*ATP 3-18.11

Special Forces Military Free-Fall Operations

April 2020

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Change 1
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Headquarters
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Special Forces Military Free-Fall Operations

1. Change Army Techniques Publication (ATP) 3-18.11, dated 28 April 2020, as follows:

Remove old pages:	**Insert new pages:**
iii and iv	iii and iv
vii through xiv	vii through xiv
9-17 and 9-18	9-17 and 9-18
12-1 through 12-26	12-1 through 12-30
13-33 and 13-34	13-33 and 13-34
G-5 through G-9 (reverse blank)	G-5 through G-9 (reverse blank)
Glossary-1 and Glossary-2	Glossary-1 and Glossary-2
Index-1 (reverse blank)	Index-1 (reverse blank)

2. A bar (**|**) marks changed material.
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ATP 3-18.11
23 December 2020

By Order of the Secretary of the Army:

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General, United States Army
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Special Forces Military Free-Fall Operations

Contents

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Preface

ATP 3-18.11 provides information related to the RA-1 Advanced Ram-Air Parachute System (ARAPS) in the military free-fall (MFF) configuration only. It consolidates references for MFF airborne operations and training and will assist commanders at all levels in preparing special operations forces (SOF) in the execution of MFF airborne operations. These operations involve the employment of forces from air platforms to meet objectives across the operational continuum. MFF operations may be in support of or independent from other air or ground operations.

ATP 3-18.11 presents a series of concise, proven techniques and guidelines essential to the safe, successful use of the RA-1 ARAPS during MFF operations. The techniques and guidelines prescribed herein are generic in nature and represent the safest and most effective methodologies available for executing MFF operations when using the RA-1 ARAPS.

The principal audience for ATP 3-18.11 consists of the commanders, staff officers, and operational personnel of Special Forces units, particularly operational detachments–alpha, operational detachments–bravo, and special operations task forces.

Commanders, staffs, and subordinates ensure their decisions and actions comply with applicable U.S., international, and, in some cases, host-nation laws and regulations. Commanders at all levels ensure their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 6-27.)

ATP 3-18.11 applies to U.S. Army MFF-capable units only. U.S. Army commanders can request waivers to this ATP to clarify and amplify the procedures and equipment being used by the U.S. Army Special Operations Command (USASOC) to meet the variety of operations conducted across the SOF community. U.S. Army commanders may also request waivers to this ATP to meet specific operational requirements when methodologies contained in this publication impede mission accomplishment. Other SOF units under the operational control of U.S. Special Operations Command (USSOCOM) may choose to supplement their own airborne publications with this ATP to clarify and amplify the procedures and equipment being used to meet the variety of operations conducted across the SOF community. Other Services and USSOCOM components and sub-unified commands who choose to adopt portions or all of this publication for MFF operations are strongly encouraged to do so to meet their units' unique mission requirements.

When USASOC and USSOCOM publications conflict, USSOCOM publications will take precedence during MFF operations as USSOCOM Manual 350-3 is the parent airborne operations publication. When units other than USASOC units are conducting U.S. Army pure MFF operations, those units will use their applicable regulations, their standard operating procedures (SOPs), and this ATP.

Publications Governing Airborne Operations

Department of Defense Directive 5100.01 tasks the Army to train and equip, as required, forces for airborne operations, in coordination with the other Military Services, and in accordance with joint doctrine. It also directs the Army, which has the primary responsibility for the development of airborne doctrine, procedures, and techniques, to develop—in coordination with the other Services—doctrine, procedures, and equipment that are of common interest.

USSOCOM derives authorities as the SOF advocate from Title 10 U.S. Code for all assigned special operations core activities and all additional skills and capabilities assigned in USSOCOM Directive 10-1, *Terms of Reference – Roles, Missions, and Functions of Component Commands.*

(continued on next page)

Publications Governing Airborne Operations (continued)

USSOCOM Directive 10-1 designates USASOC as USSOCOM's lead component for static line parachute airborne operations, nonstandard parachute operations, SOF unique parachute operations using short takeoff and landing and medium aircraft for clandestine infiltration and exfiltration operations, SOF resupply operations, and MFF operations and interoperability for USSOCOM Active Army and Reserve forces.

USSOCOM Manual 350-3, *Special Operations Forces Baseline Interoperable Airborne Operations (Parachuting) Training Standards*, provides the policy foundation for the development of USSOCOM Major Subordinate Command airborne doctrine, tactics, techniques and procedures, training literature, and the conceptual framework to facilitate interoperability. It prescribes the core tasks that make up the consolidated SOF Baseline Interoperable Standards for the associated skill set that comprise special operations airborne operations training.

The USASOC Commander delegates within **USASOC Regulation 350-2**, *Airborne Operations*, the Commander of U.S. Army John F. Kennedy Special Warfare Center and School (USAJFKSWCS), Fort Bragg, North Carolina, as the Executive Agent with responsibilities for basic and advanced techniques and procedures required for safe training and combat-effective MFF parachuting, SOF peculiar parachuting, SOF infiltration and exfiltration, SOF resupply airdrops, and SOF parachute rigger skills. The USASOC Commander retains final concurrence or nonconcurrence authority for all related Executive Agent responsibilities and activities explicitly identified or assumed.

In addition, USASOC Regulation 350-2 prescribes policy, establishes SOPs, establishes command regulatory guidance, and assigns responsibilities, requirements, and policy for the conduct of airborne operations by units and activities within USASOC.

USASOC Regulation 385-1, *USASOC Safety Program*, addresses both general Army Safety Program management functions and Army SOF-specific requirements necessary for sustaining all SOF phases and operations, whether at garrison, in contingency operations, or in wartime conditions.

USASOC Policy Number 8-17, *Revision for MFF Parachutist Training*, establishes MFF training policy and precedent for all Army SOF personnel attending USSOCOM-approved MFF parachutist courses, other than the USASOC MFF parachutist courses conducted at Yuma Proving Grounds, Arizona.

ATP 3-18.11 is not the source document for any terms. ATP 3-18.11 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

ATP 3-18.11 applies to the Active Army, the Army National Guard/Army National Guard of the United States, and the United States Army Reserve unless otherwise stated. Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

The proponent and preparing agency of this publication is the United States Army Special Operations Center of Excellence, USAJFKSWCS. Submit comments and recommended changes on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) directly to Commander, United States Army Special Operations Center of Excellence, USAJFKSWCS, ATTN: AOJK-SFD, 3004 Ardennes Street, Stop A, Fort Bragg, NC 28310-9610; by e-mail to AOJK-DT-SF@socom.mil; or by electronic DA Form 2028.

Introduction

ATP 3-18.11 provides guidance for conducting MFF operations from various aircraft using the RA-1 ARAPS.

In September 2011, model RA-1 was selected as the ARAPS. The RA-1 ARAPS is intended to replace the MC-4 Ram-Air Personnel Parachute System (RAPPS), which is approaching Service limitations. The search for a different system began with the requirement to improve on the operational and safety limitations of the MC-4 RAPPS.

The RA-1 ARAPS is intended to improve the survivability of the airborne Soldier and preserve the commander's available combat power when conducting MFF operations, during both combat and training missions. Deployment size is based upon the concept of a 12-man operational detachment–alpha or a long-range surveillance team. These elements can be delivered into the operational area via U.S. Air Force, U.S. Army, commercial, or nonstandard aircraft.

ATP 3-18.11 has fourteen chapters and eleven appendixes, which are summarized in the following paragraphs:

Chapter 1 provides specific specifications, configurations, safety, and capability considerations of the RA-1 ARAPS.

Chapter 2 provides information on the main components of the RA-1 ARAPS for MFF configuration.

Chapter 3 provides information on the assembly of components of the RA-1 ARAPS for MFF configuration.

Chapter 4 discusses the donning procedures for the RA-1 ARAPS without equipment.

Chapter 5 discusses jumpmaster and jumper aircraft procedures, signals, and commands for MFF operations for nonoxygen jumps.

Chapter 6 provides exit and body stabilization procedures for MFF operations.

Chapter 7 discusses the canopy deployment sequence for over-the-shoulder (OTS) ripcord and the bottom of the container (BOC) hand-deployed pilot chute.

Chapter 8 discusses the canopy control for the RA-1 ARAPS.

Chapter 9 provides in-flight emergency procedures for fixed-wing aircraft, to include emergency procedures in free-fall, cutaway procedures, malfunction procedures, and canopy entanglement procedures for MFF operations.

Chapter 10 provides information on the use of the altimeter for MFF operations.

Chapter 11 provides information on the use of the electronic automatic activation device (EAAD) for MFF operations.

Chapter 12 provides information on rigging weapons and equipment.

Chapter 13 provides information on oxygen safety, oxygen mask, oxygen consoles (OXCONs), and aircraft procedures and commands for oxygen MFF operations.

Chapter 14 provides drop zone (DZ) selection, markings, and procedures used in support of MFF operations.

Appendix A provides the jumpmaster personnel inspection (JMPI) procedures for the RA-1 ARAPS MFF configurations.

Appendix B provides a sample pilot brief and inspection.

