NATO STANDARD

ATP-3.3.4.3

TACTICS, TECHNIQUES AND PROCEDURES FOR NATO AIR TRANSPORT OPERATIONS

Edition B Version 1

OCTOBER 2017

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED TACTICAL PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

26 October 2017

1. The enclosed Allied Tactical Publication ATP-3.3.4.3, Edition B, Version 1 TACTICS, TECHNIQUES AND PROCEDURES FOR NATO AIR TRANSPORT OPERATIONS, which has been approved by the nations in the MCASB, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 3998.

2. ATP-3.3.4.3, Edition B, Version 1 is effective upon receipt and supersedes ATP-3.3.4.3, Edition A, which shall be destroyed in accordance with the local procedure for the destruction of documents.

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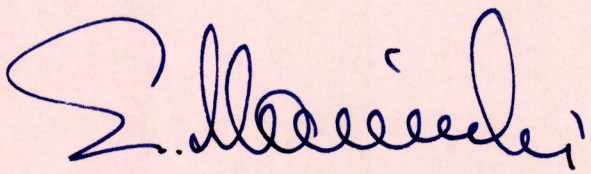

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
BEL	• Chap 4 – Annex E – 4E2 – 1a (page 64) : Belgium as EATC nation will accept loads that require a prime mover vehicle or aircraft handling equipment to facilitate the on-load/offload; • Chapter 4 Annex F 4.F.3 : Belgium will allow flights up to 4 hours during Tactical Carriage of Troops operations • 4G7 - 2a - Minimum operational equipment (page 87): Belgium as EATC Nation does not require the RADAR to be operable during Phase 3 NVG and/or Airland Missions except if weather is expected or if it is specifically mentioned in the Aircraft's Minimum Equipment List.; • 4G10 – Airdrop Procedures (page 89): paragraph 2 and 3 are not applicable for Belgium (using the ETTP and Cross Parachuting Booklet procedures).
FRA	• Chap 4 – Annex E – 4E2 – 1a (page 64): France as EATC nation will accept loads that require a prime mover vehicle or aircraft handling equipment to facilitate the onload/offload; • 4G6 - 2a - Minimum operational equipment (page 87): France as EATC Nation does not require the RADAR to be operable during Phase 3 NVG and/or Airland Missions except if weather is expected or if it is specifically mentioned in the Aircraft's Minimum Equipment List; • 4G9 – Airdrop Procedures (page 89): paragraph 2 and 3 are not applicable for France (using the ETTP and Cross Parachuting Booklet procedures). The document doesn't talk about the share out of the responsibilities, which exists in France, between the loadmaster and the jumpmaster and his team for personal or material transport for tactical missions. France will maintain the distribution of responsibilities between the air crew, the loadmaster and the jump master and his team as described in its national doctrine.

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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CHAPTER 1 INTRODUCTION

1.1 GENERAL

1. Air Transport (AT)[1], provides a military commander with the capability to deploy, employ and re-deploy forces and equipment quickly, sustain those forces, and support effective application of military effort.

2. The speed and flexibility of airlift makes it a critical means of transport in support of many types of military and humanitarian relief operations.

1.2 PURPOSE

This publication provides standardised tactics, techniques and procedures, to be used by individuals, organizations, and nations involved in the transportation and delivery of personnel and cargo by air, supporting NATO or coalition operations. It may be used as a reference document for training national forces and NATO exercises.

1.3 SCOPE

This publication is intended to ensure that all AT elements, which may support forces of another nation or command, are able to do so through the application of the standard procedures outlined herein. It is not intended to restrict the development of additional tactics, techniques and procedures by national forces or NATO Commands.

1.4 RELATED NATO PUBLICATIONS

Publication	Title
STANAG 3700 AJP-3.3	Allied Joint Doctrine for Air and Space Operations
STANAG 2234 AJP-4.5	Allied Joint Host Nation Support Doctrine and Procedures
STANAG 2506 AJP-4.4	Allied Joint Movement and Transportation Doctrine
STANAG 7207 ATP-3.3.4 Vol I	Allied Doctrine for Air Transport
STANAG 7213 ATP-3.3.4.1	Tactics, Technics and Procedures for Air Movements
ATP-3.3.4.4	Tactics, Technics and Procedures for Airborne Operations

[1] Also known as "airlift".

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CHAPTER 2 DEFINITIONS, TERMS, ACRONYMS AND ABBREVIATIONS

2.1 INTRODUCTION

This document uses the acronyms listed below. Additional definitions, terms, abbreviations and acronyms may be found throughout the document.

2.2 DEFINITION

Air Transport Operations are operations to transport and to deliver forces and material through the air in support of strategic, operational or tactical objectives.

2.3 ACRONYMS AND ABBREVIATIONS

AC	Aircraft Commander
ACE	Allied Command Europe
ACO	Air Space Control Order
AGL	Above Ground Level
ALCC	Airlift Coordination Centre
APOD	Air Port of Disembarkation
APOE	Air Port of Embarkation
ASACS	Air Surveillance and Control System
ATC	Air Traffic Control
ATD	Actual Time of Departure
ATO	Air Terminal Operations / Air Task Order
C2	Command and Control
CATO	Combined Air Terminal Operations
CCT	Combat Control Team
COMAO	Composite Air Operation
DGR	Dangerous Goods Regulations
DV	Distinguished Visitor
DZ	Drop Zone
EET	Estimated Enroute Time
ERO	Engine Running On / Offload
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure
FCG	Foreign Clearance Guide
FLIP	Flight Information Publication
Ft	Feet
GBAD	Ground Based Air Defence
GSE	Ground Support Equipment
HNS	Host Nation Support
HQ	Headquarters
IATA	International Air Transport Association
IAW	In Accordance With

ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IP	Initial Point
ISOPREP	Isolated Personnel Report
JFACC	Joint Force Air Component Command
KIAS	Knots Indicated Air Speed
LCN	Load Classification Number
LZ	Landing Zone
MEDEVAC	Medical Evacuation
MHE	Material Handling Equipment
MTL	Movement Team Leader
NEM	Net Explosive Mass
NEQ	Net Explosive Quantity
NEW	Net Explosive Weight
NM	Nautical Mile
NOTAM	Notice to Airmen
NVG	Night Vision Goggles
OPORD	Operation Order
OPSEC	Operational Security
PA	Public Announcement / Public Address
PIC	Pilot In Command
PIREP	Pilot Report
POD	Port Of Debarkation
POE	Port Of Embarkation
POL	Petroleum, Oil, Lubricants
PPR	Prior Permission Required
ROE	Rules of Engagement
SAM	Surface to Air Missile
SITREP	Situation Report
SOP	Standard Operating Procedure
SPINS	Special Instructions
TAP	Target Approach Point
TCT	Tactical Carriage of Troops
UTC	Universal Time Coordinated
VIP	Very Important Person
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

CHAPTER 3 PLANNING AND REPARATION

3.1 GENERAL

See ATP-3.3.4 for general planning considerations.

3.2 UNIT LEVEL PLANNING

In order to minimise the time for planning, aircrew require the following information:

1. Objective and general plan of operation;

2. Type of delivery method;

3. Sequence of delivery;

4. Payload to include numbers and types of cargo, weight of each individual piece, and number and type of passengers;

5. Minimum load to deliver;

6. Number and type of aircraft required;

7. Operational limitations into and out of the designated airfield;

8. Intelligence on enemy threats and locations;

9. Schedule of events and probable duration of the operation;

10. Contingency and alternative plans;

11. Specific land procedures (e.g. NORDO on LZ);

12. Deception planning;

13. Command structure and composition of transported forces;

14. Command structure and composition of AT assets;

15. Lines of communication;

16. Coordinate aircraft scheduling with the ALCC;

17. Authority handover time between support commander and package/aircraft commander;

18. Provide daily SITREP to the ALCC on aircraft/crew status and availability;

19. Provide national supply and services to aircraft resources;

20. Provide liaison to the ALCC/JFACC;

21. Unless specifically addressed by the ALCC, fully-manned with relevant LOs, Wings/units will be required to obtain detailed mission planning data for mission execution;

22. Execute missions as directed via JFAC-produced ATO/ACO.

3.3 COMMON PLANNING FACTORS

The following factors may be applicable to planners at joint, component and unit levels.

1. Mission:

   a. Rules of Engagement (ROEs);

   b. AT asset (slow mover) protection within or in coordination with Composite Air Operation package (COMAO);

   c. Plan for insertion and extraction of forces;

   d. Primary and alternate LZ/DZs;

   e. Meteorological information;

   f. Number and type of AT assets;

   g. Aircrew (Number and qualifications);

   h. Aircraft operating capabilities and limitations;

   i. Chemical, Biological, Radiological and Nuclear (CBRN) considerations;

   j. Loadmaster/ Air Movements Interface (e.g. load plans).

2. Intelligence:

   a. Enemy's order of battle;

   b. Target information including imagery;

   c. Limitations and intentions in the target area;

   d. Terrain intelligence and cartographic support.

3. Logistics:

   a. Petroleum, Oil, Lubricants (POL) requirements;

   b. Composition of air and ground sub elements;

   c. Supplies and equipment to include Material Handling Equipment (MHE);

   d. CBRN requirements;

   e. Restrictions on amount or type of supplies or equipment to be transported;

   f. Load compatibility;

   g. Host-Nation Support (HNS);

   h. Lines of Communications/Sustainment.

4. Other Considerations:

   a. Flight planning to include ACO and ATO;

   b. Navigational aid requirements;

   c. Co-ordination with other friendly forces in the operation;

   d. Combat Control Team (CCT) requirements;

   e. Crash and Fire Rescue (CFR) support;

   f. Air Surveillance and Control System (ASACS);

   g. Ground based Air Defence (GBAD).

5. Survival Escape/Evasion, Resistance and Extraction (SERE) considerations:

a. Counter intelligence situation;

b. Communication plan;

c. Operational Security (OPSEC);

d. Escape and Evasion plan;

e. Captive/Prisoner of war considerations.

3.4 USER RESPONSIBILITIES[2]

The user shall be responsible for:

1. Completing the “ground forces” section of the Air Movement Table and the preparation of the Aircraft Loading Table;

2. Organizing and setting-up the marshalling areas or camps;

3. Providing and operating any material handling equipment organic or peculiar to a particular type of unit which the transport unit cannot provide or arrange for;

4. Providing sufficient personnel as are requested by the Air Transport Unit for loading and unloading aircraft and the operation of equipment organic to the user;

5. Preparing cargo for air transport and air drops; marking the weight on each item of cargo; marking the centre of gravity on bulky items and marking dangerous cargo;

6. Preparing load manifests including, where necessary, a description of dangerous cargo;

7. Complying with applicable safety instructions as issued by the Air Transport Unit including those relating to the packing, documentation and handling of dangerous cargo;

8. Moving personnel and cargo to and from the transport aircraft or the designated loading or unloading point under the guidance direction and/or escort of the air transport unit.

[2] See also ATP-3.3.4.1 Chapter 4 and ATP-3.3.4.4 Chapter 4

3.5 AIR TRANSPORT UNIT RESPONSIBILITIES

The air transport unit shall be responsible for:

1. Issuing of information required for the air section of the air movement table;

2. Preparing the aircraft parking plan and forward this information to the user;

3. Providing all internal aircraft equipment for loading, securing and ejecting cargo;

4. Providing and operating or arranging for materials handling equipment required for aircraft loading and unloading;

5. Issuing of safety instructions, covering loading and unloading operations, in flight procedures and aerial delivery procedures;

6. Issuing applicable safety instructions for the packing of dangerous cargo;

7. Issuing instructions for the loading of cargo to be ejected in flight in accordance with the procedures of the nation providing the aircraft;

8. Ensuring that the ejection of cargo in flight are made in accordance with the procedures of the nation providing the aircraft or by other mutual agreement;

9. Supervising the loading and unloading of transport aircraft in air landed operations;

10. The weight and balance of the aircraft;

11. Providing a pre-flight briefing for personnel being transported;

12. Supervising the unloading of personnel and cargo and handing over copies of the manifests to the recipient;

13. Submitting a mission report.

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CHAPTER 3 ANNEX A BIO-SECURITY[3]

3.A.1 DEFINITION

Bio-Security is defined as prevention of the spread of bacteria, viruses, pests and flora and fauna which adversely affect humans, animals and flora between indigenous regions or between indigenous and non-indigenous regions.

