Administrative Instruction, including :—

Supplies as part of lift and carried on the man.
Jettison drop.
Maintenance lifts, including areas of drop and landings and timings.
Administrative Instructions issued by the follow-up ground formation affecting the division.
Location and control of enemy dumps after capture.
Allotment of transport, including procedure for captured transport.
Water.
Medical, including DZ and LZ casualty clearance and arrangements with follow-up ground formation.
Recovery, including arrangements with follow-up ground formation.
Ordnance, including distribution and replacement of stores.
Provost.
Salvage, including salvage of parachutes and gliders.
Postal.
NAAFI.

"A" Matters—including :—

Provisions for reinforcements.
Rendering of casualty reports, etc.
Burials—including graves registration.
Honours and awards.
Welfare.

INTERCOMMUNICATIONS

HQs ; location and times of opening.
Liaison with ground formations.
Success signals.
Recognition, air to ground and ground to air.
Wireless
(i) Wireless silence.
(ii) Frequency allotment.
(iii) Spare frequencies.
(iv) Priority of establishment of wireless links.
(v) Communications on the move.
Line communications.
DRLS.
Signal security
(i) Cipher. (ii) Codes. (iii) Authentication.
Pigeons.
Passwords.
Codes.
H hour of airborne operation and ground operation.
Allotment of intercommunication aircraft.

Details of Masking

DAKOTA (C.47) or C.53 A/C FOR PARACHUTE DROPPING

Masking

1. The object of masking is to cover all projections or sharp edges on the aircraft which might cut the static line or interfere with its free movement. With the British X type parachute the bag remains attached to the end of the static line and during development the bag swings upwards until the static line is almost horizontal before the apex tie of the parachute is broken. Thus it is essential that the static line should be attached as low as possible, otherwise it would swing very high and the canopy would foul the tailplane and elevators. It is most important that the static line is able to slide freely down the rear edge of the door to the floor. Very careful masking of all projections must be carried out to ensure this and obviate any fouling.

2. For masking purposes a 2-inch wide adhesive masking tape should be used. Projections such as the axle bobbins on the tail wheel assembly will require padding, with rag or paper before taping.

3. In addition to the masking of projections, certain obstructions may have to be removed.

4. The main points required masking are as follows :—

C.47

(*a*) *Door handles.*—Normally doors will not be positioned and the handles will be taped over. If, on any special mission it is desired to have the door closed, the handles will not be taped but will be covered with the authorized guard. It must be decided at the co-ordinating conference which method is to be used.

(*b*) *Aft door hinges.*

(*c*) *Door handle guard.*—For paratroop purposes the rear half of the door remains closed and the guard is fitted over the external door handles to allow the static lines to slide easily down to the floor of the aircraft. The guard should be positioned $\frac{1}{8}$-inch back from the forward edge of the dividing frame to enable the key to be inserted in the upper handle.

C.53

(*a*) *Door latch plate.*

(*b*) The forward edges of the door handle for the rear luggage compartment. If no guard is available the handle should be removed or very carefully masked to allow the static line to slide downwards over it.

C.47 and C.53

(*a*) Lower outside edge of door frame.

(*b*) The fire extinguisher bracket inside the cabin near the door.

(*c*) The joint between the roof fairing and de-icing equipment on the leading edge of the tailplane.

(*d*) Both axle bobbins on the tail wheel.

(*e*) Front main thru-bolt on the tail wheel assembly.

(*f*) The forward end of the glider towing attachment if this is fitted.

5. In addition a careful inspection should be made both inside and outside the aircraft and all sharp edges or obstructions, where it is possible that the static lines might suffer damage or interference, should be carefully masked. Particular care should be exercised where glider towing equipment is fitted.

6. If a venturi is used for the lavatory drain, this should be removed. If a metal tube is used this should be pushed up inside the aircraft or cut short. Rubber tubes may be safely left. The rear mooring eye should be removed.