Appendix C provides jumpmaster responsibilities and currency and requalification requirements for MFF.

Appendix D provides MFF parachutist qualification and refresher training requirements.

Appendix E provides recommended training programs for MFF operations.

Appendix F discusses the high-altitude release point (HARP) calculations for high-altitude high-opening (HAHO) and high-altitude low-opening (HALO) MFF operations.

Appendix G discusses limited visibility and night vision goggle (NVG) operations.

Appendix H discusses procedures for deliberate waterborne operations.

Appendix I discusses the Joint Precision Airdrop System (JPADS) and procedures for using the Global Positioning System (GPS) and steerable parachute.

Appendix J provides JMPI procedures of the RA-1 when used with the MC-4 RAPPS, Military Javelin (MJ) Parachute System, Multimission Parachute System, and commercial, off-the-shelf nonstandard parachute systems.

Appendix K provides the RA-1 MFF jump brief and sustained airborne training (SAT).

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Chapter 1

Military Free-Fall Configuration, Specifications, Limitations, Safety, and Capability Considerations

When designing the RA-1 ARAPS, the engineers looked at the tactical advantages the system would need to bring it to today's battlefield in the best interest of the jumper. Some of the considerations included: the best designed system for better military application during stand-off operations, better performance, better safety features, better openings, better glide ratio, greater maneuverability, improved landings, higher exit and landing altitudes, and greater weight limitations for modern equipment than the MC-4 RAPPS.

Note: Throughout the remainder of this publication, the RA-1 ARAPS may be referred to as the RA-1, the RA-1 system, the ARAPS, or the RA-1 ARAPS.

RA-1 SPECIFICATIONS AND LIMITATIONS

1-1. Both the main (figure 1-1) and reserve canopies are elliptical, nine-cell, ram-air, pressurized stabilizers with identical dimensions and performance characteristics except for one key feature: the reserve chute contains additional holes in the fabric to allow for faster opening. Table 1-1, page 1-2, summarizes the specifications and limitations of the RA-1 for MFF operations.

Figure 1-1. RA-1 canopy deployed

Table 1-1. RA-1 MFF specifications and limitations

Dimensions	
Canopy Area	360 square feet
Canopy Span	31.7 feet
Canopy Chord Middle	12 feet
Canopy Chord Tips	9.7 feet
Complete Assembly Weight	49 pounds
Construction	
Chordwise	Half-cell top, full-cell lower surface
Main Canopy Top Surface	Zero-porosity nylon ripstop
Main Canopy Bottom Surface	0–3 CFM nylon ripstop
Reserve Canopy Top and Bottom Surface	1.1-ounce, 0–3 CFM nylon ripstop (see note)
Line Strength and Type	Spectra 1,000-pound
Canopy Performance	
Lift-to-Drag Ratio at Full-Glide/Stall	4:1/resistant to stall
Rate of Descent (200 pounds)	8 feet per second
Rate of Descent (350 pounds)	10–12 feet per second
Rate of Descent at Quarter Brakes (200 pounds)	8 feet per second
Rate of Descent at Half Brakes (200 Pounds)	7 feet per second
Rate of Descent at Three-Quarter Brakes (200 pounds)	7 feet per second
Turn Rate, 180-Degree Turn	1.5 to 2 seconds
Turn Rate, 360-Degree Turn	2 to 4 seconds
Forward Speed (200 pounds)	38 feet per second (26 miles per hour)
Forward Speed (300 pounds)	50 feet per second (34 miles per hour)
Reserve Electronic Automatic Activation Device	Military CYPRES 2
Harness	
Maximum Suspended Weight	450 pounds
Main Deployment Methods	OTS ripcord; BOC hand-deployed pilot chute
Harness and Container Weight	17 pounds
Container Material	1,000 denier Cordura
Exit, Opening, and Landing Altitudes	
Exit Altitude	35,000 feet above MSL (maximum) 5,500 feet AGL (minimum)
Opening Altitude	4,500 feet AGL (minimum) 25,000 feet above MSL (maximum)
Maximum Landing Altitude	13,000 feet above MSL
Exit Weight	450 pounds (maximum); 160 pounds (minimum)

Legend:

AGL above ground level
CFM cubic feet per minute per square meter (porosity)
MSL mean sea level
BOC bottom of container
CYPRES Cybernetic Parachute Release System
OTS over-the-shoulder

Note: One square foot of (new) 0–3 CFM nylon ripstop allows the passage of 1 to 3 cubic feet of air per minute at 0.5 inches of water pressure.

MILITARY FREE-FALL DEPLOYMENT METHODS

1-2. The RA-1 may be configured for MFF by one of two deployment methods (figure 1-2 [below] and figure 1-3, page 1-4) for jumpers conducting HALO or HAHO stand-off operations. The RA-1 can either be configured to allow the jumper to activate the main parachute by using the OTS ripcord (spring-loaded pilot chute) or by using the BOC (hand-deployed pilot chute) to open the main parachute at a designated altitude during certain mission requirements. Nevertheless, the main parachute is designed to open in the same sequence for either configuration.

Note: Only qualified parachute riggers are allowed to configure the RA-1 from OTS to BOC or from BOC to OTS for MFF operations. AR 750-32 provides more information on the responsibilities for personnel maintaining and packing parachutes.

Figure 1-2. Over-the-shoulder configuration rigged for free-fall

Figure 1-3. Bottom of the container configuration rigged for free-fall

SAFETY

1-3. The RA-1 incorporates the most advanced safety features available on any U.S. Army MFF parachute system in the world. These safety features include the following:

- Reserve static line (RSL).
- No-stall technology. (System cannot be stalled in flight or landing.)
- Reserve canopy with holes in the bottom skin to allow the parachute to pressurize after fully deploying for faster openings.
- Reversed chest-strap buckle.
- Reserve ripcord handle (yellow pillow).
- Main and reserve clear windows for checking pins.
- OTS ripcord with spring-loaded pilot chute on the main parachute (for MFF configuration only).
- BOC with hand-deployed pilot chute (for MFF configuration only).
- Hybrid main canopy for slower, softer openings, putting less force on the jumper.
- Increased suspended weight, allowing for heavier combat loads.
- Pressurized stabilizers.
- Increased glide performance.

- Cybernetic Parachute Release System (CYPRES) 2/EAAD.
- High-altitude opening seat.

Note: The RA-1 system is designed to avoid stalling while in-flight and during landing.

MILITARY FREE-FALL RA-1 CAPABILITY CONSIDERATIONS

1-4. Near-peer anti-access and area denial systems create multiple layers of stand-off across the operational spectrum. The full RA-1 system enables high altitude deployment, up to 35,000 feet, increasing insertion of 40–80 kilometers. The increase in clandestine deployment reduces exposure of aircraft and personnel to the threat's anti-access and area denial systems and allows Army personnel to conduct the deep-sensing targeting mission. The RA-1 system provides the parachutist the capability to support higher exits thereby affording longer mission duration times, allowing the jumper to glide greater distances, and creating additional standoff distances for U.S. and coalition forces. These advantages allow jumpers to conduct operations at altitudes not normally associated with conventional parachuting, thereby permitting jumpers to open at virtually any altitude, assemble in the air, and perform group precision landings with heavy loads on small DZs. The RA-1 system of systems provides a rapid, cost-effective solution to mitigate the Army's number one large scale combat operations gap. The RA-1 can be employed from diverse platforms, such as fixed-wing (propeller and jet) and rotary-wing platforms, and in conjunction with other operations, such as aerial refueling or surveillance. In addition, the RA-1—

- Allows for easier training because of a common harness and container assembly for all configurations.
- Incorporates improved ergonomics, better adjustment for improved harness comfort, and a HAHO seat.
- Allows for quieter landings because of the collapsible slider.
- Allows better stand off from the landing point.
- Has a higher maximum suspended weight limit.

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Chapter 2

Military Free-Fall Components and Accessories

This chapter identifies the RA-1 MFF main components.

Note: Questions regarding employment of the RA-1 in the MFF configuration should be addressed to USASOC, G-37 Special Skills, Fort Bragg, North Carolina. TM 10-1670-335-23&P contains additional reference on the RA-1 components and accessories and information on maintaining, packing, and repairing the RA-1. Any questions on rigging should be addressed with USAJFKSWCS Military Free-Fall School, 2d Battalion, Yuma, AZ.

CONTAINER AND HARNESS ASSEMBLY

CAUTION

Jumpmasters should ensure that only approved equipment listed in TB 43-0001-80 is used during all MFF operations. Jumpmasters should also verify that all rigging is accomplished in accordance with this publication and with unit SOPs.