3.A.2 GENERAL EXAMPLES

General examples are as follow:

1. Transmission of animal diseases some of which are transmissible to humans;

2. Transmission of diseases of plants and trees especially those affecting agricultural crops;

3. Movement of insects and animals which may carry disease, or are otherwise harmful to humans and/or animals or which may cause damage to agricultural crops;

4. Movement of plants from a region where they are endemic to one where they do not exist. Non-endemic plants may have a severe negative impact on a region's ecosystem. Plants may also transmit disease and pests even when a plant species exists in both regions;

5. Movement of food that may transmit many types of human and animal disease;

6. Movement of souvenirs and products made from animal skin, bone, feathers and tusks that may carry disease. Although not related to bio security, consider how a violation of the International Convention on the Trade in Exotic Species may affect a particular operation;

7. Movement of maritime species in bilge water and attached to ships' hulls which may transmit disease and/or cause severe negative impact to the marine ecosystem to which it is introduced.

3.A.3 GUIDELINES

Current changes in global meteorological conditions increase the probability of a species being able to establish a breeding presence in regions previously considered unviable to it. Also, the reduction in required time to deploy and recover military forces and increased numbers and locations of deployments has

[3] See also ATP-3.3.4.1, Chapter 5 Annex B

reduced the opportunity for bio-security threats to be negated by quarantine. Therefore, NATO and coalition nations must take all reasonable precautions to ensure bio-security threats are not transported between POEs and PODs by way of their personnel, equipment, supplies, packaging materials or means of transport. Nations participating in operations external to their home nations are requested to follow guidelines as follow:

1. Adhere to national and international civilian legislation unless applicable legislation provides specific exemptions for military transportation operations;

2. In cases where bio-security threats are unidentified or not adequately identified in any operation, a "worse case" scenario must be assumed;

3. Exemption from national/international bio-security legislation for obtaining scientific specimens of flora and fauna obtained as part of a military expedition may be requested.

4. Bio-security measures are required to minimise the wide range of threats depend upon identified threats in countries of departure, destination and transit; movement timeframe; and strength of existing civilian national and international legislation and level of inspection and enforcement infrastructure. Minimum measures which must be taken by each nation to reduce bio security threat are:

a. Remove all mud and organic material (especially manure) from all equipment and vehicles being transported between regions;

b. Prohibit transport of fruit, vegetable, dairy and meat products;

c. Prohibit transport of animal products (skins, feathers, bones, tusks, etc.);

d. Prohibit transport of plants (live plants, flowers, seeds, bulbs, etc.);

e. Prohibit transport of animals without veterinary issued certification of health;

f. Prohibit transport of wood products unless they are certified as having been treated against disease/infestation;

g. Inspect containers prior to loading and off-loading for mammals, snakes, and insect infestations. Ensure creatures do not board or disembark and that containers showing signs of insect infestation are fumigated at point of origin and again at POD if required;

h. Fumigate aircraft prior to departure from high risk areas;

i. Purge and rinse bilge tanks prior to departure and ensure ships hulls are clear of pests and fungi;

j. Establish procedures to certify shipments as having followed measures to reduce bio security threats.

k. The World Organisation of Animal Health based in Paris (http://www.oie.int) collates and disseminates animal disease information. They identify the most rapidly spreading diseases having the most devastating impact on socio-economic and public health as follow: Foot and Mouth, Swine Vesicular, Lumpy Skin and Newcastle Diseases; Rift Valley, African Swine and Classical Swine Fevers; Vesicular Stomatitis, Rinderpest, Peste des Petits Ruminants, Contagious Bovine Pleuropneumonia and Bluetongue; African Horse Sickness, Highly Pathogenic Avian Influenza and Sheep and Goat Pox.

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CHAPTER 4 OPERATIONS

4.1 INTRODUCTION

1. AT resources will seldom be sufficient to satisfy all demands, particularly in large operations. In planning for airlift, it is necessary to employ the minimum number of aircraft capable of completing the task in the required time. Decisions regarding the use of airborne combat forces are made in light of continuous planning at the highest joint headquarters in the field. Effective transport operations require extensive co-ordination and co-operation between all participating elements. Each nation will have their own particular method of deployment of equipment and personnel; they will be employed where necessary to complete the assigned task.

2. All operations/procedures in this chapter are not necessarily used by all the nations but may be a valuable source of information in a joint operation.

4.2 GENERAL

1. Tactical air transport operations can be defined as air land or air drop of personnel, supplies and/or equipment throughout a tactical environment, where tactical considerations are in use.

2. For each of the missions stated above certain rules and procedures apply. Annex A gives detailed guidance that can be adapted to the particular mission. For additional information on the aerial delivery of equipment or personnel, refer to ATP-3.3.4.4.

3. Depending on the type of operation, Air land is an important way to deliver cargo or personnel because, there is:

a. Increased payload efficiency;

b. Less preparation for troops and equipment;

c. Faster availability of troops on the ground after landing, and also;

d. Minimizes the risk of injury to personnel and damage to equipment.

(1) In addition, airdrop may be essential as well as offer some advantages:

e. Provides an element of surprise;

f. Places the force nearer its objective and in less time and;

g. Reduces aircraft exposure to the enemy.

4.3 AIR LAND

1. When supplies, passengers and cargo belonging to one nation are transported by an aircraft of another nation, the aircraft providing nation's SOPs will apply:

a. The aircraft commander has responsibility for the aircraft, its passengers and cargo at all times;

b. The loadmaster is responsible for the emplaning and deplaning of passengers and loading, securing and unloading of cargo. The duties of the loadmaster are detailed in Annex B;

c. The air-transported personnel must comply with the particular rules relating to the use of equipment installed on board the aircraft;

d. On the ground and in-flight the aircrew and the air-transported personnel must comply with the standard safety and emergency procedures. However, if special rules relating to the mission apply, air transported personnel must be briefed before emplaning.

2. Landing Zone Markings (refer to ATP-3.3.4.4) vary dependent upon location, safety requirements, as well as personnel and equipment availability. Aircrews will be briefed about the markings prior to the mission.

3. Tactical Arrivals (Annex D). A tactical arrival may be employed during all categories of airlift operations. Tactical landing operations play a significant role in moving and re-supplying ground forces. The following procedures are the most commonly used approaches when operating into airfields or LZs. The procedures contained herein are not all encompassing. Therefore, aircrews should use good judgement and sound airmanship to successfully accomplish the mission.

a. **Tactical VMC Arrivals.** Dependent upon the tactical situation and weather conditions permitting, the following approaches allow high-speed arrival from various altitudes and directions. Each nation will establish procedures and develop techniques for the following approaches: Random Shallow, Overhead and Random Steep. All approaches keep the aircraft in close proximity to the airfield and, apart from the straight-in, allow reconnaissance of the airfield.

(1) **Random Shallow Approach**. Minimizes threat from enemy fire. The initial approach may be flown either as:

(a) The straight-in;

(b) The teardrop;

(c) The abeam approach variation.

(2) **Overhead**. Allows maximum number of aircraft to recover in minimum time and airspace over the field. Flown as a straight-in approach to the runway at 1000-1500 ft AGL with a break overhead the threshold to enter downwind.

(3) **Random Steep.** Minimizes threat from small arms. Flown similar to the overhead, only from significantly higher altitudes. Arrival altitudes correspond to turns required.

b. **IMC Arrivals.** If approach aids are available, instrument approach procedures will be established. Aircrews must maintain published minima or own national minima whichever is higher.

4. Combat Off-load Procedures are useful in time-critical situations. Restrictions on size, weight and types of load are specified within each nation's publications. It requires 500-1000ft of clear area. In addition to placing the load on the ground, the load may be placed on top of upright oil drums. With modified loading ramps pallets can be pushed and rolled off the aircraft. Offloading can take place in the length of the aircraft.

5. Engine Running On / Off load. See Annex E.

6. Tactical Carriage of Troops. See Annex F.

7. Tactical Departures ensure minimum exposure to the aircraft as it departs under low airspeed and altitude.

a. **Low Departure.** Used when a low altitude escape is necessary, e.g. avoidance of enemy detection or fire. After take-off, maintain low altitude and an appropriate air speed until reaching a safe area, then climb to en route altitude.

b. **High Departure.** Used when a low escape is not appropriate and a permissive high or medium altitude threat environment exist. An example of this escape is to fly a climbing spiral at minimum flap retraction speed with flaps 50%. Upon reaching a safe altitude, retract the flaps, accelerate and continue climb at charted climb speeds. Actual time to climb will increase proportionally with bank angle.

c. Therefore, use the minimum bank required to remain within the confines of the field boundary.

d. **VIP or DV Movements.** They are national responsibilities. Each nation will refer to their national regulations and possibly coordinate with other nations, if necessary, for a specific event(s).

4.4 AIR DROP

Extraction, Extraction Zone (EZ), Air Drop and Dropping Zone (DZ) requirements, concerning markings, signals, definitions, etc., refer to ATP-3.3.4.4.

4.5 NVG OPERATIONS

The NVG standard procedures operations are described in Annex G.

1. Night operations degrade optically sighted threat systems and increase the probability that enemy defences may be in a lowered state of readiness. However, if NVGs are not used, the aircraft may be forced up to an altitude where radar tracking is more likely. Therefore, NVG operations provide a more tactically sound environment for the execution of a transport mission.

2. Although, the use of any night vision device can improve efficiency and effectiveness of night flight, all these types of devices have numerous and different limitations. In order to conduct operations in a safely manner, all aircrews involved in such type of operations must be familiar with those limitations, reported in Appendix 1 to Annex G.

3. Despite the advantages to NVG operations, they do not turn night into day. A detailed briefing involving all pertinent crewmembers must precede any NVG flying operation.

4.6 MISSION/DETACHMENT COMMANDER

1. Whenever aircraft/aircrew is assembled to perform missions away from home station, the C2 authority will designate a mission/detachment commander responsible for co-ordinating mission efforts. In the event of conflicting procedures, national mission/detachment commander(s) must ensure mission co-ordination is accomplished. The mission/detachment commander is the final authority to ensure aircrews have properly co-ordinated mission details.

2. For all multi-national operations, tasked units will ensure an appropriate level of ground and flight supervision is provided for the entire mission. Emphasis should be placed on who is the overall mission/detachment commander, and who are the subordinate commanders, for each aircraft type and nation in the operation.

4.7 AIRCRAFT COMMANDER RESPONSIBILITY AND AUTHORITY

1. An Aircraft Commander (AC), also known as Pilot in Command (PIC), is designated for all flights on the flight authorisation. The AC is:

a. In command of all persons aboard the aircraft;

b. Responsible for the welfare of the crew and the safe operation of the aircraft;

c. The final mission authority and will make decisions not specifically assigned to higher authority;

d. The final authority for requesting or accepting any waivers affecting the crew or mission.

2. The AC is the focal point for interaction between aircrew and mission support personnel and other external agencies. The local C2 agency is the focal point for all mission support activities. ACs must inform the C2 authority of any factor that may affect mission accomplishment. When transiting a stop without a C2 agency, it is the responsibility of the AC to ensure relevant mission information is placed into the C2 system by the most expeditious means available. The AC shall not permit the transmission of unencrypted classified / sensitive messages over unsecured networks. The transmission of messages is at the discretion of the AC. The AC will establish a point of contact with the appropriate C2 agency prior to entering crew rest.

4.8 MISSION CLEARANCE DECISION

1. The final decision to delay a mission may be made either by the executing agency or the AC when conditions are not suitable to start or continue a mission. Final responsibility for the safe conduct of the mission rests with the AC. If the AC refuses a mission, the mission will not depart until the unsuitable conditions have been corrected or improved so that the mission can operate safely. Another AC and aircrew, under the same limitations, should not be asked to take the same mission under the same conditions.

2. Re-routing or diverting a mission must be authorised by the C2 authority, except in an emergency or when required by en route or terminal weather conditions.

3. The C2 authority directing the re-routing or diversion is responsible for ensuring the aircraft is compatible with departure, en route, and destination requirement and facilities.

4. The AC will notify the appropriate C2 authority of any aircraft or aircrew limitation that may preclude diverting or re-routing the mission.

5. When directing an aircraft to an alternate airfield, the C2 authority will ensure the AC is provided existing and forecast weather for the alternate, notices to airmen (NOTAMs), and appropriate airfield information. If the planned alternate becomes unsuitable while en route, the AC will co-ordinate with the C2 authority for other suitable alternates. The C2 authority will co-ordinate with customs and ground service agencies to prepare for arrival. The AC is the final authority on selecting a suitable alternate.