APPENDIX 23

Procedure Aboard Parachute Aircraft during Approach and Drop

Door exit type aircraft

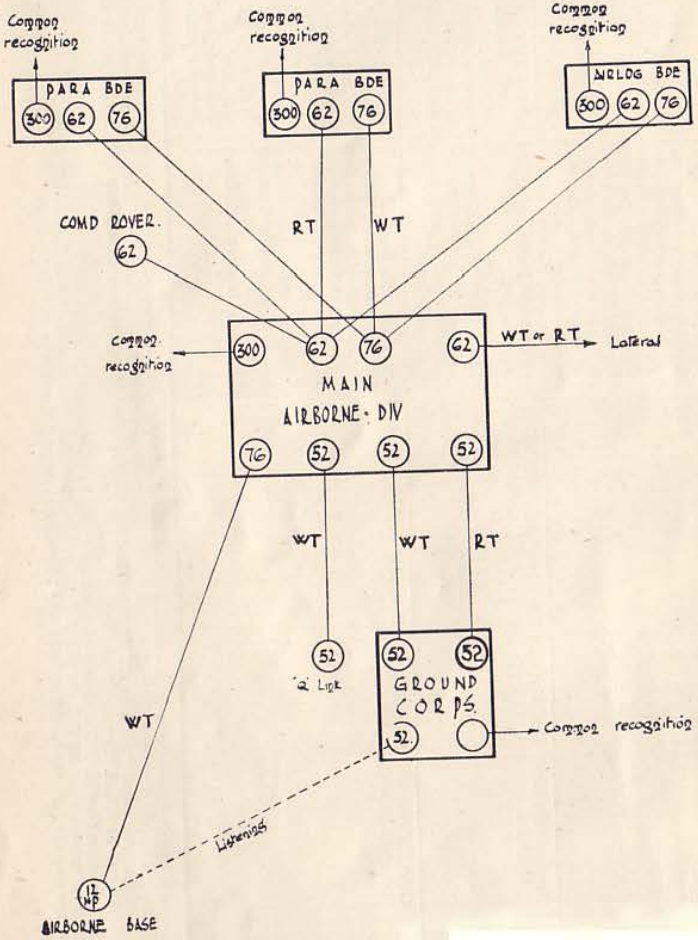
Serial No. (a)	Time (b)	Signal (c)	Command (d)	Action (e)	Remarks (f)
1 (a)	Twenty minutes from DZ	—	Pilot to stick commander —" PREPARE FOR ACTION STATIONS "	Stick commander decides when to give order " Stand Up "	
(b)		—	Stick commander to troops " STAND UP "	(i) Troops adjust parachutes and individual equipment. (ii) Nos. 2, 4 and 6 of stick will fold rear starboard seat. (iii) Troops form single or slightly staggered file facing aft.	
(c)		—	Stick commander to troops—" HOOK UP "	Troops hook up static lines to cable.	
(d)		—	Stick commander to troops—" CHECK EQUIPMENT "	(i) Each man checks own equipment and man on either side. (ii) Stick commander goes fown fuselage checking each man's equipment and hooking up.	At night, stick commander will use a torch with red filter for checking equipment.
				(iii) Stick commander checks own equipment and hooks up—is checked by nearest man. (iv) Member of the crew removes and stows away door (if not already removed).	
2	Four minutes from DZ	Red light	Denotes " ACTION STATIONS," stick commander to troops—" STAND TO THE DOOR "	(i) Troops form up for jumping. (ii) Member of the crew takes up position near door wearing his intercom helmet.	RED light remains on until GREEN light is turned on. Provides alternative communication in case GREEN light fails.
3	Over DZ (a/c at correct altitude)	GREEN light	Denotes " GO "	(i) First man jumps. (ii) Troops move down fuselage to jump in order as formed up. (iii) Each man guides loose static line with his left hand down the cable until he is third man from door. (iv) Each throws static line aside.	GREEN light remains on until it is no longer safe to jump when the RED light will be turned on. It is most important that each man throws his static line to the far end of the cable and well clear of the door. If this is not done following men may trip, thereby causing an accident.