2-1. The container and biometric harness (figure 2-1, page 2-2) are integral to each other. The biometric harness is the newest innovation in tactical parachute harness systems. The biometric harness was added to the system for increased comfort, allowing the main container to sit away from the jumper's back. The biometric harness is the device that interfaces between the parachutist, the main and reserve parachute canopies, and the jumper's equipment. The harness is worn by the parachutist, and the parachutes and equipment are affixed to the harness. The main canopy and reserve canopy are mounted on the back in a piggyback configuration. The harness has shoulder-mounted riser attachment points for interfacing with the main parachute and reserve parachute. There is one integral main parachute release device for separation of the main parachute in the event of a malfunctioning main canopy. The harness has equipment attachment points capable of interfacing with all current equipment certified for MFF operations, to include oxygen and weapon systems. The harness has eight points of adjustment, which consist of the following:

- One chest strap.
- One waistband.
- Two main lift webs (right and left) with matching sewn thread colors.
- Two horizontal adjustment straps (right and left).
- Two leg straps (right and left).

2-2. The harness has a rapid doffing capability once the parachutist lands either on the ground or in the water. The harness has incorporated separate attachment points on either side for an equipment lowering line.

Figure 2-1. Biometric harness and container

RESERVE AND MAIN PARACHUTE COMPARTMENTS

2-3. The reserve and main parachute compartments are located on the back of the harness in a piggyback configuration, with the reserve parachute on top of the main parachute. Four container closing flaps for each compartment secure the main and reserve parachutes within the container by a pin and soft closing loops.

MAIN COMPONENTS

2-4. The main components are illustrated and listed in figure 2-2, page 2-3. Jumpers should become familiar with the name, location, function, inspection, and purpose of all components associated with the RA-1. Description of the components and their use are described below.

BASE RING

2-5. The main risers are attached to the base rings by a three-ring release assembly that bears the load under the parachute. The three-ring system is located on each side of the main lift web at collarbone level and secures the main risers to the harness; it assists the jumper in quickly cutting away a malfunctioning main parachute with a single motion. Jumpers must execute this procedure quickly during emergencies in order to successfully deploy a reserve parachute. The three-ring system is reliable, and it requires less physical force than other parachute release systems.

2-6. The large bottom ring is securely attached to the jumper's harness, the middle ring is securely attached to the end of the parachute riser, and the small ring is securely attached to the parachute riser above the middle ring. The middle ring is passed through the large ring and looped upward; the small ring is then passed through the middle ring and looped upward. Continuing in the same manner, a cord loop is passed through the small ring, is looped upward, and finally passes through a grommet to the opposing side of the parachute riser. A semi-rigid cable attached to a release handle then passes through this loop, thereby securing the loop. Releasing the cord loop by removing the cable with a tug causes the three-ring system to cascade free and quickly disconnects the riser from the harness. Each ring in the series multiplies the mechanical advantage of the loop of cord that is held in place by the semi-rigid, coated steel cable.

- (A) Integral Biometric Harness and Parachute
- (B) Base Ring
- (C) Reserve Ripcord (Pillow) Handle and Elastic Pocket
- (D) Main Canopy Release Handle
- (E) Reserve Static Line Snap, Shackle, and Ring
- (F) Chest Strap
- (G) Waistband
- (H) Equipment Lowering Line Attachment Point
- (I) Oxygen Pouch for Bailout Oxygen System
- (J) Accessory Pouch
- (K) Equipment Attachment Rings
- (L) High-Altitude High-Opening Seat Attachment Points
- (M) Military Cybernetic Parachute Release System Location
- (N) Padded Adjustable Saddle and Leg Straps
- (O) Main Ripcord Elastic Pocket (for Over-the-Shoulder Ripcord)
- (P) High-Altitude High-Opening Seat
- (Q) Bottom of Container Pouch and Hand-Deployed Pilot Chute Handle

Figure 2-2. RA-1 main components

RESERVE STATIC LINE SNAP, SHACKLE, AND RING

2-7. An RSL system (figure 2-3, page 2-4) is a backup device for activating the reserve after a cutaway is performed. It consists of a line of webbing that connects the left main risers to the reserve handle cable. The RA-1 has a ring through which the reserve ripcord cable is routed. The riser end attaches to a ring on the risers with a snap shackle for quick-release capability. When the risers are jettisoned, the lanyard pulls the cable, releases the ripcord pin, and activates the reserve. This results in a minimum loss of altitude during the cutaway procedure. The RSL system (snap shackle) may also be disconnected for safety during certain emergency situations—such as disengaging from entanglement with another parachutist, before high wind landings, being dragged after landings, water landings, or premature opening of the main canopy on the aircraft in-flight—that would require the main to be cutaway without deploying the reserve parachute.

DANGER

The RSL is a safety device hooked to the left main riser to pull the reserve closing pin when the main canopy is released. This is a safety device only and should not replace pulling the reserve ripcord handle (yellow pillow) during cutaway procedures.

WARNING

Parachutists should use caution when disconnecting the RSL snap shackle below 1,500 feet AGL. Serious injury or death may result if the yellow RSL connected to the snap shackle is pulled instead of the RSL release lanyard when disconnecting the RSL from the RSL shackle.

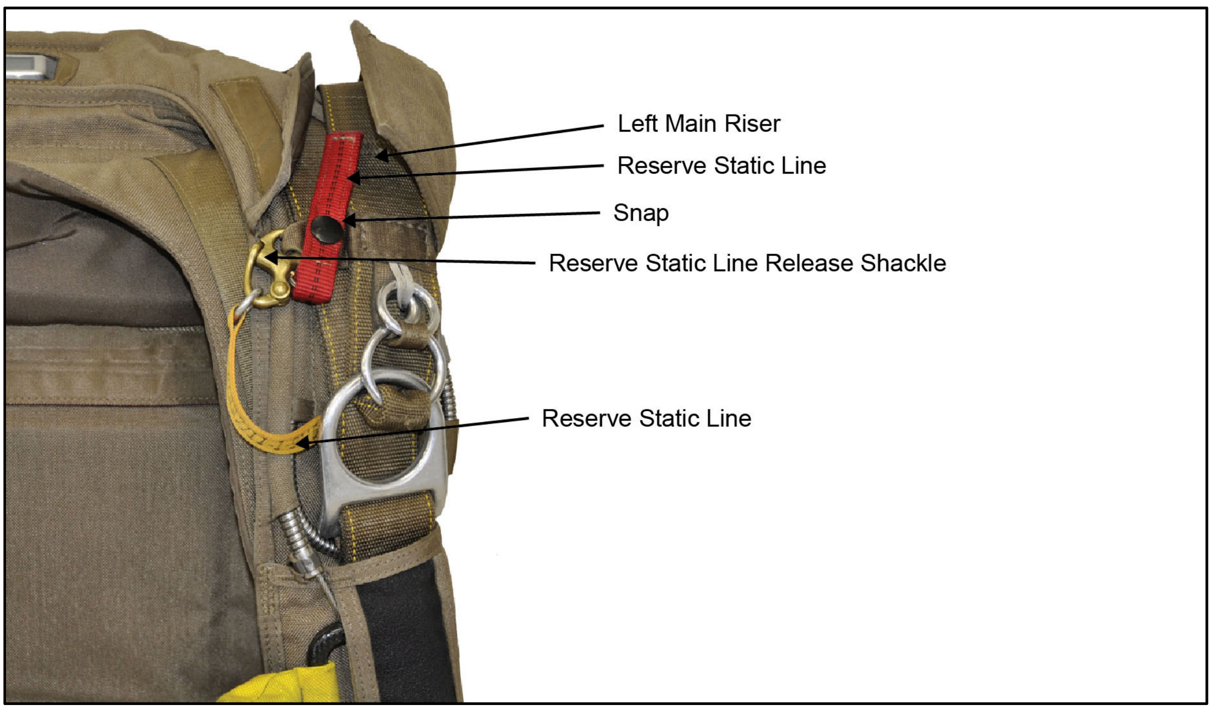

Figure 2-3. Reserve static line snap, shackle, and ring

CHEST STRAP

2-8. The chest strap is one of the eight designed points of adjustment. It is designed to keep the parachutist from falling out of the harness during canopy deployment.

WAISTBAND

2-9. The waistband is one of the eight designated points of attachment. It is routed behind both main lift webs, unless there is a weapon mounted on the left. If there is a weapon mounted on the left, the waist band is routed over the left main lift web. The waistband secures equipment such as the weapon and oxygen bailout system.

EQUIPMENT ATTACHMENT RINGS

2-10. Equipment attachment rings are used for attaching combat equipment. The rings are located on the main lift webs.

EQUIPMENT LOWERING LINE ATTACHMENT RINGS

2-11. Equipment lowering line attachment rings are located below the main lift web adjustment points on the right and left side of the harness. The equipment lowering line attachment rings are used to secure the jumper's lowering line.

BARREL LOCKS

2-12. Barrel locks (figure 2-4) are located on both sides of the RA-1 container to secure the oxygen pouch and radio pouch to the RA-1 ARAPS.

ACCESSORY POUCH

2-13. The accessory pouch (figure 2-4) can be used to contain and secure the radio or other mission equipment. The accessory pouch is replaced or removed by connecting or disconnecting the barrel locks on the pouch and on the side of the container. The accessory pouch must be attached when jumping with a weapon to secure the weapon to the jumper. The accessory pouch is secured by a slide fastener on top of the pouch and by securing the snap tab.