4.9 AIRCREW RESPONSIBILITIES

1. The aircrew is responsible for in-flight reporting to keep the applicable C2 or executing agencies informed concerning mission progress. The aircrew shall not transmit unencrypted classified/sensitive messages over unsecured networks. The transmission of messages is at the discretion of the AC. This includes the following messages. Aircrews should refer to OPORD/SPINS for mission specific guidance.

a. **Departure Advisory:**

(1) Call-Sign/Mission number;

(2) ATD;

(3) ETA.

b. **En route Advisory.** Aircrews on operational missions should transmit an en route advisory to the destination C2 agency or, in the absence of a local C2 agency, to the ALCC (or current ops) when approximately 2-3 hours from destination which will include the following information:

(1) Call sign/Mission number;

(2) ETA;

(3) Maintenance status/Aircraft Serviceability (Go/No-Go);

(4) Meteorological conditions pilot report (PIREP) if required.

c. Arrival Advisory. Aircrews should transmit an UHF or VHF arrival advisory as soon as contact can be established with the destination C2 agency. The following information should be furnished:

(1) Aircraft call sign/Mission number;

(2) ETA.

(3) Maintenance status/Aircraft Serviceability (Go/No-Go);

(4) DV/VIP requirements;

(5) Number of passengers to be downloaded and number that is through manifested;

(6) Dangerous Goods and remote parking requirements;

(7) Additional service required;

(8) Number of pallets to be downloaded and number that is through manifested;

(9) Passenger and pallet space and weight available for the next mission segment;

(10) Fuel Requirements.

2. The aircraft commander can delegate a mandatory passenger briefing to another crewmember. The following items should be briefed in English by an aircrew member (generally the Loadmaster), or assisted by video. This brief should be given to the passengers prior to engine start or when practical. The briefing should be repeated when new passengers board at transit stops:

a. Brief introduction of briefer (rank, name, duty position, responsibility for passengers);

b. How and when to wear seat belts;

c. Life preserver location and use of emergency oxygen system as required;

d. Location of emergency exits, emergency egress procedures, and rally point (a point referenced from the aircraft where the AC or troop commander can take accountability);

e. Restrictions on accessing hold baggage during flight;

f. Specific movement, restricted areas within the aircraft (if any) when allowed to traverse during non-critical phases of flight;

g. Restrictions on use of electronic devices that interfere with flight instruments and / or aircrew communication systems;

h. Smoking restrictions on board and in vicinity of aircraft during stops;

i. Toilet facility location if available;

j. Availability of motion sickness bags;

k. Offer disposable ear plugs if required;

l. Waste disposal;

m. Answer any questions.

4.10 SAFETY PRECAUTIONS RELATED TO AIR TRANSPORT

1. Before each flight, the aircraft commander or his designated representative must explain the emergency procedures to all transported personnel, i.e. emergency, hook-up, abandon aircraft, forced landing, and ditching signals. The drop and emergency signals will be tested before taxiing.

2. Smoking will be prohibited inside the aircraft on the ground. In flight, permission to smoke will be granted at the discretion of the aircraft commander or his designated representative. Under no circumstances will smoking be allowed:

a. During refuelling;

b. When fuel vapours are detected in the aircraft;

c. In aircraft with fuselage supplementary fuel tanks;

d. During take-off;

e. During landing;

f. When jettisoning fuel;

g. In the cargo compartment when explosive, flammable or oxidiser cargo is aboard;

h. When oxygen is used.

3. All equipment (e.g. wheel chocks, tool boxes, luggage, cargo or safety equipment) must be lashed in the aircraft before taxiing. The lashing must be checked by the aircraft commander or his designated representative during pre-flight inspection and periodically during flight. Adequate normal and emergency exits will be kept clear of anything that would impede their use.

4. Each person over two years of age must be provided with an approved seat equipped with a safety belt.

5. Crew and passengers must be strapped in their seats before taxiing and will remain so until authorized, by the aircraft commander or his designated representative, to unfasten their seat belts. Seat belts will be fastened in flight when ordered by the aircraft commander. After landing, seat belts will only be unlocked after the aircraft has come to rest, all engines stopped as directed by the aircraft commander.

Note: This procedure may be modified in the case of assault landings.

1. The wearing of parachutes by crew and airborne personnel will be as prescribed by the national authority operating the aircraft.

2. In flight over water, life jackets will be worn at the discretion of the aircraft commander or his designated representative.

3. In flight, movements by passengers in the aircraft will be kept to a minimum. Only personnel authorized by the aircraft commander or his designated representative may enter the cockpit area.

4. The aircraft commander is responsible for ensuring that passengers obey the safety and emergency rules.

5. All dangerous goods will be stowed in such a manner that it will be easily accessible in flight without moving other cargo.

6. All dangerous goods will be loaded and stored away from oxygen and heating outlets, from sources of heat, and away from sources of sparks, such as auxiliary power generators and invertors

7. Visual signals to passengers:

OCCASION FOR USE	DESCRIPTION OF SIGNAL	PROCEDURE TO BE COMPLIED WITH
Take-off or landing or turbulence or In-flight incident	Arms spread on both sides of body, fists closed at belt level, draw fists simultaneously back to stomach.	Sit down Fasten belts Do not smoke
In Flight	The fists being joined on the stomach, spread arms, fists remaining at belt level.	Unfasten belts Moving about in aircraft allowed (limitation laid down by a/c commander) Smoking allowed (restrictions possible)

Table 1 Visual signals to passengers

4.11 PROCEDURES FOR TRANSPORTING DANGEROUS GOODS

1. The term Dangerous Goods, used in conjunction with airlift operations, applies to the classes and types of materials covered by Dangerous Goods Regulations (DGR) on the International Air Transport Association (IATA) and International Civil Aviation Organisation (ICAO). If required, Dangerous Goods not covered by IATA may be transported in accordance with the NATO Manual of Safety Principles for the Transport of Military Ammunition and Explosives (AASTP2). However, such clearances may be subject to national approval. Any national deviations to these definitions are listed in the country specific deviation listings of AMovP-6.

2. The Aircraft Commander will be briefed when the quantities specified in the Dangerous Goods Regulation are involved. A sample template, which has to be signed by the AC, can be found in ATP-3.3.4.1. Chapter 6. The briefing will cover the following points:

a. UN Classes of Dangerous Goods;

b. Proper shipping name;

c. Net Explosive Weight (NEW)/Net Explosive Quantity (NEQ)/Net Explosive Mass (NEM) for all class 1 explosives, and their subdivisions;

d. Gross weight/volume of Dangerous Goods classes 2 to 9;

e. Passenger restrictions;

f. Written notification indicating "prior permission required" (PPR) obtained from the next base to be visited;

g. Smoking restrictions;

h. Flight plan annotation requirements;

i. Isolated parking and taxiing requirements;

j. Security classification, if appropriate;

k. Notification of the requirement to contact the next base to be visited at least 30 Minutes prior to landing;

l. Placard requirements;

m. Escort team requirement, if applicable;

n. Other special handling requirements;

o. Cargo documentation and loading procedures;

p. Written notification of special diplomatic clearances.

1. The Loadmaster will verify that proper documentation, certification and identification of cargo have been provided.

2. **Safety Precautions**[4]**.** Dangerous Goods fall into many categories and the utmost precautions must be observed when handling or transporting these items. Load all Dangerous Goods to permit easy access in-flight without moving other cargo and to facilitate jettisoning. Adhere to the following safety precautions when loading Dangerous Goods as appropriate:

a. Ventilate the aircraft;

b. Placard the aircraft;

c. No smoking;

d. Fire extinguishers must be available;

e. Thoroughly inspect the cargo;

f. Stow cargo away from heater outlets;

g. Notify medical personnel in case of damage to radioactive materials;

h. Use protective clothing and equipment;

i. Special handling requirements (e.g. distance between different loads);

(1) Monitor distance from other aircraft and built-up areas when loading/offloading explosives;

(2) Do not load/offload explosives or refuel the aircraft if lightning conditions exist in the area or as national regulations dictate;

j. Control of cell phones and/or other RF emitting devices.

3. **Flight Planning.** When carrying Dangerous Goods, the AC will:

a. Enter "Dangerous Goods" and the mission identifier or flight number in the appropriate section of the flight plan. Refer to the Foreign Clearance Guide (FCG) for country specific requirements concerning over-flight when transporting Dangerous Goods;

b. If possible, plan the flight to minimize over-flying heavily populated or otherwise critical areas; Approach, landing, and take-off tracks are excluded;

[4] See also ATP-3.3.4.1, Chapter 6

c. Prepare a departure message at stations when a C2 centre is not available. The remarks section of the departure message should include the following information:

(1) Class of Dangerous Goods aboard and the UN class and division for explosives and NEQ/NEM/NEW, include the gross weight for the materials; request for special handling; for example isolated parking, security, technical escort teams, etc.;

(2) If Estimated Enroute Time (EET) remaining is less than 1 hour, or if other circumstances preclude timely message receipt at destination, notify the base of first intended landing by priority telephone of the ETA and information regarding Dangerous Goods.

4. **Before engine start.** Remove placards, when used, from the aircraft. Give the controlling agency parking location, approximate engine start time, and verify the firefighting agency has the Dangerous Goods information; otherwise, request the following be relayed to the firefighting agency:

a. Class of Dangerous Goods on board and for class 1 explosives, divisions and NEW/NEQ/NEM;

b. ETD.

5. **Enroute.** Normal procedures apply.

6. **Before landing.** Unless specifically prohibited by the theatre commander, Flight Information Publication (FLIP) or the FCG, contact the agency specified in the appropriate FLIP, base operations dispatcher, control tower or approach control at least 30 minutes (or as soon as practical) before ETA to announce that "Dangerous Goods" are on board and to verify that the Dangerous Goods message has been received. Transmit the Call Sign/Mission Number, ATD, and ETA. Request the information be relayed immediately to base operations or the civil airport manager, crash and fire protection agency, and other support activities. If landing at a civil airport without a tower, give the above information to the nearest civilian flight service station.

7. **Parking.** Some cargo requires the aircraft to be parked in an isolated area. When such cargo is aboard, the AC is responsible for ensuring the cargo is correctly identified to the tower or ground control. If the aircraft is not directed to an isolated area, identify the cargo again to tower or ground control. When identification is acknowledged, the host is solely responsible for selecting the parking area. Should host procedures be questionable, submit trip reports or hazard reports as appropriate, to document such occurrences.

8. **Placarding.** The military host is responsible for placarding aircraft. When missions operate on non-military bases, the briefing to the AC will include placarding requirements and, if required, placards will be furnished at the on-load base. The shipper and receiver must make prior arrangements with the airport manager for shipments of Dangerous Goods requiring placarding, including the need for cargo identification, fire-fighting procedures and isolated parking requirements.

9. **Unscheduled Landing.** Transmit the following information to the appropriate ATC facility as follows:

a. Nature of emergency and intent to land (if applicable);

b. Aircraft position and ETA;

c. Number of personnel and location in aircraft;

d. Fuel on board;

e. Type, quantity and location on aircraft of Dangerous Goods on board.

4.12 GROUND OPERATIONS

There may be significant differences in scope of responsibilities between nations' air movement organisations, particularly with respect to full load planning, loading and weight and balance preparations. Of critical importance is the need for a close and co-operative working relationship between aircrew and air movement's personnel.

1. **Aircraft Services.** Ensure the following aircraft services, although not in any particular order, have been arranged prior to the aircraft's arrival:

a. Aircraft-parking bay;

b. Requirements for aircraft with Dangerous Goods;

c. Refuelling/defueling facilities;

d. Ensure a procedure for billing of services provided;

e. Ground Power;

f. Catering;

g. MHE/aircraft tow bar/towing-arm and push-back team;

h. Customs and Immigration officials;

i. Aircraft marshal and wing-tip walker;

j. Water and Lavatory Truck;

k. Air Conditioning, External Heating and de-icing;

l. Cabin Cleaning Services;

m. Liquid/Gaseous Oxygen, Liquid/Gaseous Nitrogen.

2. **Vehicle/Equipment Marshalling.** Ensure all vehicles and equipment approaching aircraft are to be used for their intended purpose. Vehicles within 3 metres of an aircraft are to be marshalled. All vehicles parked in the vicinity of aircraft are to have at least one wheel chocked.

3. **Re/Defueling.** Ensure grade of required fuel and means of delivery are available. Assets should be identified that can be used for de-fuelling aircraft.