Hole Exit Type Aircraft

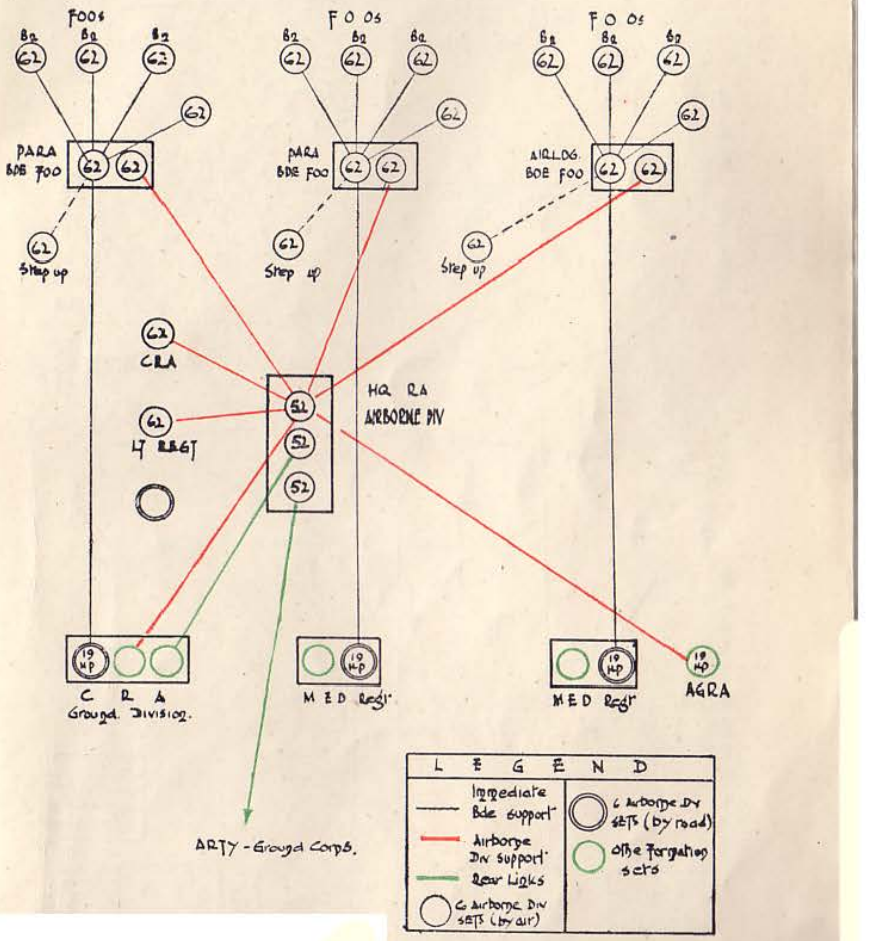
(a) With troops jumping from aircraft with hole exit the procedure given in serial 1 above will apply in principle, but on receipt of the command " PREPARE FOR ACTION STATIONS " troops will carry out the drill applicable to the type of aircraft in which they are travelling.
(b) *Five minutes from the DZ* a final verbal warning will be given.
(c) *Fifteen seconds from the DZ* the RED light will be switched on and will denote " ACTION STATIONS ".
(d) *When over the DZ*, the GREEN light will be switched on and the troops will then jump.