Figure 2-4. Barrel locks attachment point for accessory pouch

Oxygen System Pouch

2-14. The oxygen system pouch (figure 2-5) secures the oxygen bottles to the jumper during free fall. There are different types of oxygen system pouches for the RA-1 ARAPS. All pouches will be connected by a barrel locks system (strap and buckle) to secure the system to the jumper.

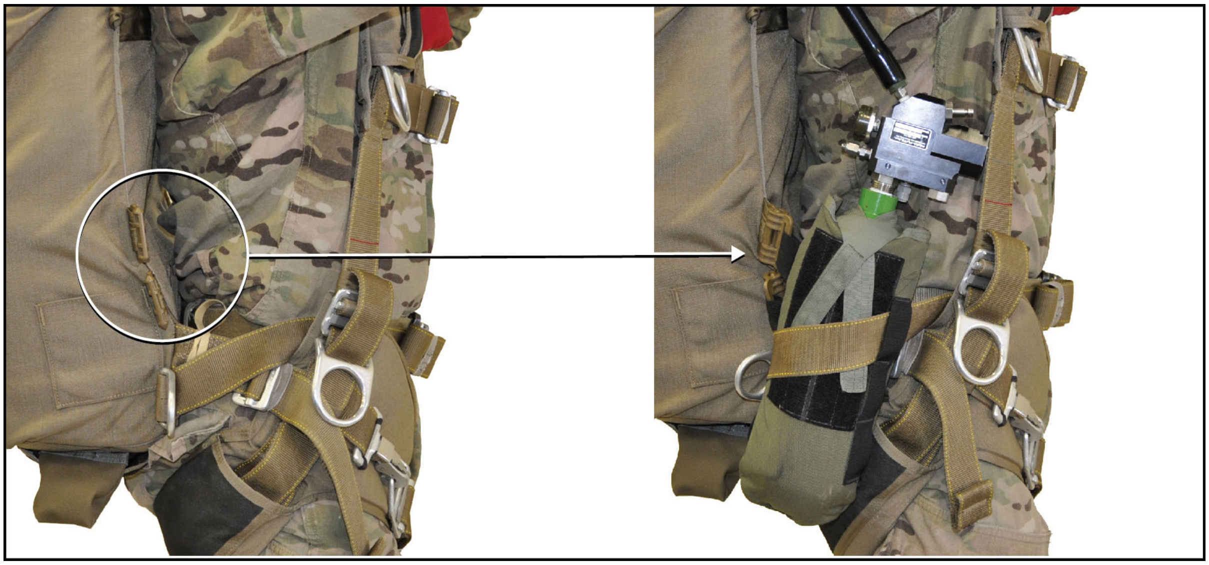

Figure 2-5. Barrel locks attachment point for oxygen system pouch

> ***Note:*** Chapter 13 provides additional information regarding the use of oxygen and rigging procedures for MFF operations.

High-Altitude High-Opening Seat Attachment Points

2-15. The HAHO seat attachment points are located under the ripcord stow pockets. The attachment points should be stowed under the ripcord stow pockets when not using the HAHO seat.

High-Altitude High-Opening Seat

2-16. The seat (figure 2-2, page 2-3) consists of a pre-formed padded seat and adjustable straps with quick release connectors. The seat is used for a MFF HAHO mission for added comfort while the jumper is suspended under the canopy during descent. The seat helps alleviate the loss of circulation in the jumper's legs. The seat is easily attached to the HAHO seat attachment points during rigging. During exit from the aircraft, the seat is stowed to the jumper's back under the main container.

Weapon Tie-Down Loops

2-17. The weapon tie-down loops are sewn to the outboard left and right sides of the container and harness assembly. Tie-down loops are placed at different levels to accommodate the different weapon systems and the unique body sizes of individual jumpers. The loops also are used to route and secure the quick-disconnect medium-pressure oxygen delivery hose on the right side of the container.

Padded Adjustable Saddle and Leg Straps

2-18. The padded adjustable saddle and leg straps are two of the eight designated points of adjustment. The padded saddle and leg straps are adjusted with friction adapters on the quick-fit V-rings hooked to quick-eject snaps on the main lift webs. The straps should be adjusted so that the padding on the saddle is worn on the inner thighs of the jumper.

MAIN RIPCORD ELASTIC POCKET

2-19. The main ripcord nylon elastic pocket (figure 2-2, page 2-3) secures the main ripcord handle until the time when the jumper grabs and pulls the main ripcord handle to activate the main canopy when jumping the OTS deployment method. The main ripcord nylon elastic pocket and the main ripcord handle are located on the outboard side of the right main lift web.

> ***Note:*** The main OTS ripcord is used only for MFF operations.

MAIN BOTTOM OF THE CONTAINER POCKET

2-20. The main BOC pocket (figure 2-2, page 2-3) is located on the BOC. The pocket is used to stow the hand-deployed pilot chute until the time when the jumper grabs, pulls, and releases the pilot chute handle to activate the main canopy when jumping the BOC deployment method.

MAIN LIFT WEB ADJUSTMENT FRICTION ADAPTERS

2-21. The main lift web adjustment friction adapters are two of the eight designated points of adjustment. The main lift web adjustment friction adapters are located on both left and right sides of the container and harness beneath the chest straps. Different colored thread for sizing is sewn into the webbing for ease of adjustment. The jumper should ensure that the colored thread on the webbing is adjusted the same on both sides of the harness for proper fit.

HORIZONTAL ADJUSTMENT STRAPS

2-22. The horizontal adjustment straps are two of the eight designated points of adjustment. The horizontal adjustment straps are located on the left and right sides of the container and harness at hip level. The straps must be properly and securely tightened in order to hold the container securely to the parachutist's back.

RA-1 ACCESSORIES

2-23. The following accessories will be used by the jumper when conducting MFF operations with the RA-1. The altimeter and CYPRES must be used by all U.S. Army jumpers when conducting any MFF operation.

PARACHUTIST OXYGEN MASK

2-24. The breath-demand parachutist oxygen mask (POM) is an in-flight oxygen breathing device that is fitted to the jumper's face and attached to the jumper's helmet.

> ***Note:*** Chapter 13 provides additional information on oxygen-related equipment.

PARACHUTIST OXYGEN MASK QUICK-DISCONNECT HOSE

2-25. The quick-disconnect hose is used to connect the portable bailout oxygen bottles to the POM.

TWIN 53-CUBIC-INCH PORTABLE BAILOUT OXYGEN BOTTLES

2-26. The Twin 53-cubic-inch portable bailout oxygen bottles are used to supply jumpers with oxygen.

3,000-PSI PORTABLE BAILOUT OXYGEN BOTTLE

2-27. The 3,000-pounds per square inch (psi) portable bailout oxygen bottle provides significantly increased oxygen to jumpers during MFF HAHO (stand-off) operations. Jumpers should use the bottles when opening above 17,500 feet above ground level (AGL) when jumping the RA-1 ARAPS.

Note: Chapter 13 provides additional information on portable bailout oxygen bottles.

RA-1 Kit Bag

2-28. The RA-1 kit bag is used to protect the parachute system while transporting the parachute to and from the DZ. The jumper wears the kit bag attached above the horizontal adjustment straps between the jumper's back and the container's pack tray following MFF operations in order to secure the parachute after landing.

Altimeter

2-29. The parachutist wears the altimeter on his left wrist. The altimeter shows the parachutist's altitude above the ground during free fall. The altimeter permits the parachutist to determine when he has reached the proper altitude for deploying the main parachute.

Note: Chapter 10 provides more information on the use of the altimeter.

Cybernetic Parachute Release System

2-30. The CYPRES is designed to activate and enable the reserve parachute to deploy in the absence of the parachutist deploying his main parachute or experiencing a main parachute malfunction.

Note: Chapter 11 provides more information on the use of the CYPRES.

Chapter 3

Military Free-Fall Assembly Components

This chapter identifies the RA-1 assembly components.

MAIN PARACHUTE

3-1. The RA-1 main parachute serves as the functional component used to safely deliver the jumper to the ground during combat and training MFF operations. The RA-1 main parachute has a surface area of 360 square feet. It is a fully elliptical, ram-air wing airfoil canopy with upper and lower surface panels connected by a series of ribs. All inner ribs have cross-ports cut into them to allow span-wise air flow. In a procedure known as cross-port venting, holes are cut into the support ribs to equalize the internal air pressure of the canopy. Support ribs maintain the airfoil shape of the canopy. Reinforced, load-bearing support ribs serve as attaching points for the suspension lines, and non-load-bearing support ribs separate a cell into two compartments. The RA-1 can be converted to a spring-loaded pilot chute (for OTS) or hand-deployed pilot chute (for BOC) to open the main parachute (figure 3-1) for MFF operations.