4. **Security.** Ensure adequate security measures are in place commensurate with the aircraft role and load. Only personnel required and authorised to be in the vicinity of aircraft are allowed access to the Apron.

5. **Passenger Access.** Ensure necessary emplaning and deplaning procedures and facilities are arranged. Pedestrian access to the aircraft operating area must always be controlled. Passengers should be fully briefed regarding safety measures prior to entering the aircraft operating area.

6. **Vehicular Access and Control.** Ensure access to the apron is restricted to only those personnel that have a justified task to complete. Drivers and passengers that are not cleared for access to the apron must be escorted at all times. All drivers operating on the airfield are to have the appropriate license and qualifications for the vehicles/equipment they operate.

7. **De-icing and Snow Clearing.** Ensure de-icing facilities are arranged in order to meet aircraft departure slot times and snow clearance is carried out to ensure safe access to the aircraft by personnel, passengers and vehicles.

8. **Ground Communications.** Ensure approved frequencies and correct communication security procedures are adhered to.

9. **Ground Support Equipment (GSE).** Ensure ground power is applied to and removed from aircraft only by qualified personnel and after crew authorization has been given.

10. **Liquid/Gaseous Oxygen, Liquid/Gaseous Nitrogen.** Ensure handling and storage by properly by qualified personnel.

11. **Health and Safety.** Ensure all personnel operating in the vicinity of aircraft are in possession of effective noise protection (ear defenders), protective clothing and high visibility clothing.

12. **Bio-Security.** Ensure prevention measures are taken.

13. **Customs and Immigration Regulations.** Ensure Customs, Immigration and Agriculture personnel are informed of all planned aircraft arrivals, requiring the above. Prior to off-loading, customs, immigration and agriculture clearance must have been obtained.

14. **Firefighting.** Ensure adequate man-portable firefighting equipment is available for aircraft start up crews when on board systems are not available. The airfield fire section is to be advised of any requirement to provide fire cover for aircraft with loads that require this (e.g. explosives or MEDEVAC passengers) and for aircraft being refuelled with passengers on board.

15. **Lighting.** Ensure adequate lighting is available.

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CHAPTER 4 ANNEX A BRIEFING GUIDANCE5

4.A.1 COMMANDING OFFICER/DETACHMENT COMMANDER

1. Introduction of Unit Commanders present at briefing;
2. Mission Objective;
3. Outline of operation;
4. D-Day and H-Hour;
5. Air units participating;
6. Airborne/ground units participating;
7. Number of transport aircraft participating;
8. General location of LZ/DZs;
9. Delivery Methods;
10. Safety.

4.A.2 MISSION PLANNING CELL

1. Meteorological Information:
   a. General weather trends;
   b. Route weather;
   c. Weather over the DZ or LZ with special emphasis on visibility, cloud base, surface wind, QNH and last rain;
   d. Route winds;
   e. Base weather on return.
2. Intelligence / Intelligence Officer.
   a. Enemy.
      (1) Ground situation:
         (a) Identity, strength, weakness, deployment of forces in the target area;

(b) Location, strength, weakness, deployment of potential counter-attack forces;

(c) Location, strength, weakness, deployment of ground units which can influence aircraft during ingress and egress.

(2) Air defence situations:

(a) Identity, strength, deployment, capabilities and limitations of enemy air units, which can influence ingress/egress and airborne forces on the ground;

(b) Identity, strength, deployment, capabilities and limitations of tactical and strategic air defence units, which can influence the ingress/egress of forces, involved in the operations.

b. Security.

c. Escape and Evasion:

(1) Procedures;

(2) Aids;

(3) Routes and Tactics;

(4) Safe Areas;

(5) Laws of Armed Conflict for involved nations;

(6) Rule of Engagement;

(7) Information to be given to the enemy if captured.

d. Survival with national Combat Search and Rescue capabilities.

e. Challenge, counter-sign, ISOPREP and authentication procedures.

f. Intelligence reports requirement.

[5] Information duplicated in ATP-3.3.4.4. Chapter 4

4.A.3 AT MISSION COMMANDER

1. Sequence of Events:
    a. Runways to be used;
    b. Taxi routes;
    c. Aircrew stations time at aircraft;
    d. Communications checks;
    e. Engine start time;
    f. Taxi time;
    g. Take-off time;
    h. Air Refuelling Control Time;
    i. Time over target;
    j. Recovery procedures.
2. Marshalling:
    a. Departure airfields;
    b. Aircraft parking plan;
    c. Aircraft chalk number;
    d. Vehicle routing on airfield.
3. Aircraft loading and enplaning:
    a. Total number of personnel;
    b. Total amount and type of cargo;
    c. Specific loads by chalk number designated;
    d. Type of equipment and weight of loads for heavy drop aircraft;
    e. Loading times;
    f. Collection of load manifests.

4. Emergency procedures:
    a. Abandoning aircraft;
    b. Crash or emergency landing;
    c. Ditching;
    d. Emergency airfields;
    e. Safe Areas;
    f. Search and rescue forces;
    g. Abort procedures.
5. Spare aircraft procedures.
6. Contingency Plans.
7. Objective Area Procedures:
    a. Signals for clear to drop or to land;
    b. DZ or LZ identification features as seen from the air;
    c. Visual/electronic aids.
8. Slow mover Protection through integration with COMAO:
    a. Number and type;
    b. Nationality;
    c. Rendezvous point;
    d. En route and target procedures.
9. Electronic Warfare procedures.
10. Crew Brief.

4.A.4 COMMUNICATION PLAN

1. Call sign, words and authentications.
2. Frequencies.
3. EMCON procedures.
4. Radio silence procedures.

5. Emergency procedures.

6. Security and codes.

7. Other emitters.

4.A.5 CREW CONSIDERATIONS

1. Pre Take off /take off Procedures/Considerations:

    a. Sequence of events;

    b. Parking positions;

    c. Taxiing procedures;

    d. Ground operations;

    e. Take off and departure procedures.

2. En route Procedures.

    a. Courses (tracks) times and distances.

    b. Assembly point.

    c. En route procedures including de-confliction.

    d. Ingress procedures.

    e. Objective area data:

        (1) Target approach point (TAP)/initial (IP);

        (2) Line of flight to LZ;

        (3) LZ escape procedures.

    f. Egress procedures.

    g. Recovery airfield procedures.

    h. Force rendezvous for ground forces.

3. Navigation aids:

    a. En route;

    b. On the LZ (electronic and/or visual).

4. Altitudes, Heights and Pressure Settings.

5. Last minute considerations.

6. Time checks.

7. Debriefing (Where, Who and When).

CHAPTER 4 ANNEX B DUTIES OF THE LOADMASTER AS THEY CONCERN THE TRANSPORTED UNITS[6]

1. The Loadmaster is a representative of the Aircraft Commander relative to matters pertaining to the reception, loading and despatch of troops or cargo from the aircraft. He will receive a briefing on his duties from the Aircraft Commander prior to each mission.

2. The Loadmaster will be present at the aircraft when passengers and/or cargo are delivered to the aircraft for loading and will supervise loading operations. He will accompany the Aircraft Commander/Jumpmaster during the joint inspection of the aircraft aerial delivery equipment.

3. The Loadmaster, while in flight in the vicinity of and over the drop zone.

a. Will relay all messages from the Aircraft Commander to the Jumpmaster when required.

b. Will check that the air-transported personnel do not jeopardize the safety of the aircraft.

c. Supervise the preparation of cargo for despatch.

d. Will transmit the Aircraft Commander's orders when required.

e. When it is no longer safe to jump, or to despatch supplies/equipment, or when the pilot has turned the green light off and the red light on, will notify paratroopers who have not yet jumped or will ensure (when required) that no further supplies/equipment will be despatched.

f. The LM shall inform the Aircraft commander with following calls:

(1) "Load Clear" or equivalent when all load (jumpers or cargo) to be dropped has left the aircraft.

(2) "Load Secure" or equivalent when, after an incident, emergency or any other situation where the planned drop was only partially completed and the remaining load is secure for continued flight.

(3) "Cargo Area Secure" or equivalent when, after completion of the normal drop checklist the cargo area is secure for continued flight.

g. Is responsible for retrieval of static lines.

h. In the event of a parachutist being towed behind the aircraft, the crew will follow the procedures as outlined in ATP-3.3.4.1 and the national emergency procedures. In case of a hung-up load the Loadmaster will carry out the national emergency procedures.

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CHAPTER 4 ANNEX C LANDING ZONE (LZ)

For details of LZ markings/criteria see ATP-3.3.4.4, Chapter 6.

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CHAPTER 4 ANNEX D TACTICAL ARRIVALS[7]

4.D.1 LOW ALTITUDE ARRIVALS

Low Altitude Arrivals are used primarily when low altitude ingress is necessary, e.g. avoidance of early warning radar coverage or radar-guided surface to air missiles (SAM) near the airfield. All manoeuvring is done at low altitude. These random shallow approaches can be entered from any direction at en route altitude and airspeed.

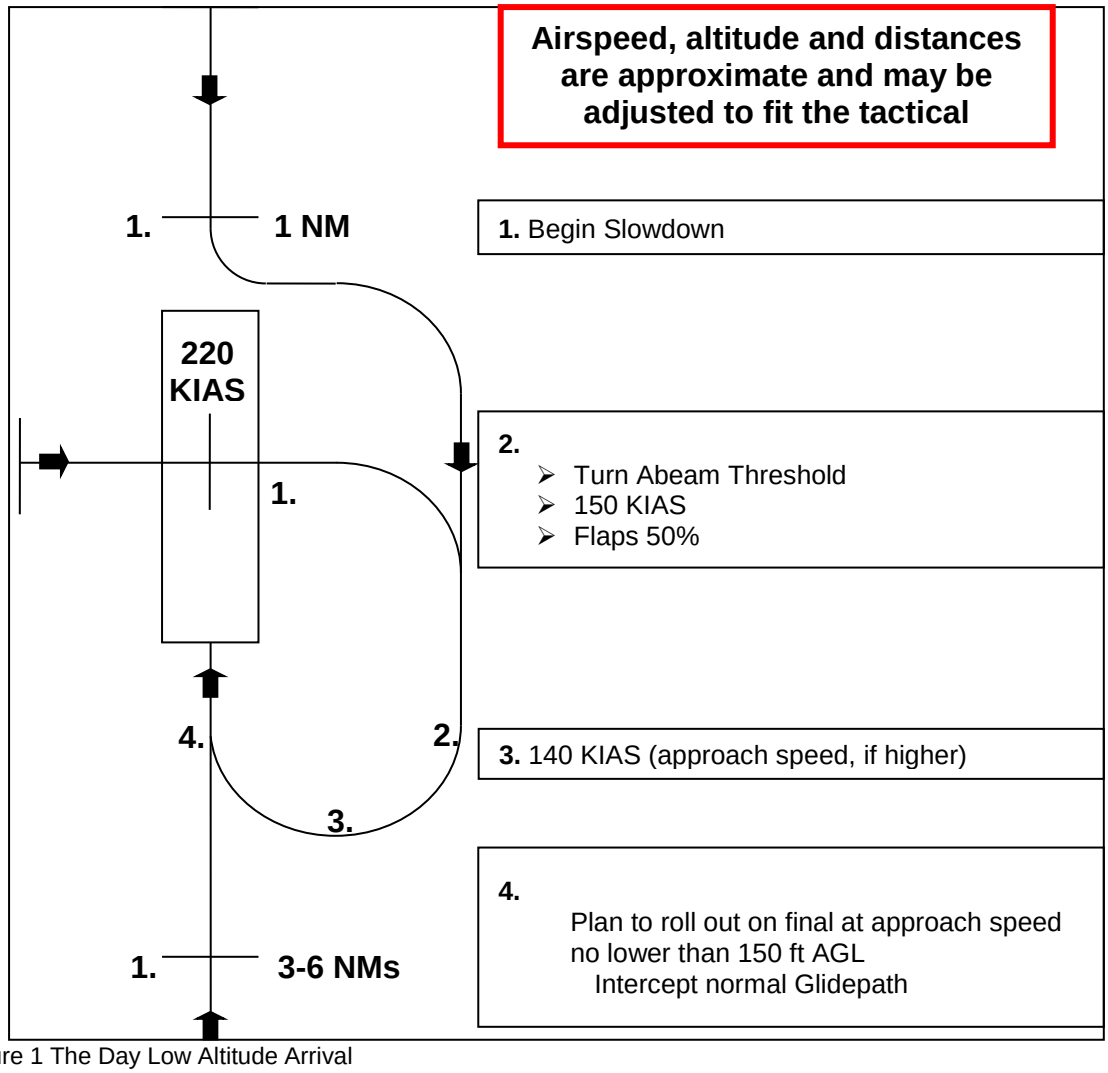


Figure 1 The Day Low Altitude Arrival

[7] All air speeds and flap settings in this annex are related to the C-130 and are provided for reference only.