Normal Airborne Div Wireless Comns

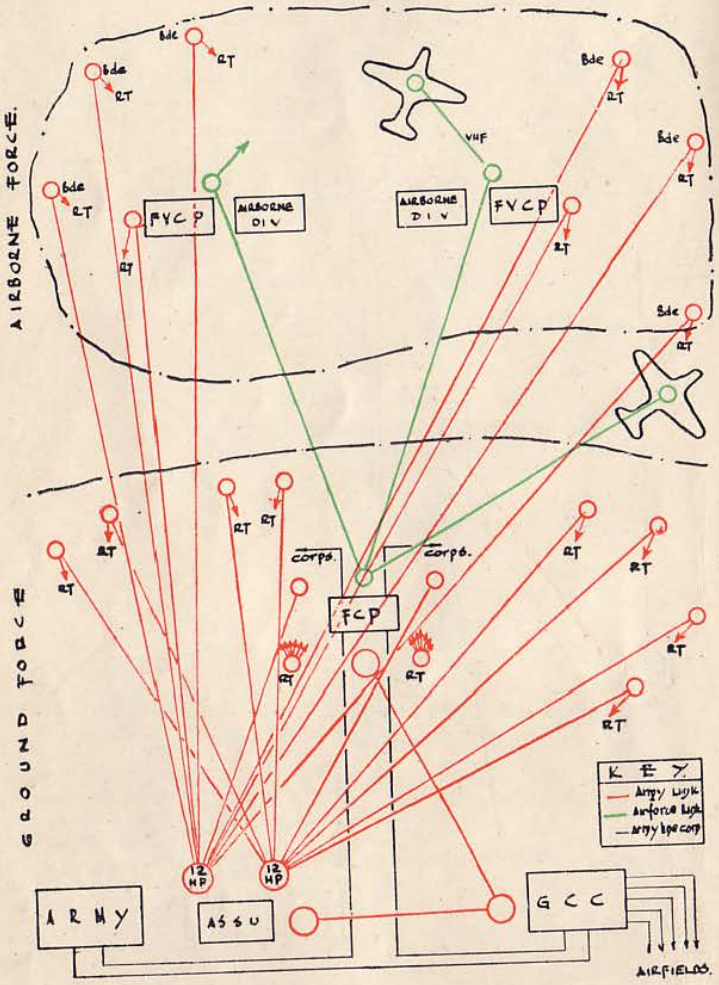
(Less RA & Offensive Air Support)



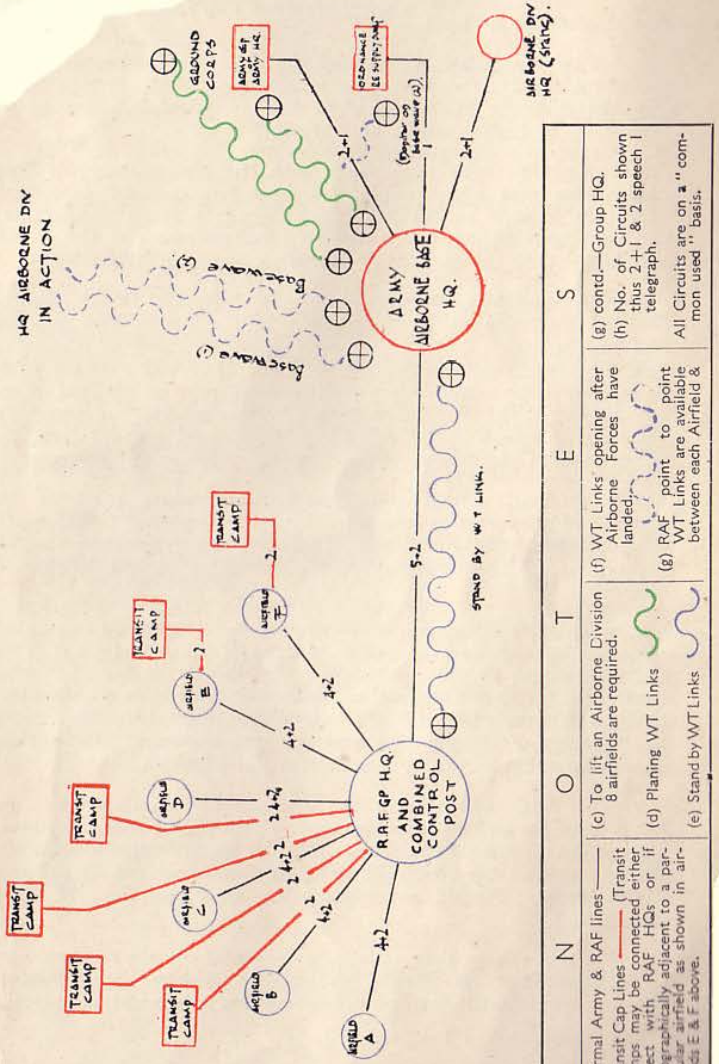
Normal Airborne Div RA Comns



Normal Airborne Div Offensive Air Support Comns



Airborne Base Communications



NOTES

(a) Normal Army & RAF lines ——
(b) Transit Cap Lines —— (Transit camps may be connected either direct with RAF HQs or if geographically adjacent to a particular airfield as shown in airfields E & F above.
(c) To lift an Airborne Division 8 airfields are required.
(d) Planing WT Links
(e) Stand by WT Links
(f) WT Links opening after Airborne Forces have landed.
(g) RAF point to point WT Links are available between each Airfield & (g) contd.—Group HQ.
(h) No. of Circuits shown thus 2+1 & 2 speech 1 telegraph.
All Circuits are on a " common used " basis.