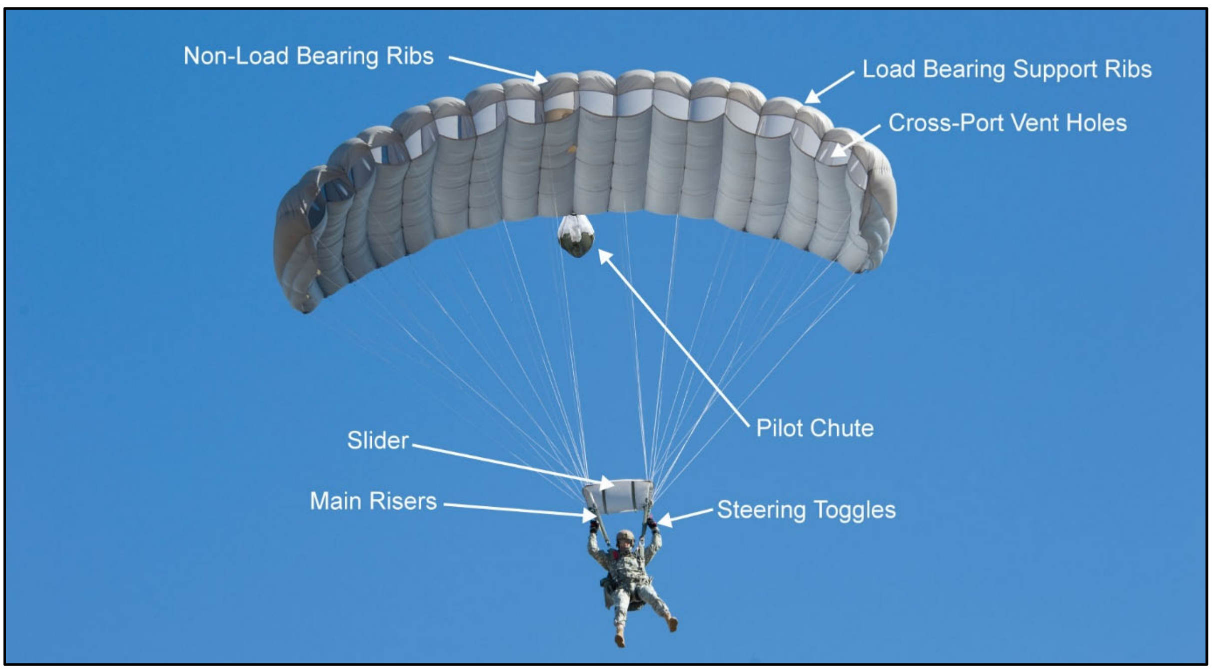

Figure 3-1. RA-1 in military free-fall configuration

3-2. The main canopy has nine dual-cell openings on the nose leading edge. The cells allow ram-air pressure between the upper and lower surfaces, giving the canopy its shape and glide characteristics. The canopy is made with a zero-porosity nylon material on the top and a bottom of the main canopy with a 0–3 cubic feet per minute per square meter of porosity and one set of toggles. It has inflatable stabilizers and a collapsible slider to reduce signature and to increase glide ratio.

RESERVE PARACHUTE

3-3. The RA-1 reserve parachute is intended for emergency use in the event of a main parachute malfunction during MFF airborne operations. It comprises a pilot chute, free bag assembly, suspension lines, risers, control toggles, and a reserve ripcord activation handle (yellow pillow). The reserve parachute functions across a wide range of main parachute malfunctions—from no main parachute deployment to a partially inflated malfunctioning main parachute. The reserve parachute contains holes in the bottom skin to allow the parachute to pressurize after fully deploying for faster openings and enhanced stability. Jumpers will be able to determine if the reserve has prematurely deployed by the square holes in the bottom skin of the reserve canopy. In addition, the slider will have a mesh center, and there will be no trim tabs, no pilot chute attached to the reserve, and no three-ring assembly (snowman) like on the main parachute risers.

SLIDER

3-4. The slider is a rectangular piece of reinforced fabric with a large metal grommet in each corner. The slider slows the opening of the main canopy. As the canopy inflates, it forces the slider down toward the risers as the suspension lines spread apart. Once the canopy deploys and the jumper is under control of the main canopy, the jumper can collapse the slider by reaching up and pulling the two tabs located on the slider. Collapsing the slider reduces noise, decreases drag, and gives the jumper a clearer field of view.

MAIN RISERS

3-5. The risers are constructed of nylon webbing and have trim tabs on the front and toggle attachments on the rear. An RSL attachment shackle is located on the left riser. The risers are attached to the harness container using a three-ring system. Trim tabs, located on the rear of the front risers, are used to increase attack angle and increase descent rate.

STEERING TOGGLES

3-6. The steering toggles are used during descent for canopy control to maneuver the canopy as the jumper glides under canopy to flare for landing. The steering toggles are also used during postopening procedures to correct certain malfunctions and to avoid collisions with other jumpers.

3-7. The steering toggles are stowed and located on the rear set of risers. After the canopy has completely deployed, the jumper unstows the steering toggles by pulling on them to release the control lines from the deployment brake setting to the desired flight setting.

TRIM TABS

3-8. Trim tabs are located on the rear of the front main risers. The tabs are used to increase attack angle, which also increases descent rate.

SUSPENSION LINE GROUPS

3-9. Suspension lines are divided into four groups and are identified (starting from the nose and continuing toward the tail) as line groups A, B, C, and D (figures 3-2 and 3-3, page 3-3). The A and C lines are continuous; that is, they are routed directly from their attachment points on the bottom skin of the canopy to the Rapide links on their respective risers.

3-10. The number of suspension lines in each group attached along the span depends upon the number of cells in the canopy. For example, a nine-cell canopy has ten lines in each group. The suspension lines distribute the suspended load evenly throughout the canopy without distorting the airfoil shape. The relative lengths of the suspension lines are such that the nose is slightly lower than the tail in full flight. The relative lengths of the suspension lines maintain the canopy's angle of attack into the wind.

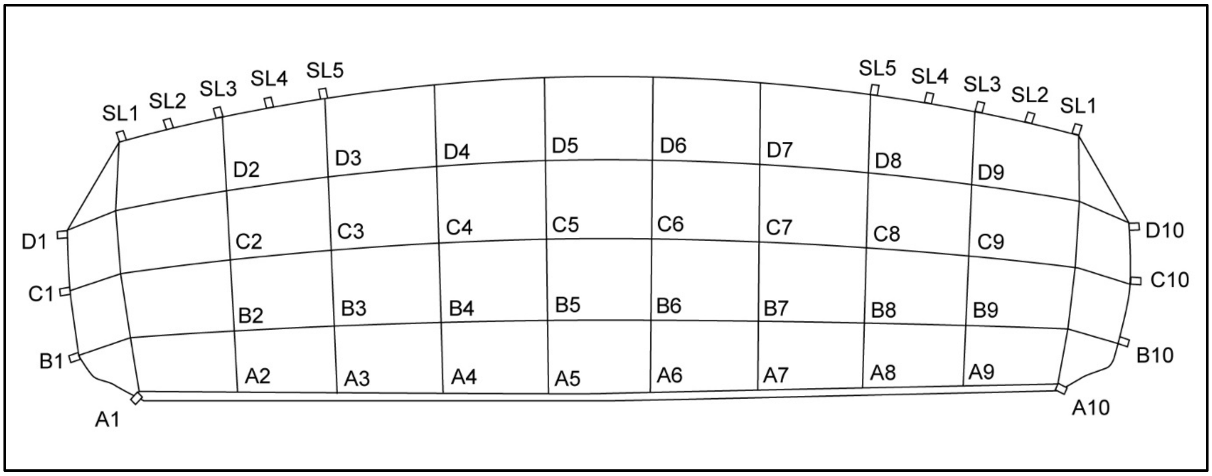

Figure 3-2. Suspension line groups

Figure 3-3. Suspension line groups under a deployed canopy

CONTROL LINES

3-11. The upper control lines converge from their points of attachment at the right and left sides of the tail to a common connection with the lower control line. The lower control line is a single line that is attached to the upper control lines at one end and a soft toggle at the other end. The parachutist manipulates the control lines to maneuver the canopy. The deployment brake loops are located on the lower ends of the lower control line. When set, they cause a ram-air canopy to open in the half-brake configuration, which prevents a forward surge on opening and allows the canopy to properly inflate.

MAIN CANOPY RELEASE HANDLE

3-12. The red main canopy release handle (figure 3-4) is located on the inboard side of the right main lift web. It is designed to be pulled with the right hand to release the main canopy in the event of a malfunction.

RESERVE RIPCORD HANDLE (YELLOW PILLOW) AND ELASTIC POCKET

3-13. The yellow reserve ripcord handle, in figure 3-4, (which will replace the currently fielded stainless steel, open frame handle) is located on the inboard side of the left main lift web and consists of a ripcord pillow, cable, and ripcord pin. The metal end is secured by an elastic nylon pocket leaving the yellow pillow exposed to the outside. It is designed to be pulled with the left hand to activate the reserve deployment sequence.

Figure 3-4. Main canopy release handle (red) and reserve ripcord handle (yellow)

RESERVE RIPCORD PIN

3-14. The reserve ripcord pin is inserted through the reserve ripcord cable eyelet. When the yellow reserve ripcord handle is pulled, or when the RSL is activated, the pin is withdrawn from the soft closing loop to deploy the reserve canopy.