1. **The Straight-in Approach** appears the simplest, but may be the most difficult to execute consistently. The lack of turn's result is that the energy dissipation problem is one dimensional, making the timing of slowdown critical. The key to a successful approach is timing slowdown to obtain the proper configuration. For the C130, approximately 3 NMs are required to slow from 200 KIAS to threshold speed. From 250 KIAS, plan on 4.5 to 5 NMs. These distances assume the aircrew configures "on airspeed to landing configuration" and allows approximately 0.5 miles at threshold airspeed. Tail winds or increased gross weights require an even earlier slowdown. Distances will also depend on aircraft type. Using an angling final, a dogleg, or an entry to base using the same basic techniques may vary this approach.

a. Advantages:

(1) No low-level manoeuvring required;

(2) Minimum exposure to threat environment.

b. Disadvantages:

(1) Slow airspeed throughout approach. Slowdown is initiated further from airfield than other types of approaches;

(2) Aircraft is easily recognisable, if seen;

(3) Slowdown timing and entry parameters are critical.

2. **The Teardrop Approach** variation is very similar to a circling approach to the opposing runway; the primary difference is that the random shallow is entered at en route airspeed rather than fully configured with energy dissipating throughout the approach. Also, a 100m/300-ft pattern altitude is somewhat lower than most circling approaches. Start slowing down about 1.5 NM from the approach end, with 30 degrees displacement from the runway axis 1 NM from the approach end, with 45 degrees displacement from the runway axis. Turn base when the aircraft is even with the landing threshold.

a. Advantages:

(1) Pattern is flexible enough to allow adjustments to manage energy and still stay within close proximity to the airfield;

(2) Allows conversion from a straight in to the opposite runway while maintaining ingress airspeed until close proximity to the airfield;

(3) LZ acquisition is about the same as a straight in, but less precision is needed due to a more flexible pattern.

b. Disadvantages:

(1) Manoeuvring at low altitude and airspeed;

(2) The usual "picture" is likely to result in too tight a pattern and an overshoot.

3. **The Abeam/Perpendicular Approach** variation offers flexibility and keeps the aircraft close to the airfield. Approach from perpendicular to the runway sets the aircrew up for landing in either direction and allows reconnaissance of the field as it is flown over. The key parameters are field crossing at 220 KIAS, initiate base turn at not more than 150 KIAS, flaps set to 50 per cent, and landing gear in transit. If the pattern is entered with more than 220 KIAS, a downwind extension is likely.

a. Advantages:

(1) Ingress airspeed maintained until over the airfield;

(2) Easily adapted to landing either direction;

(3) Constant turning degrades the aircraft as a target;

(4) The airfield is approximately 0.5 miles wide when approached from the beam, reducing the precision required for navigation.

b. Disadvantages:

(1) LZ acquisition may be more difficult, particularly for dirt strips or austere fields without adequate ground references;

(2) Considerable manoeuvring in close proximity to the ground with decaying airspeed;

(3) Possible losses of position awareness during turn to downwind; visual-contact may be lost passing the runway.

4. **The Spiral Approach** variation allows pattern entry at maximum airspeed but requires planning to ensure entry is within the required parameters. The pattern is a continuous energy decay manoeuvre, and each of the previous patterns is included in the spiral. The pattern allows a depletion of energy and the ability to land in the absolute minimum time. The key parameters for this approach are offsetting the aircraft 1 NM abeam the touchdown zone at 250 KIAS, crossing the runway at 90 degrees and 220 KIAS, and 150 KIAS with flaps 50 per cent and gear in transit before starting the base turn.

a. Advantages:

(1) Maintains higher airspeed until very close to the airport;

(2) Constant turning while changing airspeed and configuration degrades the aircraft as a target and provides flexibility for energy management.

b. Disadvantages:

(1) Manoeuvring close to the ground;

(2) Possible loss of position awareness as the runway passes to the 6 o'clock position;

(3) Pattern entry point is difficult to determine.

5. **The Overhead Approach.** For an overhead approach, break as the tactical situation permits with approximately a 45-degree angle of bank and retard the power to flight idle after the bank is established. Make a level turn to downwind with power reapplied as necessary to maintain 150 KIAS. Maintain 140 KIAS (or approach speed if higher) until wings level on final.

a. Advantages:

(1) Expedites arrival;

(2) Keeps airspeed high until overhead the airfield.

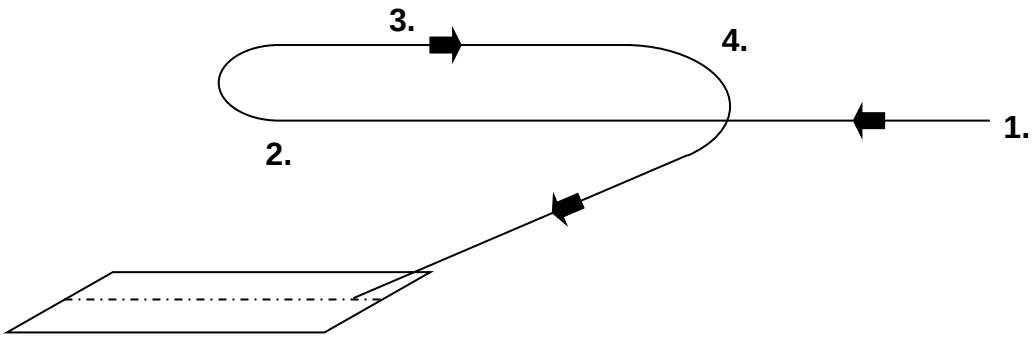
b. Disadvantage:

(1) Aircraft is easily observed;

(2) Lower airspeed and banking exposes wings and engines to ground fire and SAMs.

THE OVERHEAD APPROACH

Airspeed, altitude and distances are approximate and may be adjusted to fit the tactical situation



1. Initial
- Runway Extended Centreline
- 1500 feet AGL
- 200 KIAS

2. Break
- Break as required by Tactical Situation
- 45 Degree of Bank
- Idle Power
- Level Turn

3. Configure
- 150 KIAS
- Flaps 50%
- Gear Down
- Before Landing Check

4. Final Turn
- 140 KIAS (Approach Speed, if higher)
- Plan to roll out on final at approach speed no lower than 150 ft AGL
- Intercept normal Glidepath

Figure 2 The Overhead Approach

4.D.2 HIGH ALTITUDE ARRIVALS

High Altitude Arrivals are used primarily when a high or medium altitude ingress is necessary (e.g., small arms environment and a permissive high or medium altitude threat environment exists), thus allowing some reconnaissance of the field as you fly over. Initial altitude, airspeed, and heading are based on the threat.

1. **The Random Steep Approach** is a high altitude manoeuvre conducted in VMC. It is designed as an alternate method to approach an airfield when small arms are the primary threat and the field perimeter security is limited (usually 1850-5400 meters / 1 to 3 nautical miles radius) or when terrain does not permit a normal traffic pattern.

a. Advantages:

(1) Rapid descent to reduce exposure time;

(2) Continuous turns and descent may compound tracking;

(3) Over-flight of the threat area is minimised.

b. Disadvantages:

(1) Requires careful pre-planning to perform properly;

(2) Not all nations may be trained in this manoeuvre.

c. Plan slowdown for configuration approximately 4 miles from the break. Remember to use actual ground speed and drift at altitude.

d. Prior to the break, select prominent ground features to aid in staying within the "protected" airspace when the runway is not in sight. Additionally, get the picture of altitude versus runway length. Remember, an 1800 m/6,000 ft strip at 3000m/10,000 ft AGL could look the same as a 900m/3,000-ft strip at 1500m/5,000 ft AGL.

e. Review the low key or final base turn MSL altitude. As a technique, add field elevation plus 600m/2,000 ft.

f. Review flight characteristics and limitations from the Technical Operations Manual.

g. Wings level descent at 140 KIAS is about 800mpm/2,500 fpm.

h. Configured, at 140 kts, 45 degrees of bank, the turn radius is charted at 570m/1,900 ft, which means that the aircraft should be no further from the runway centreline than 3,800 ft (.625 NM). In addition, the aircraft is turning at a rate of 7.5 degrees per second, which means that a 180-degree turn will be completed in 22 seconds. During that interval, the aircraft will descend at least 480m/1,650 ft.

i. Turn radius for 30 degrees of bank is about 960m/3,200 ft with a rate of turn of approximately 4.5 degrees per second. A 360-degree turn will lose approximately 1100m/3,700 ft (90 seconds at 800-mpm/ 2,500 fpm).

j. Plan roll out on final between 150-320m/ 0.5 and 1 mile at approximately 100-200m/ 300 to 600 ft AGL. This will provide a comfortable glide path.

k. Selection of Manoeuvre. The desired outcome of the random approach is to place the aircraft on final (never less that 100m/ 300 ft and 400m/ 0.25 miles from the runway) wings level, above threshold speed so that a safe landing may be executed. The most common type of approaches includes the following:

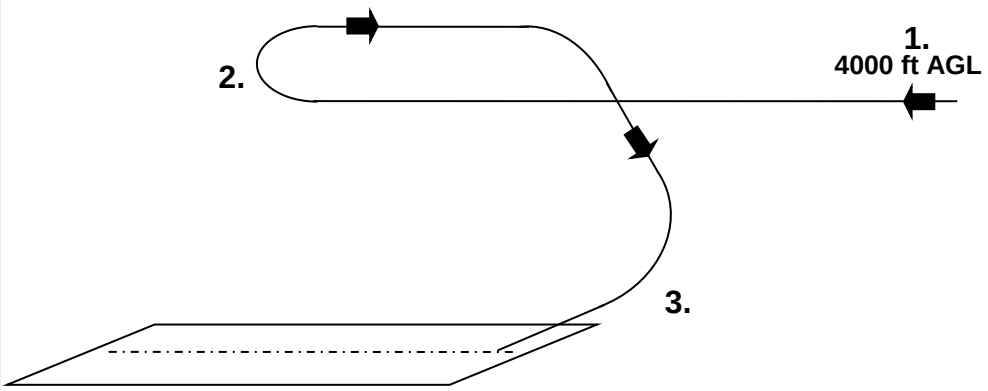
(1) A modified 360-degree turn initiated at 1450m/ 4,500 ft AGL and 140 KIAS;

(2) A 270-degree turn to base and 140 KIAS;

(3) An opposite direction approach initiated at 1200m/ 3,500 ft AGL and 140 KIAS.

THE RANDOM STEEP APPROACH

Airspeed, altitude and distances are approximate and may be adjusted to fit the tactical situation



1. Initial
- Gear Down
- Flaps 100%
- Before Landing Checks

2. Break
- Break as required by Tactical Situation
- -140 KIAS (approach speed, if higher)
- Throttles Idle

3. Final
- Plan to roll out on final at approach speed no lower than 150 ft AGL
- Intercept normal Glidepath

Figure 3 THE RANDOM STEEP APPROACH

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CHAPTER 4 ANNEX E ENGINE RUNNING ON/OFF LOAD (ERO)[8]

4.E.1 GENERAL

ERO refers to the rapid loading and offloading of troops, vehicles and man-portable equipment with the aircraft engines still running. It reduces the ground time of the aircraft, thereby increasing the flow of aircraft through the APOD and reducing the time spent in potentially hostile conditions.

4.E.2 LOAD SUITABILITY

1. Generally, troops, vehicles and man-portable equipment are suitable candidates for ERO but careful consideration must be given to the nature of each particular load. Nations are required to provide drivers for all vehicles. The following loads should only be subject to ERO under exceptional circumstances:

a. Loads that require a prime mover vehicle or Aircraft Handling Equipment to facilitate the onload/off load.

b. Large tracked/wheeled loads where communication with the driver is of prime importance.

c. Any load requiring the use of the aircraft winch.

d. Any load where injury to personnel or damage to the aircraft may result.