APPENDIX 28

Duties of Airborne Control Officers (ACOs)

1. The airborne control officer is the representative of Airborne Forces with the air force.

2. He is responsible for keeping the air force commanders concerned informed of the military situation at all times. It is therefore essential that the ACO shall know the commanders and staffs of formations and units whom he represents.

3. He will be fully conversant with the technicalities of both parachuting and glider equipment, and with airfield procedure. Wherever possible he will check that all orders issued by units and sub units are complete and cover all detail necessary at the airfield and ensure that the exercise or operation proceeds satisfactorily.

4. ACOs will work directly under the control of GSO1 (Air) at the air force formation HQ from whom they will receive all information and orders. Once ACOs have been informed of the units operating from their respective airfields, they will contact those units, inform the commanders of the procedure to be adopted on the airfield and make any other detailed arrangements as necessary. They are responsible for obtaining the ground picture from the airborne units and passing it on to the air force units concerned.

5. ACOs will attend co-ordinating conferences prior to the exercise or operation as instructed by their respective GSO1 (Air); they will note both ground and air aspects. They will then be available to assist the air force unit commander in the briefing of aircrews.

6. Each ACO will attend the briefing of the airborne unit operating from his airfield, and if possible will be accompanied by a representative of the air unit concerned. He will also attend all briefing of aircrews. The ACO is responsible for watching out for any change in detail between the time of the co-ordinating conference and the final briefing of the air force and airborne personnel. Should any change be noted he will at once inform all concerned.

7. The ACO will receive the appropriate forms "AA" and "AB" for his airfield from the control HQ (GSO1 Air), and also a copy of the air force unit Orders. He is then responsible for checking the one against the other and ensuring that there are no points of disagreement. Should any discrepancy be found, he will notify control HQ.

8. He will ensure that all arrangements are made to ensure the smooth running of the ground movement procedure. He will ensure that the points outlined below are catered for before arrival of troops.

(*a*) Reception of troops.

(*b*) Marking of routes.

(*c*) Provision of guides.

(*d*) Container spare parts and REME repair detachment available.

= (*e*) All aircraft or gliders correctly numbered in accordance with Forms "AA" or "AB".

= (*f*) Preparation of parking diagrams.

= (*g*) Marshalling of aircraft.

(*h*) Provision of the correct number of parachutes in each aircraft as shown on Form "AA".

= (*i*) Spare aircraft provided.

= (*j*) Time of emplaning and take-off of each block.

= (*k*) Gliders prepared for loads to be carried (including rifle racks).

(*l*) Knowledge of location of all installations and accommodation on airfield.

Points marked thus = are an air force responsibility but the ACO should ensure that they are covered.

9. ACOs will make the necessary arrangements for the collection of the two forms "B" parachute and glider from each aircraft prior to take-off. He will hand over one copy to the air force unit HQ and forward the other copy to GSO1 (Air). He will ensure that the latter copy is complete with the unit of each individual.

10. The ACO will be present on the airfield when parachuting aircraft return. He will be responsible for the return to their units of personnel and equipment, who, for some reason or another, have not been dropped. He will attend the interrogation of pilots and aircrews.

11. The ACO will submit a report on the conduct of any operation or exercise from the ground aspect direct to the GSO1 (Air). Such a report will include matters of incorrect filling in of Proforma "B" incorrect marshalling of aircraft, failure to comply with exercise timings, details regarding container failure and any other important points.

12. ACOs will ensure that any army equipment left in the aircraft or gliders is returned to a place of safety and the unit concerned notified. All applications for release of lost equipment will invariably be made to the ACO.

(22114) G. 841 55,000 8/45 K.H.K. Gp. 8/7