MAIN CANOPY (OVER-THE-SHOULDER RIPCORD)

3-15. The main canopy OTS ripcord (figure 3-5, page 3-5) consists of a ripcord handle, cable, and ripcord pin. The ripcord is used to activate the main free-fall deployment sequence.

MAIN FREE-FALL DEPLOYMENT BAG (OVER-THE-SHOULDER RIPCORD AND BOTTOM OF THE CONTAINER)

3-16. The deployment bag (figure 3-5, page 3-5) is constructed of nylon cloth. The main canopy is packed into the deployment bag. The deployment bag has an elastic stow bar for 2-inch retainer bands, which are used to lock the free-fall deployment bag closed and stow the suspension lines. The deployment bag has a nonslip launch pad for pilot-chute deployment. The same deployment bag will be used for MFF operations when packing for OTS or BOC MFF airborne operations.

MAIN FREE-FALL PILOT CHUTE (OVER-THE-SHOULDER RIPCORD)

3-17. The pilot chute (figure 3-5, page 3-5) is constructed of nylon fabric and mesh netting. The pilot chute is used to initiate the deployment of the main canopy. The pilot chute is attached with a girth hitch to the bridle line.

Figure 3-5. Assembly components for military free-fall when jumping in the over-the-shoulder configuration

MAIN FREE-FALL HAND-DEPLOYED PILOT CHUTE (BOTTOM OF THE CONTAINER)

3-18. The main hand-deployed pilot chute consists of a handle (pillow), pilot chute, bridle, and ripcord pin (figure 3-6) attached to the bridle. The handle (pillow) is connected to the top of the pilot chute and the pilot chute is stowed in the BOC pocket on the main container.

> ***Note:*** The main OTS ripcord must be removed during MFF BOC operations using the hand-deployed pilot chute from the BOC. The hand-deployed pilot chute is used only during MFF operations.

Figure 3-6. Assembly components for military free-fall when jumping in the bottom of container configuration

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Chapter 4

Donning Without Oxygen or Equipment

This chapter provides instructions on inspection, torso measurement, and donning and adjusting the eight points of adjustments.

Note: Chapter 13 provides information on donning oxygen and equipment.

INSPECTING THE RA-1

4-1. Before donning the RA-1, the jumper should always inspect the system to ensure that the RA-1 is serviceable for the MFF operation. The jumper will ensure that all additional equipment (such as helmet, goggles, altimeter, parachutist drop bag [PDB], lowering line, and complete oxygen system) for the MFF operation is properly adjusted, as shown in figure 4-1.

Figure 4-1. Parachute ready for donning

4-2. Although a jumper can accomplish donning and adjusting the RA-1 without assistance, it is recommended that jumpers operate in pairs to ensure the parachute is donned in the safest, most efficient, and most accurate manner. Using the buddy system to properly don and adjust the RA-1 provides an additional safety check and prevents unnecessary delays for the jumper and jumpmaster during the JMPI.

Note: Jumpers should refer to Chapter 13 for rigging the POM and oxygen system for use with the RA-1.

Note: Jumpers should refer to Chapter 12 for rigging the parachutist weapon, rucksack, and PDB for use with the RA-1.

DONNING AND ADJUSTING THE RA-1

4-3. The RA-1 has eight points of adjustment (figure 4-2). These points of adjustment are crucial for maintaining comfort, keeping the parachutist safely in the harness, securing equipment to the jumper, and alleviating malfunctions. The points of adjustment are as follows:

- One chest strap.
- One waistband.
- Two main lift webs (right and left) with matching sewn thread colors.
- Two horizontal adjustment straps (right and left).
- Two leg straps (right and left).

Figure 4-2. Eight points of adjustment

4-4. There are a total of nine steps to donning and adjusting the RA-1, as described in the following paragraphs.

STEP 1

4-5. The jumper begins by inspecting the equipment and loosening all eight points of adjustment and taking out all excess slack from the retainers. If jumping the kit bag, the jumper can fold and attach the kit bag (figure 4-1, page 4-1) to the front of the container against the back pad using retainer bands at this time. The kit bag must be attached above the two horizontal adjustment straps (right and left sides).

4-6. The jumper must then determine his torso length (if not already known). The jumper accomplishes this by placing the tape measure at the base of the neck (sternal notch) and running the tape measure to either the right or left hip bone (figure 4-3). The jumper then pinches the tape with his fingers at the hip bone to acquire the length needed for the torso adjustment. For example, if the jumper's torso length is 22 inches, he will use the white thread stitching (figure 4-4 [below] and table 4-1, page 4-4) on the main lift web.

Figure 4-3. Torso measurement

Note: Torso length is defined as the distance between the sternal notch (between the two collarbones) and the hipbone. Recommend jumper make two separate measurements when wearing body armor.

Figure 4-4. Main lift web thread stitching location

4-7. If the jumper's torso length falls between two numbers on the torso conversion table, the jumper should use the lower of the two numbers to determine his torso length from the torso conversion table. For example, if the torso length is 19 inches, the jumper should use the 18-inch gold thread stitching on the main lift web.

If the torso length is 19 1/2 inches, the jumper should use the next higher number or the 20-inch black stitching on the main lift web adjustment. If jumping body armor (ballistic vest), the jumper may need to extend the lift web adjustment to the next size so the RA-1 fits properly.

4-8. Parachutists reference the torso sizing table (table 4-1) to determine their main lift web adjustments. Five marks are on the main lift web of the harness to facilitate adjustment and harness symmetry. The marks are differentiated by five colors (green, red, gold, black, and white). The marks are positioned every 1 1/2 inches. The table also provides the recommended relationship between torso length and the colored marks. Parachutists adjust the main lift web by moving the proper stitch color to the center of the main lift web buckle.

Table 4-1. Torso measuring chart

Torso Measurement (Inches)	Torso Size	Main Lift Web Adjustment
14	Extra Small	Green
16	Small	Red
18	Medium	Gold
20	Tall	Black
22	Extra Tall	White
Note: Colored stitching will be centered inside the friction adapter.		

STEP 2

4-9. The assistant holds the RA-1 so that the jumper may don the RA-1 while standing (figure 4-5, page 4-5). If sitting, the jumper will place the RA-1 on his back and loosely connect the chest strap and then stand up.

STEP 3

4-10. The jumper bends forward at the waist (figure 4-5, page 4-5) until the upper body is parallel to the floor. The assistant then places the container as high up on the jumper's back as possible so that the carrying handle rests at the base of the jumper's neck.

Figure 4-5. Assistant holding parachute

STEP 4

4-11. The jumper loosely secures the chest strap through the chest strap friction adapter (figure 4-6, page 4-6). All excess webbing should remain unstowed at this stage.

Figure 4-6. Securing chest strap friction adapter

STEP 5

4-12. The assistant hands the leg straps (figure 4-7, page 4-7) to the jumper one at a time to ensure there are no twists. The jumper then connects the V-ring to the quick-ejector snap. Once both leg straps have been attached, the jumper tightens the leg straps until the padding on the leg straps rests on the inner portion of the jumper's thigh. The leg strap quick-ejector snaps need to be low in the jumper's groin area to ensure proper fit during deployment.

Note: The leg strap quick-ejector snaps should have a heavy weight doubled-looped retainer band around the quick-ejector snap activation lever.

Figure 4-7. Attaching leg straps

STEP 6

4-13. The jumper stands up straight. The stitching block where the leg straps and main lift web meet should rest on top of the jumper's hipbone. The jumper should also ensure that all the handles are located at the correct height and that the base ring of the three-ring system rests in the proper area (that is, the hollow of the shoulder). The jumper should feel some tension in the main lift web between the shoulder and the hip joint. If not, the jumper repeats steps 1 through 6 for adjusting the main lift web.

STEP 7

4-14. The jumper tightens the horizontal adjustment straps (figure 4-8, page 4-8). The jumper accomplishes this by grasping both horizontal adjustment straps and pulling them until the container is snug to his back.

Figure 4-8. Horizontal adjustment straps

> ***Note:*** The excess portion of the horizontal adjustment straps are rolled outboard and stowed over the friction adapter.

STEP 8

4-15. The jumper attaches the waistband (figure 4-9, page 4-9). The running end of the waistband will be routed under the right lateral adjusting strap, under the right main lift web, across the jumper's front then under the left main lift web and under the left lateral adjusting strap to the friction adapter. The waistband should be snug and not hinder the jumper's ability to arch. When jumping a front-mounted kit bag, handles should be placed on the left side with the waistband running through both handles.

> ***Note:*** When jumping a side mounted weapon, the waistband is routed under the right lateral adjusting strap; routed under the right main lift web across the jumper's front over the left main lift web, weapon, and left lateral adjusting strap; and routed through the keeper on the accessory pouch to the friction adapter.

> ***Note:*** When jumping the center-mounted weapon harness (CMWH), the waistband is routed under the right lateral adjusting strap, under the right main lift web across the jumper's front, then under the left main lift web and under the left lateral adjusting strap to the friction adapter.