4.E.3 AUTHORIZATION

1. This procedure is only to be used where operationally necessary due to the dangers that exist around the aircraft and must be used in close liaison between aircrew and Movement Team Personnel. EROs may be authorized in the following situations depending on national restrictions:

a. When an ALCC (or Combined Air Terminal) has been established, on the proviso that other nations' movement personnel have been trained to conduct EROs.

[8] Information duplicated in ATP-3.3.4.1, Chapter 5, Annex L

b. When specifically tasked by the HQ with operational control of the aircraft of participating countries.

c. On an exceptional basis with the joint concurrence of the AC / Movement Team Leader. This decision may need to be justified on return to base.

4.E.4 MOVEMENT TEAM AND AIRCREW RESPONSIBILITIES

1. A Movements Team may form part of the support crew on an aircraft or as the team operating from a forward airhead.

2. The aircrew maintain control of the ERO in accordance with their respective standard operating procedures and the Loadmaster assumes overall control of the freight bay during loading and offloading operations of an ERO. The Movements Team is responsible for the control of loading and offloading operation outside of the cargo area. It is essential that the Movements Team Leader and the Loadmaster maintain close liaison during loading and offloading operations.

3. Movement Team Leaders are to abide by these procedures and are to supervise closely the safe actions of Movements Team personnel, vehicle drivers and troops being enplaned and deplaned.

4. Control of access to the aircraft rests with the Loadmaster.

4.E.5 PERSONNEL REQUIREMENTS

Personnel requirements need to be based on conditions, nature and amount of cargo and/or passenger loading/unloading. The number should be a part of pre-mission coordination.

4.E.6 PERSONAL EQUIPMENT REQUIRED

1. All Movements Team Personnel should be in possession of:

a. Safety goggles.

b. Gloves and ear defenders.

c. Reflective garments (belts, vests) for use at night during non-tactical movements.

d. Combat equipment in line with national requirements for tactical exercises and operations.

4.E.7 TEAM EQUIPMENT REQUIRED

1. The Movements Team should be in possession of the following equipment:

   a. Extra ground loading ramps as available.

   b. For night operations, marshalling wands or chemical lights.

4.E.8 TEAM BRIEFING

1. The Movements Team Leader (MTL) is to brief personnel thoroughly on the handling of ERO designated aircraft. The MTL is to ensure that the team is aware of:

   a. The formation/emergency meeting area.

   b. The route and approach of the aircraft to the offload / onload site.

   c. Their route to and from the aircraft.

   d. The load aboard the aircraft and the offloading sequence.

   e. The position and role of each team member, including aircraft and vehicle marshals.

   f. The specific orders relating to individual instructions and signals to be given to Movements Team personnel or passengers.

   g. Support equipment position (Aircraft Ground Equipment, Movements Handling Equipment).

4.E.9 COMMUNICATING WITH THE INBOUND AIRCRAFT

1. The Movements Team Leader will ensure that the AC has been briefed with regard to:

   a. The aircraft parking area.

   b. Onload and offload, to include whether the aircraft's crew expects an ERO.

   c. Any safety considerations for aircraft movement whilst on the ground and/or onloading and offloading.

4.E.10 PREPARATORY ERO PROCEDURES

1. **Aircraft Marshalling**. If there are no ground engineering staffs available, and the situation allows, the Team Leader is to detail a qualified movement's team member to marshal the aircraft.

2. **Team Positioning Inside Aircraft**. If the Movements Team is on the inbound aircraft, restraint may be reduced to the minimum during the taxi-in, which for standard vehicles would be at minimum chains fore and aft or as per national procedures. If already on the ground, the team is to be positioned at the designated meeting point; which is clear of engine exhaust, outside of the aircraft turning circle and at a minimum distance from the aircraft of 30m/100 ft. The team must remain in this position until the team leader has received the all clear signal from the Loadmaster indicating that the aircraft and crew are ready and that the team is clear to approach the rear cargo door.

3. **Approach to the Aircraft**. The team is to walk parallel to the aircraft wing at a distance of at least 25m / 75 ft to the aft of the aircraft ramp. Once on the centreline, walk towards the rear of the aircraft staying clear of the ramp until it is fully grounded. This is the 'safe route'.

4. **Liaison with the Loadmaster**. The Movements Team Leader is responsible for liaising with the Loadmaster:

a. Collecting the inbound manifests (where applicable).

b. Briefing the Loadmaster on the actions of the Movements Team personnel.

c. Informing the Loadmaster to brief on-board passengers on deplaning instructions.

d. Providing the Loadmaster with details of outbound loads where applicable. This should be limited to weight and distribution of the upload only (ideally passed to the Loadmaster inbound to the airfield) to enable basic trim calculations.

5. Due to the nature of EROs and the need to control access to the aircraft closely, other tasks are required in addition to purely onloading and offloading an aircraft:

a. The Team Leader, or nominated deputy, is to act as the ER Ground Co-coordinator taking position at the marshalling point 25m / 75ft behind the aircraft ramp in order to control all movement between the reception area and the rear of the aircraft. No one is to be allowed access to the rear of the aircraft unless specifically cleared by the ERO Ground Coordinator as directed by the Loadmaster.

b. If aircraft engines are left running on both wings, 2 additional ground team members are to be appointed to act as wingmen (one at the end of each wing) for the entire time of the ERO to ensure that no personnel encroach into the danger area. This may be reduced to one wingman if an engine or engines are running on only one wing. The use of wingmen may not be feasible in some operational circumstances.

c. When several aircraft are aligned in trail formation, onloading/offloading EROs must not be conducted unless absolutely essential (e.g. a/c is receiving ground fire). Instead, aircraft should taxi in and park 45 degrees parallel to the taxiway for this type of operation.

4.E.11 OFFLOADING FULL PASSENGER-FIT AIRCRAFT

1. Primarily the team will release the net/straps from the baggage/equipment stack (if any). Passengers travelling on the aircraft may be utilised to assist with this task. On a signal from the ERO Ground Co-ordinator, the passengers will be directed along the safe route to their reception area:

a. Passengers will move directly aft of the aircraft a minimum of 15m/50 ft before stopping and 90m/300 ft before turning.

b. Passengers will remain in the control of the ERO Ground Co-ordinator or a designated representative until their arrival at the control point.

4.E.12 VEHICLE/PASSENGER LOADS

Prior to landing, the Loadmaster will brief all personnel in the cargo compartment regarding their locations, duties, and responsibilities during the ERO.

1. Brief drivers on the following items:

a. Exact offload procedures and applicable signals to be followed.

b. When cleared by the Loadmaster, to assume their position.

c. Actuate brake pedal sufficiently to ensure brakes are operational.

d. That for vehicles requiring a build-up of air pressure to provide brake pressure build-up must be delayed until engine start.

e. Vehicle engines are not to be started until the aircraft comes to a complete stop, cargo ramp and door are open, and only when directed by the Loadmaster.

f. Vehicle parking brakes will not be released until all restraint is removed and cleared by the Loadmaster.

g. Vehicles will proceed directly aft of the aircraft at least 15 m/50 feet before turning and/or 100 m/300 feet before stopping.

2. Brief troops on the following items:

a. Secure baggage aboard vehicles, if applicable.

b. Deplane when directed by the Loadmaster.

c. Proceed directly aft of the aircraft at least 15 m/50 feet before turning and/or 90 m/300 feet before stopping.

3. Unless cargo size or location dictates otherwise, troops are to be offloaded before the cargo is offloaded and enplaned after cargo is loaded. Once this is complete, the traffic team will start/complete unlashing the most aft vehicles first; moving forward, lashings must be clear of the vehicle tread ways to avoid damage to the aircraft floor. While this is happening the vehicle drivers are to be briefed on their route to the reception area by the Loadmaster or Movements Team Leader. The Loadmaster will direct all onload and offload operations using pre-briefed signals. Other qualified Loadmasters may perform these duties; however the aircraft LM retains overall responsibility for the operation. Once the ERO Ground Co-coordinator is satisfied that all the lashings are clear of the tread ways, and the Movements Team is clear, the vehicles are to be marshalled along the safe route to the reception area. Personnel on/offload through the aft cargo door and ramp.

a. Passengers will be escorted by a crewmember or other qualified personnel, when onloading or offloading through the aft door and ramp.

b. Auxiliary ground loading ramps should be used.

4. Personnel onload and offload through the crew entrance door only.

a. Normally Loadmasters on interphone will place themselves with cord held taut at approximately 7 m/20 feet at an angle of 45 degrees from the aircraft axis.

b. Brief offloading personnel to secure loose articles and remain forward of the interphone cord.

c. No onloading personnel should approach the aircraft until the Loadmaster is in place.

4.E.13 OUTBOUND LOADS

In general outbound loads are governed by the same principles as the inbound loads.

4.E.14 PREPARATION

All vehicles and trailers are to be checked that they have been prepared in accordance with IATA DGR, ICAO, or National Dangerous Good Regulations as previously agreed to by movement control authorities of the participating nations. Passengers are to be briefed to ensure that all weapons have been made safe (with safety catches applied) and that they are carrying no undeclared dangerous articles.

4.E.15 LOADING

1. **Engine running offload.** When loading for an engine running offload, all trailers and vehicles should be loaded in a manner to permit an expeditious offload, normally trailers and vehicles will be reversed in to be driven off expeditiously.

2. **Engine running onload.** When loading for an engine running onload, all vehicles should be loaded in the most expeditious manner.

NOTE:
Once the lashing is complete, the passengers may be enplaned using the approach method and safe route. Conditions permitting, prior to aircraft departure, a foreign object sweep should be carried out. The Movements Team Leader is to confirm to the Loadmaster that the foreign object sweep is complete and that the Movements Team has all departed aircraft and is safely located at the designated meeting point.

4.E.16 HEALTH AND SAFETY

Whilst time is of the essence in carrying out EROs, safety is paramount and must be considered at every stage. Sound preparatory work will greatly ease the situation. However, if at any stage it appears that the ERO is putting personnel or the aircraft in danger, the Loadmaster or another member of the crew is to be informed to cancel the engines running aspect of the onload/offload.

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CHAPTER 4 ANNEX F TACTICAL CARRIAGE OF TROOPS (TCT)

4.F.1 GENERAL

A large number of troops may be carried in a tactical transport aircraft without applying normal standards of restraint. Tactical Carriage of Troops (TCT) should not be regarded as a standard method for the movement of personnel but instead should be restricted for use only in the event of unforeseen circumstances, operational necessity or emergencies.

4.F.2 SCOPE

1. This annex describes the procedures for TCT which exploits maximum utilisation of transport aircraft by:

2. Substantially minimising the time taken to load and offload troops compared to the use of side and centre paratrooper seats.

3. Substantially saving time by negating the need to reconfigure aircraft from side and centre paratrooper seats for passengers to:

   (1) Bare floor roles (Appendix 1);

   (2) Palletisation roles. (Appendix 2).

4. Increasing the number of troops that can be carried compared to the use of side and centre paratrooper seats.

4.F.3 FLIGHT DURATION

Due to the austere conditions, flight duration of troops should normally not exceed 2 hrs.

4.F.4 LOAD OPTIONS

The tactical carriage of troops would normally be conducted using the aircraft in bare floor or in the palletised role. Even if the cargo handling system is installed it can be considered to load the troops without the use of pallets.

4.F.5 RESTRAINT

Restraint may be achieved by seating personnel as tightly as possible. Additional restraint can be provided by using chains or straps attached to the aircraft floor, pallet or sidewall rings. Personal weapons are to be hand held and any section weapons or other equipment may be loaded to the ramp.

4.F.6 SAFETY

Troops will require a thorough briefing prior to enplaning to ensure that embarkation is carried out quickly and safely, otherwise the value of this method of carriage will be negated. When practical a walkway should be provided on the port side in the bare floor role, or a smaller walkway in a palletised role along the port side guidance rail. Loadmaster movement will be restricted, and troop movement about the aircraft must be kept to a minimum. [The ladder need not be fitted].

4.F.7 CARRIAGE OF PATIENTS ON STRETCHERS

When transporting patients on stretchers, they will be placed along the axis of an aircraft, and strapped to the floor of the cargo compartment. If 2 or more stretchers are side by side, the strap should be wrapped around each handle of the stretcher before securing the restraining strap.