Figure 4-9. Waistband adjustment

STEP 9

4-16. Once all points of adjustment have been properly made, the excess webbing is stowed in the excess webbing slack retainer or with a heavy-duty retainer band (figure 4-10, page 4-10). All excess webbing is rolled outboard except the main lift webs, which are routed and stowed inside the padded portion of the leg strap. If the HAHO seat is to be used, it is attached at this time. The jumper is required to undergo the JMPI at this time.

Note: If the HAHO seat is not worn, the HAHO attachment points should be stowed.

Figure 4-10. Stowed excess webbing

Chapter 5

Aircraft Procedure Signals and Jump Commands for Nonoxygen Jumps

Aircraft noise, the MFF parachutist helmet, and the POM make verbal communication extremely difficult. Therefore, the jumper receives aircraft procedure signals and jump commands by hand-and-arm signals. The MFF jumper must be thoroughly familiar with all signals along with the commands and required actions for each signal. Standardization of procedural signals and jump commands permit interoperability of all MFF-capable units. Safety significantly increases when the jumper understands the jumpmaster's intent and when the jumpmaster understands the jumper's desired response.

AIRCRAFT PROCEDURE SIGNALS

Note: For the purpose of this segment, commands and signals are written in capital letters.

5-1. Signals used between aircraft boarding and the jump command STAND UP are procedure signals. The aircraft procedure signals discussed in the following paragraphs begin before takeoff. The jumpmaster gives these signals. The following sequence depicts the procedures used by the jumpmaster and jumpers when jumping without oxygen:

- **LOAD AIRCRAFT.** Load the aircraft on the jumpmaster's signal in reverse stick order.
- **DON HELMETS.** Don helmets and fasten seat belts.
- **UNFASTEN SEAT BELTS.** At 1,001 feet AGL, unfasten seat belts at the jumpmaster's command. Helmets may be removed at the jumpmaster discretion.
- **20 MINUTES.** At the 20-minute warning, everyone awake and keep eyes on the jumpmaster.
- **10 MINUTES.** At the 10-minute warning, keep eyes on the jumpmaster and don helmets if removed.
- **Obtain update on winds.** Updated winds from the DZ safety officer, expressed in knots.
- **CYPRES/PIN CHECK.** Jumpers receive a CYPRES and pin check.
- **STAND UP.** Given 2 minutes from release point. Stand up, face rear of the aircraft, check CYPRES and pins on jumper in front of you and give him a thumbs-up, then conduct a check of all your handles and equipment.
- **MOVE TO THE REAR.** Given approximately 1 minute from time on target (TOT). Pass the signal back, then the first jumper moves to hinge of ramp or 1 meter from the jump door.
- **STAND BY.** Given approximately 15 seconds from TOT. Return a thumbs-up. First jumper moves to edge of ramp or to the jump door.
- **GO.** Given at the release point. Exit as briefed.
- **ABORT.** Given when release conditions are not favorable. Back up to hinge of ramp and await further instructions.

Note: If at any time you experience an equipment-related problem, extend your arm toward the center of the aircraft and give a thumbs down signal.

Note: MFF oxygen procedures and jump commands are in Chapter 13.

DON HELMETS

5-2. The jumpmaster gives the signal DON HELMETS (figure 5-1) before takeoff. He may also give it during the flight or if the aircraft is landing with the jumpers (for example, winds out of limits on the DZ or mission aborted). Upon receiving this signal, the parachutist dons his helmet, fastens his chinstrap, and fastens his seat belt.

Figure 5-1. DON HELMETS signal

UNFASTEN SEAT BELTS

5-3. The jumpmaster normally gives the signal UNFASTEN SEAT BELTS (figure 5-2) upon reaching an altitude of 1,000 feet AGL or when the flight crew chief indicates that it is safe to do so. If the aircraft descends back through 1,000 feet AGL later in the flight, the parachutist refastens his seat belt upon receiving the command DON HELMETS.

Figure 5-2. UNFASTEN SEAT BELTS signal

EMERGENCY BAILOUT

5-4. The jumpmaster gives the EMERGENCY BAILOUT signal (figure 5-3) for an emergency exit during flight. Jump commands may be given if time permits. If there is no time for the full jump command sequence, the jumpmaster gives abbreviated signals immediately after the bailout signal as follows:

- For exits from 1,001 to 3,000 feet AGL, the jumpmaster signals to immediately exit, clear, and pull the reserve ripcord handle (yellow pillow) (figure 5-3).
- For exits at 3,001 feet AGL and above, the jumpmaster signals to immediately exit, clear, and pull (figure 5-4) the main OTS ripcord handle. When jumping the hand-deployed pilot chute from BOC, the jumpmaster signals to immediately exit, clear, grab, pull and release (figure 5-5, page 5-4) the hand-deployed pilot chute from the BOC.

Figure 5-3. EMERGENCY BAILOUT signal for over-the-shoulder and bottom of the container (1,001 to 3,000 feet AGL)

Figure 5-4. EMERGENCY BAILOUT signal for over-the-shoulder ripcord (3,001 feet AGL and above)

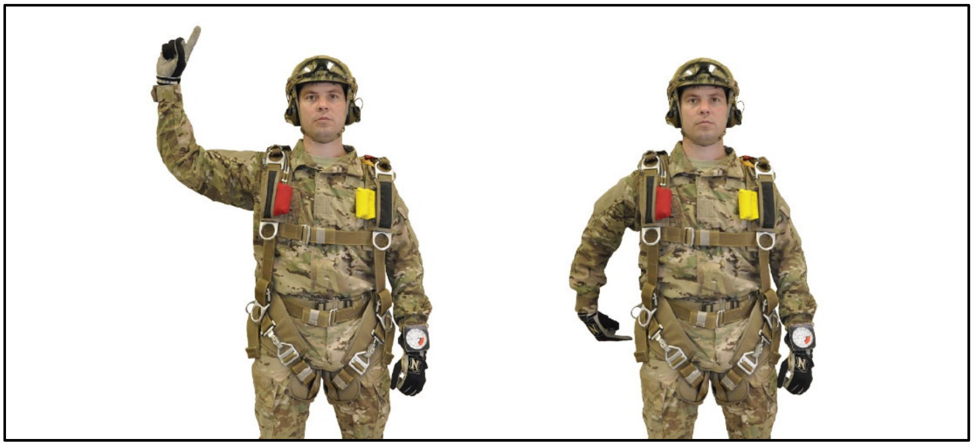

Figure 5-5. EMERGENCY BAILOUT signal for bottom of the container (3,001 feet AGL and above)

TIME WARNINGS

5-5. The jumpmaster receives time warnings from the flight crew. The jumpmaster signals the TIME WARNINGS (figure 5-6) to the parachutist to allow him adequate time to prepare for the jump. The parachutist normally receives the time warnings 20 minutes and 10 minutes before TOT.

Figure 5-6. TIME WARNINGS signal

WIND SPEED

5-6. The jumpmaster signals WIND SPEED (figure 5-7) after the 10-minute time warning. In gusting wind conditions, the jumpmaster gives the wind speed signal first to indicate the lower wind speed. He follows with the GUSTING WINDS signal (figure 5-8, page 5-6) to indicate the higher wind speed.