4.F.8 LOAD CONFIGURATIONS

The following load configurations represent standard loads (not necessarily the maximum) and will trim (i.e. maintain proper centre of gravity) with the ramp offloaded. The maximum load will vary and depend on factors such as the amount of equipment the troops are carrying. While the most flexible and useful load configuration is likely to be bare/clear floor, details of palletised fits are also provided for completeness:

Load Configurations

Aircraft Type	Role	No. of Pallets	No. of Troops (1)	Total Weight (kg) (2.2 lbs/kg)
C-130	Clear floor	0	80	10159
CMk4 (5)		0	110	13968
C-130	108 width	5	92	12476 (2)
CMk4 (5)		6(6-39)	108 (3)	16327 (2)
C-130	88 width	4	80 (3)	10794 (2)
CMk4 (5)		5	120 (3)	16190 (2)
C160	Clear floor	0	84	10672
C160	108 width	5	82	11075
ESP C-130	Clear floor	0	80	10190
ESP C-130	108 width	5	92	12476 (2)
ESP C-130-H30	Clear floor	0	110	13968
ESP C-130-H30	108 width	6(6-39)	108 (4)	14667 (2)
ESP CN-235 (6)	Clear floor	0	28	3940
ESP CN-235 (6)	88 width	3	-	-
ESP C-295 (6)		0	37	4700
ESP C-295 (6)		4	-	-
Number of Stretchers				
C-130	Clear floor/ 108 width	0/5	20/15	2540/3334
C-130-H30	Clear floor/ 108 width	0/7	28/21	3556/4667
CN-235 (6)	Clear floor/ 88 width	0/3	14/9	1778/1620
C-295 (6)	Clear floor/ 88 width	0/4	17/12	2159/2160

(1) Each soldier complete with webbing, backpack and personal weapon is assumed to weigh 127 kg/279lbs (122 kg for ITA paratroops or operative soldiers).

(2) Where applicable, an allowance of 159 kg/350lbs has been included for each pallet (GBR). Lighter pallets at 132 kg/290 lbs may also be used.

(3) Side paratroops seats have not been utilised in 88” width as their use would block loadmaster movement and bulk out equipment on the ramp. However, 13 (CMk1) and 22 (CMk3) extra seats would be available in extremes.

(4) The aircraft will not trim (maintain centre of gravity) with 7 pallets containing troops without a ramp load. The aircraft will trim with 6 pallets containing troops to Tie Down Rows 6-39 plus 8 troops bare floor at the front of the aircraft without a ramp load.

(5) The CMk4 is the stretched version of the C-130 J.

(6) To be within weight & balance performance tables, cargo must be loaded on the ramp up to a maximum of 650 Kg for the CN-235 and 800 Kg. for the C-295.

Table 2 Load Configurations

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CH 4 ANNEX F APPENDIX 1 TACTICAL CARRIAGE OF TROOPS – BARE FLOOR

4.F.9 AIRCRAFT PREPARATION

1. The aircraft is to be prepared as follows:

   a. All centre and wheel well paratrooper seats are to be rolled and stowed. The remaining side paratrooper seats are to be lifted and secured;

   b. All loose aircraft equipment, including toe ramps, should be stowed;

   c. All B and G Floor points are to be fitted; the A floor points are those running down the port side of the aircraft and the G points are those on the starboard side, floor points B, C, D and E fall between A and G;

   d. Utilising restraining straps will provide troop restraint; a line of interconnected straps is then to be connected to each of the “G” floor points and laid along the starboard side of the aircraft;

   e. Paratroop doors will be closed;

   f. The port outboard paratroops cable will be fitted wherever possible to assist Loadmaster movement up and down the aircraft;

   g. The Escape Ladder may be fitted wherever possible to enhance safety;

   h. For C-160 troop restraint will be provided by utilising straps or chains according to the equipment available. All of the 17 tie down rows are to be prepared as follows: restraining lines lay flat and untightened across the floor, connected to tie down point on each side of the cargo, ready to be tightened on the left side.

4.F.1 SAFETY

Extreme care is to be taken to ensure that troops remain clear of the aircraft propellers IAW ERO procedures.

4.F.2 TACTICAL TROOP ON LOAD

1. The procedure for the on loading of troops is as follows:

   a. The troops are to enplane the aircraft via the ramp in single file and move down the port side of the aircraft to the front bulkhead;

   b. Any equipment/weapons over and above hand-held webbing, backpack and personal weapon are to be stacked on the ramp;

   c. Under the direction of the Loadmaster or air movement personnel, the troops are to lay their backpacks short ways across the aircraft floor to a maximum of 5 backpacks per Tie Down Row in line with each Tie Down Row;

   d. A maximum of 5 troops are then to be seated on their backpacks holding their personal weapons;

   e. The Loadmaster or air movement personnel will then position the restraint straps across the troops' laps;

   f. The next 5 troops are to be called forward from the line and the procedure repeated until all the Tie Down Rows have been filled or no troops remain;

   g. Surplus equipment and weapons are to be secured on the ramp;

   h. For C-160 first row with 4 troops and the other 16 rows with 5 troops. The troops sit on their backpacks and put themselves the strap or chain on their laps. They face aft (cold to hot) or forward (hot to cold).

4.F.3 TACTICAL TROOP OFFLOAD

1. The procedure for the offload of troops is as follows:

   a. Once the aircraft is on the ground, and at a safe taxiing speed the red light remains on, and the troops or the Loadmaster remove their restraint straps;

   b. The Loadmaster removes the restraint from any equipment/weapons loaded on the ramp;

   c. Whilst the aircraft is taxiing the ramp may be lowered;

   d. When the green light is illuminated, the troops deplane quickly under the direction of the Loadmaster down the starboard side of the aircraft (starboard or port side for C-160), picking up any equipment/weapons on the ramp;

e. Once the offload is complete, the Loadmaster will raise the ramp and report ready to taxi if there is no backload.

NOTE:
ERO on load and/or offload of troops by either the port or starboard side of the cargo ramp will be determined by the ERO regulations governing the aircraft crew conducting the ERO.

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CH 4 ANNEX F APPENDIX 2 TACTICAL CARRIAGE OF TROOPS - PALLETISED

4.F.2.1 AIRCRAFT PREPARATION

2. The aircraft is to be prepared as follows:

a. The aircraft is to be rolled/configured, dependent on make/model of aircraft, with pallets secured to the side guidance beams and side paratrooper seats lifted and stowed;

b. All loose aircraft equipment, including toe ramps, should be stowed;

c. Ramp site guidance and roller is to be taken up and stacked on the ramp;

d. Troop restraint will be provided by utilising restraint straps, which are to be clipped together into lines of 3; a line of straps is to be connected to every other tie down shackle on the starboard side of each pallet or the sidewall ring dependent on palletisation fit;

(1) 108” fit - 4 rows of straps;

(2) 88” fit - 5 rows of straps;

e. Paratroops doors will be closed;

f. The port outboard paratroops cable will be fitted wherever possible to assist Loadmaster movement up and down the aircraft;

g. For C-160 troop restraint will be provided by utilising straps or chains according to the equipment available. The entire 18 tie down rows are to be prepared as follows: restraining lines lay flat and untightened across the pallets, connected to tie down point on each side of the cargo or the pallet, ready to be tightened on the left side.

4.F.2.2 SAFETY

Extreme care is to be taken to ensure that troops remain clear of the aircraft propellers in accordance with the ERO procedures.

4.F.2.3 TACTICAL TROOP ON LOAD

1. The procedure for the on loading of troops is as follows below.

    a. The troops are to enplane the aircraft via the ramp in single file and move down the port side of the aircraft to the front bulkhead.

    b. Any equipment/weapons over and above the hand-held webbing, backpack and personnel weapon are to be stacked on the ramp.

    c. Under the direction of the Loadmaster or air movement personnel, the troops are to lay their backpacks across the aircraft pallet dependent on Palletisation fit:

        (1) 108” fit. Five backpacks (lengthwise across pallet) per row (20 troops per pallet) except for the 2 wheel well pallets (16 troops per pallet) which will be 4 backpacks per row;

        (2) 88” fit. Four backpacks (short ways across pallet) per row (20 troops per pallet);

        (3) For C-160 the 82 troops are spread in 10 rows of 5 and 8 rows of 4. They sit on their backpacks and put themselves the strap or chain on their laps. They face aft (cold to hot) or forward (hot to cold).

    d. 4 or 5 troops dependent on pallet position and orientation are then to be seated on their backpacks holding their personal weapon.

    e. The Loadmaster or air movements’ personnel will then position the restraint strops across the troops’ laps and fit the loose end strap to the corresponding pallet D ring on the port side of the pallet or the sidewall ring.

    f. The next 4 or 5 troops are to be called forward from the line and the procedure repeated until all the pallet rows have been filled or no troops remain.

    g. Surplus equipment and weapons are to be secured on the ramp.

4.F.2.4 TACTICAL TROOP OFFLOAD

2. The procedure for the offload of troops is as follows:

    a. Once the aircraft is on the ground and at a safe taxiing speed, the red light remains on, and the troops or Loadmaster remove their restraint strops but remain seated.

    b. The Loadmaster removes the restraint from any equipment/weapons loaded on the ramp.

c. Whilst the aircraft is taxiing the ramp may be lowered.

d. When the green light is illuminated, the troops deplane quickly under the direction of the Loadmaster down the starboard side of the aircraft (starboard or port side for C-160), picking up any equipment/weapons on the ramp.

e. Once the offload is complete, the Loadmaster will raise the ramp and report ready to taxi if there is no backload.

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CHAPTER 4 ANNEX G NVG STANDARD OPERATING PROCEDURES

NOTE:
The criteria stated in this annex may not apply for Special Forces Operations.

4.G.1 AIM

The aim of this Annex is to standardise procedure for Night Vision Device/Goggles (NVD/G) Operations with C-130 aircraft and similar air transport aircraft. It provides guidance for NVG operations and a list of limitations. This type of operations includes Air Transport and Airborne Operations.

4.G.2 GENERAL

1. Night operations degrade optically sighted threat systems and increase the probability that enemy defences may be in a lowered state of readiness. However, if NVGs are not used, the aircraft may be forced up to an altitude where radar tracking is more likely. Therefore, NVG operations provide a more tactically sound environment for the execution of a transport mission.

2. Although, the use of any night vision device can improve efficiency and effectiveness of night flight, all these types of devices have numerous and different limitations. In order to conduct operations in a safely manner, all aircrews involved in such type of operations must be familiar with those limitations. A list of these is reported in Appendix 1.

3. Despite the advantages to NVG operations, NVGs do not turn night into day. A detailed briefing involving all pertinent crewmembers should precede any NVG flying operation. In addition, if time and conditions permit, a minimum combined training is strongly recommended prior to any operational employment.

4.G.3 TRAINING LEVEL

1. It will be single nation responsibility to determine phase level of NVG certified aircrews. For the purposes of this annex, the following are the phase levels:

a. **NVG - Phase 0.** Introductory-level phase that conforms to the ICAO rules of General Air Traffic (GAT). VFR flights on NVGs may be conducted with a vertical separation of at least 1,000 feet above the highest obstacle within a radius of 5 NM from the estimated position of the airplane. All Phase 0 operations are single-ship. If standard VFR routes are flown under this phase of training, this vertical separation will be maintained unless the standard VFR route has a greater minimum altitude.

b. **NVG - Phase 1.** Single ship or formation at night VMC altitudes no lower than 500 feet above the highest man-made obstacle or terrain feature and spot elevation or 400 feet plus one contour interval above the highest depicted basic terrain contour, whichever is higher, within 5 NM of centreline.

c. **NVG - Phase 2.** Single ship or formation at night VMC altitudes no lower than 500 feet above the highest man-made obstacle or terrain feature and spot elevation or 400 feet plus one contour interval above the highest depicted basic terrain contour, whichever is higher, within 3 NMs of centreline.

d. **NVG - Phase 3.** Single ship or formation at night VMC altitudes no lower than 500 feet above the highest terrain feature/spot elevation or 400 feet plus one contour interval above the highest depicted basic terrain contour, whichever is higher, within 3 NMs of a segmented route centreline. Once the controlling obstacle of the entire leg is visually acquired, aircrews can descend to the next lowest altitude in the leg based on the highest obstacle in the remaining distance to go. The crew must visually acquire and circumnavigate all obstructions (towers, antennas, etc.) by a safe distance during flight. If obstructions are not visually acquired, climb to arrive at an altitude of 500-feet above the obstruction height 2 NMs prior to the obstruction.

4.G.4 NVG – AIR LAND

1. Allows an NVG crew to fly air land missions wearing NVGs. NVG air land operations include single-ship or formation NVG take offs, approaches, landings and taxi operations on IR-light LZs.

Note 1:
LZ markings/patterns see Appendix 1.

Note 2:
The NVG Air Land Phase is not subject to any of the other three phases and should be regarded as a particular training event/qualification. However it is strongly encouraged that aircrews complete Phase 0 training before being qualified for NVG Air Land Operations.

2. MISSION PLANNING AND PRE-FLIGHT

a. Normally one full day of planning for pilots and other pertinent crewmembers is required for any NVG missions employing NVG formations and Phase 3 operations. The operations unit will designate a Mission Commander for any NVG mission involving formation flight or multiple NVG air land sorties in one mission. The designation of a mission commander for any other type of NVG operation is encouraged.

b. All NVG Mission Commander will brief an Emergency Safe Altitude (ESA) and a procedure to reach this altitude in case of inadvertent IMC or disorientation during navigation. In addition, mission commanders are responsible for choosing and briefing orbit points, rendezvous points, NVG donning/doffing points, and prohibited areas.

4.G.5 WEATHER

1. VFR Minimums for NVG flight are in accordance with ICAO Night VFR Standards, except for those countries using higher minima.

2. Weather minimums for NVG air land should not be less than ICAO Standards, except for those countries using higher minima (see Appendix 2 for individual country weather requirements).

3. IFR flight on NVGs can be accomplished using ICAO Standard IFR Procedures. Instrument approaches on NVGs shall not be flown below IFR published minimums, or higher minima if these apply for the specific country (see Appendix 2 for individual country weather requirements).

4.G.6 MINIMUM OPERATIONAL EQUIPMENT

1. The following equipment is required for NVG operations and are considered the absolute minimum for the purpose of this agreement:

a. ANVIS-6 NVGs or better. One per crew member plus one spare per crew.

Note 1:
All crewmembers will pre-flight their NVGs prior to every flight. The Pilot in Command (Aircraft Commander) will ensure that the pre-flight is completed for the spare set.

Note 2:
The Minimum Visual Acuity shall be 20/45.

b. Spare batteries for each set of NVGs carried on board.

c. Aircrew helmets.

Note:
Both pilots will wear the same type NVGs.

2. The following equipment must be operational for Phase 3 during NVG air land missions:

a. Radar (Exception for pilot proficiency or currency sorties);

b. Radar altimeter;

c. All landing and taxi lights (air land), including NVG compatible;

d. All navigational systems that are required for IFR flight, including INS/GPS.

e. **Mixing NVGs.** Mixing different types or models of NVGs within a crew is not recommended. This is due to performance differences (e.g. increased gain, visual acuity, etc.) between the goggles. These differences in visual capabilities can cause problems in communicating information within the crew. If it becomes necessary to mix different types of NVGs within a crew, the Pilot (Aircraft Commander) should use the better performing NVGs, and the remainder of the crew should use the least-capable NVGs.

f. **NVGs in Multi-Place Aircraft.** Generally, all crewmembers requiring NVGs should be on or off goggles at the same time. This does not preclude multi-place aircraft from having certain crewmembers off goggles to use various types of aircraft equipment, visual display, etc.

g. **Aircraft Internal Lighting.** Regardless of the type of NVG used, it is essential that aircraft has compatible aircraft lighting schemes to ensure adequate NVG function.

h. **Aircraft External Lighting.** Conventional aircraft external lighting operates within wavelengths (both visible and near Infrared (IR)) which are incompatible with NVGs. Incompatible external lighting from an aircrew's own aircraft or other aircraft in formation can degrade NVG performance because of the automatic gain-control feature of the goggles.

i. NVG compatible visible as well as covert/IR external lighting should be installed on all aircraft that will conduct real-world NVG operations. While turning off incompatible external lighting is possible in a combat environment, it is impractical for peacetime operations. Blacked-out operations (i.e. lights-out) as well as operations using covert/IR external lighting (that means not visible with naked eyes) are severely restricted by ICAO and most national aviation administration regulations. In combat, covert/IR external lighting provides the added benefit over blacked-out operations of allowing aircrews to fly most tactical single aircraft/formations while limiting the possibility of visual detection only to adversaries equipped with NVGs.

4.G.7 TAKE-OFF PROCEDURES

Both pilots will wear NVGs for take-off.

4.G.8 ENROUTE PROCEDURES

1. Altimeter Updates. Altimeter update points should be planned for each enroute portion of the mission. This involves the comparison of absolute altitude (radar altimeter) to the pressure altitude when flying over a body of water or flat terrain. Obtain an updated altimeter setting as close to the objective area as possible. If this is not possible, use the lowest forecast altimeter setting.

2. **Formation Procedures.** Testing and safety investigation reports have shown that all members of a formation should be on or off NVGs at the same time. Items such as terrain or weather, which are obvious to a pilot on NVGs, may not visible to a non-NVG pilot. These differences in visual capabilities and resulting visual perceptions or perspectives can cause problems in communicating information within the formation. For the same reasons, mixing different types or models of NVGs within a formation is not recommended.

3. Additionally, while most proficient aircrews can transition to or from NVGs in-flight, it is safer, and thus preferable, to avoid this situation and wear the goggles from chock to chock. When this is not possible, formation aircraft should transition from rear to front when donning NVGs and transition from front to rear when doffing NVGs in-flight.

4.G.9 AIRDROP PROCEDURES[9]

1. After slowdown, when the DZ is in sight and will remain in sight or when a positive position is identified and adequate terrain clearance is assured, the aircraft may descend to calculated drop altitude. If the aircraft must climb to drop altitude, the Mission/Aircraft Commander will decide when to climb after considering the threat.

2. The aircraft should be at or above drop altitude and stable not later than 2 minutes prior to green light for jumpmaster-directed personnel airdrops.

3. The aircraft should be at or above drop altitude and stable not later than one minute prior to green light for standard personnel airdrops.

4.G.10 AIR LAND PROCEDURES

4. Each member nation is responsible for determining which airfields are suitable for NVG air land. Airfield markings required for NVG air land are outlined in ATP-3.3.4.4, Chapter 5. Also refer to STANAG 3534 AMLI - Airfield Lighting, Marking and Tone Down Systems for Non-permanent/Deployed Operations, STANAG 7134 AMLI - Control of Lighting at Airfields During NVG Operations and STANAG 7025 ASP - Air Traffic Management and Control of Minimum Operating Strips (MOS) Operations.

5. Usually, the Minimum Runway required for NVG Landing depends on the airfield marking pattern being used. For wartime or contingency operations, each individual nation will establish the Minimum Runway length for NVG landings (in Appendix 3 are reported individual country runway requirements for landing).

4.G.11 EMERGENCY PROCEDURES

Each nation will develop NVG related emergency procedures according to national regulations. However, during mission preparation, emergency actions will be properly coordinated by the crews involved in the same NVG sortie/mission/flight operation.

[9] For DZ markings refer to ATP-3.3.4.4 Chapter 5

CH 4 ANNEX G APPENDIX 1 NVG LIMITATIONS

4.G.1.1 FIELD OF VIEW

NVG Field of View (FOV) refers to the total instantaneous area covered by the combined NVG image. The NVGs FOV depends on its design and type, and ranges from 30 to 40 degrees for current systems. Regardless of the FOV of any particular system, it is considerably less than the eye's normal FOV of 120 degrees by 80 degrees. This lack of aided peripheral vision around the NVG can influence the onset of misperceptions and illusions.

4.G.1.2 RESOLUTION

Resolution, or visual acuity, refers to the ability of the goggle to present an image that makes clear and distinguishable the separate components of a scene or object. Normal unaided night vision is approximately 20/200 at best. Current NVGs typically have a resolution capability of between 20/25 and 20/40. This resolution can be severely degraded by the amount and type of ambient light present. While not as good as day vision, NVGs represent a significant improvement over unaided night vision.

4.G.1.3 DEPTH PERCEPTION

Depth perception encompasses determining the relative distance of objects in relation to each other. There are two types of depth perception cues; binocular and monocular. The use of binocular cues requires both eyes working together and provides one with a three dimensional capability. Although somewhat useful out to a distance of approximately 200 meters, most are only useful out to 6 meters. Monocular cues, on the other hand, do not require the eyes work together and are the most important sources for depth perception information for aircrew as they are available at and well beyond the distances at which binocular cues are available. Examples of monocular cues include relative size and height of objects, overlap of objects, convergence of parallel lines, and motion parallax (closer objects within the field of vision moving faster than farther objects). The use of NVGs seriously degrades the use of binocular cues. Monocular cues are only slightly degraded relative to daytime and are a result of the limited field of view and resolution of the NVG image. However, anything that degrades the image, such as lower illumination or shadowing, will also degrade the usefulness of monocular cues.

4.G.1.4 DISTANCE ESTIMATION

Distance estimation is altered while using NVGs due to a reduction in visual acuity. This result in unlit objects sometimes appears farther away than they actually are. This is primarily a learned subconscious phenomenon as humans expect objects that are less distinct in detail to be farther away than ones which have sharp detail. This can cause problems with overestimating altitudes or distances. The opposite occurs when observing lit objects, which may result in underestimating distances.

4.G.1.5 REDUCED CONTRAST

Reduced contrast manifests itself primarily as reduced visual acuity since low contrast objects are more difficult to see than those that have a high contrast. A reduction in contrast occurs as the eye is presented a monochromatic image and some subtle colour contrast cues are lost. In other words, the monochromatic output of NVGs does not allow aircrews to distinguish differences in colour. Also, a bright light source in or near the FOV will reduce contrast as the NVG begins to reduce the gain. Because there are individual differences in sensitivity to contrast, there can be differences among aircrews of the same flight with regard to what they can and cannot see.

4.G.1.6 DYNAMIC VISUAL CUES

1. Dynamic visual cues provide aircrews with cues for direction, altitude, and speed. There are three primary dynamic cues.

   a. **Static Cue Motion**. Static cue motion is the summed effect of the change in one or more of the static cues caused by aircraft movement. Static cues include elevation, known size, and perspective. Central vision tracking is a method for seeing static cue motion and will be degraded by NVGs.

   b. **Optical Flow**. Optical flow is the angular rate and direction of movement of objects as a result of aircraft velocity measured relative to the aviator's eye. This provides the visual perception system the information necessary to interpret speed and direction of motion. If there is no relative motion, there is no optical flow. Central vision is used to obtain optical flow information. Since visual acuity is degraded with NVGs, the optical flow cues are degraded as compared to daytime cues.

c. **Peripheral Vision Motion**. Peripheral vision motion, also known as motion parallax, is a subconscious method of detecting optical flow. It is dependent on a wide FOV and is the primary airspeed and altitude sensory input. With the significant reduction in FOV when using NVGs, this cue is severely degraded and central vision tracking becomes the primary detection means. This leads to one of the most insidious dangers when flying low altitude with NVGs. Just as in the day, visual acuity will improve as the aircraft gets closer to the ground. However, because of the reduction in peripheral vision motion, the ensuing "speed rush" that would indicate close proximity to the ground is not available, and controlled flight into the ground becomes a possibility. This potential becomes more likely over water or featureless (barren desert or sand dunes) terrain. Under certain conditions, such as flying within canyons during high illumination or flying over areas with a lot of cultural lighting, unaided peripheral vision may continue to provide useful information. However, the information may be erratic or erroneous. Therefore, it is vital to continue to use and crosscheck other instruments for flight information.

4.G.1.7 DEGRADED ABILITY TO DETECT METEOROLOGICAL CONDITIONS

One of the most disconcerting situations that can be experienced with NVGs is flight into undetected meteorological conditions. The inability to detect changes in meteorological conditions, particularly as they worsen, can cause the aircrew to continue further into Instrument Meteorological Conditions (IMC) to a point where there is virtually no visual information. This can result in a gradual loss of scene detail and place the aircrew in an area of heavy moisture and, in the low-level environment, place the aircrew in a potential conflict with masked terrain. This late detection of IMC decreases the time available for the aircrew to transition from visual flight using NVGs to instrument flight using aircraft instruments, and reduces the time available to execute a route abort from low altitude if required.

4.G.1.8 SPATIAL DISORIENTATION

Although NVGs usually improve situational awareness, under certain conditions they can increase the possibility of spatial disorientation. This is due to the NVGs limited field of view and reduced resolution.

4.G.1.9 OVERCONFIDENCE

After initial NVG training, there may be a tendency for aircrews to become over confidant in their abilities during NVG flight. NVGs do not turn night into day. They have limitations, and aircrews must exercise caution to avoid becoming complacent.

ATP-3.3.4.3(B)(1)