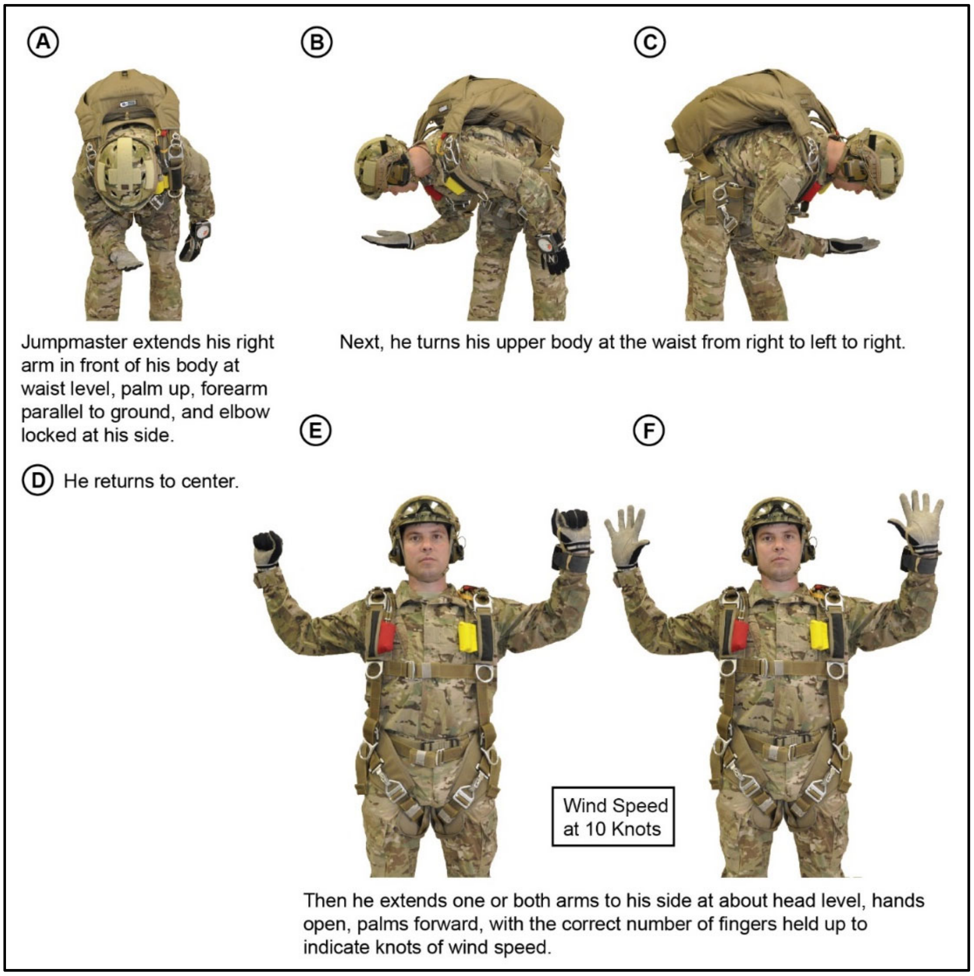

Figure 5-7. WIND SPEED signal

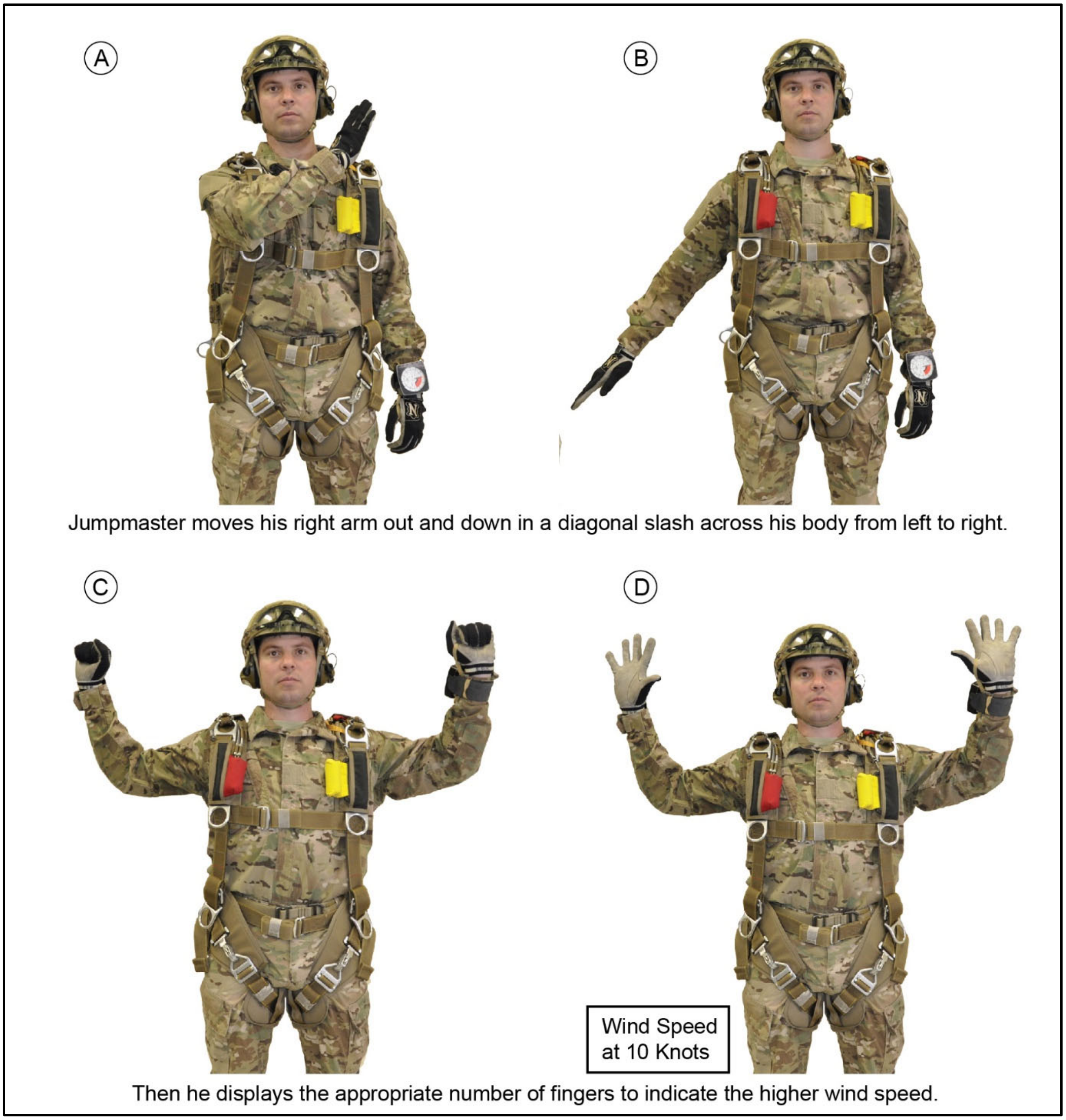

Figure 5-8. GUSTING WINDS signal

Note: The arm signal has been eliminated from the jump commands when jumping the Military CYPRES 2, but all jumpers must receive a Military CYPRES 2 and pin check after the WIND SPEED or GUSTING WINDS signal is given and then pass the THUMBS-UP signal.

JUMP COMMANDS

5-7. The jump commands discussed in the following paragraphs begin as early as 2 minutes before the actual jump is made. The jumpmaster gives these commands.

Note: The 2 MINUTE, 1 MINUTE, 15 SECOND, and GO commands can be given with either hand, depending upon which side of the aircraft the MFF jumpmaster is on.

STAND UP

5-8. The jumpmaster commands STAND UP (figure 5-9) about 2 minutes before TOT. (Oxygen or equipment jumps may require additional time for this command only; all other commands remain the same.) Upon receiving this command, the parachutist stands up, receives the CYPRES and pin checks, faces the jumpmaster, and checks his equipment. If jumping with oxygen, the parachutist also places his right hand on the ON/OFF valve of the bailout bottles and grasps with his left hand the console hose at the regulator connection point on the bailout bottle.

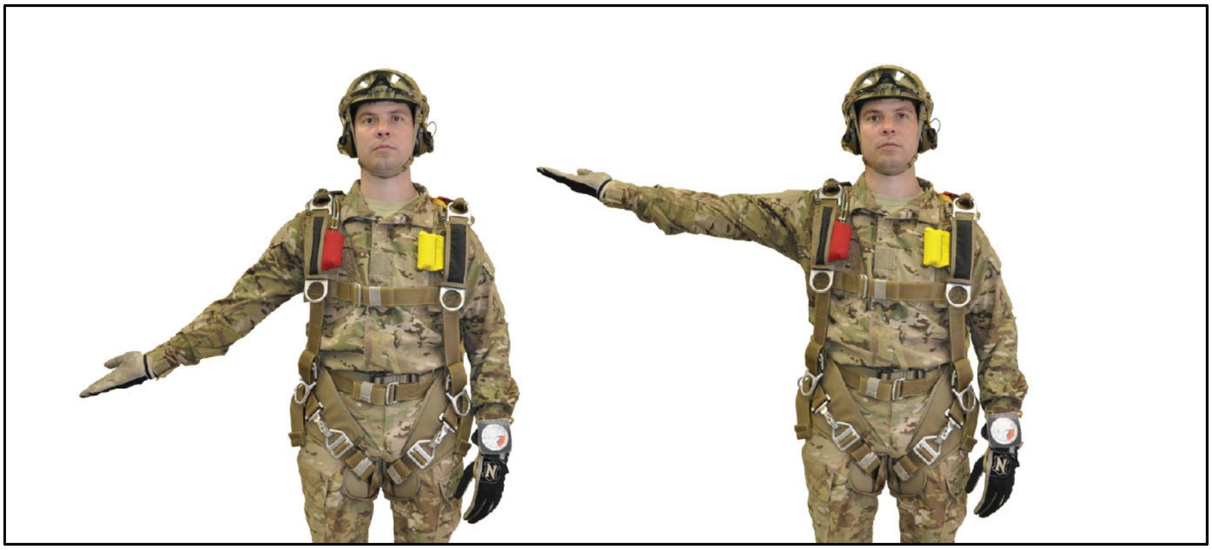

Figure 5-9. STAND UP command

MOVE TO THE REAR

5-9. The jumpmaster commands MOVE TO THE REAR (figure 5-10, page 5-8) about 1 minute before TOT. Upon receiving this command, the parachutist tightens the combat pack's shoulder straps around his legs, adjusts his goggles, and moves to within 1 meter of the jump door or to the hinge of the cargo ramp. If jumping with oxygen, the parachutist must ensure the bailout oxygen system is activated, check the pressure gauge on the bailout bottle regulator, and disconnect from the OXCON before moving to the rear of the aircraft. The MOVE TO THE REAR command can be given standing or kneeling.

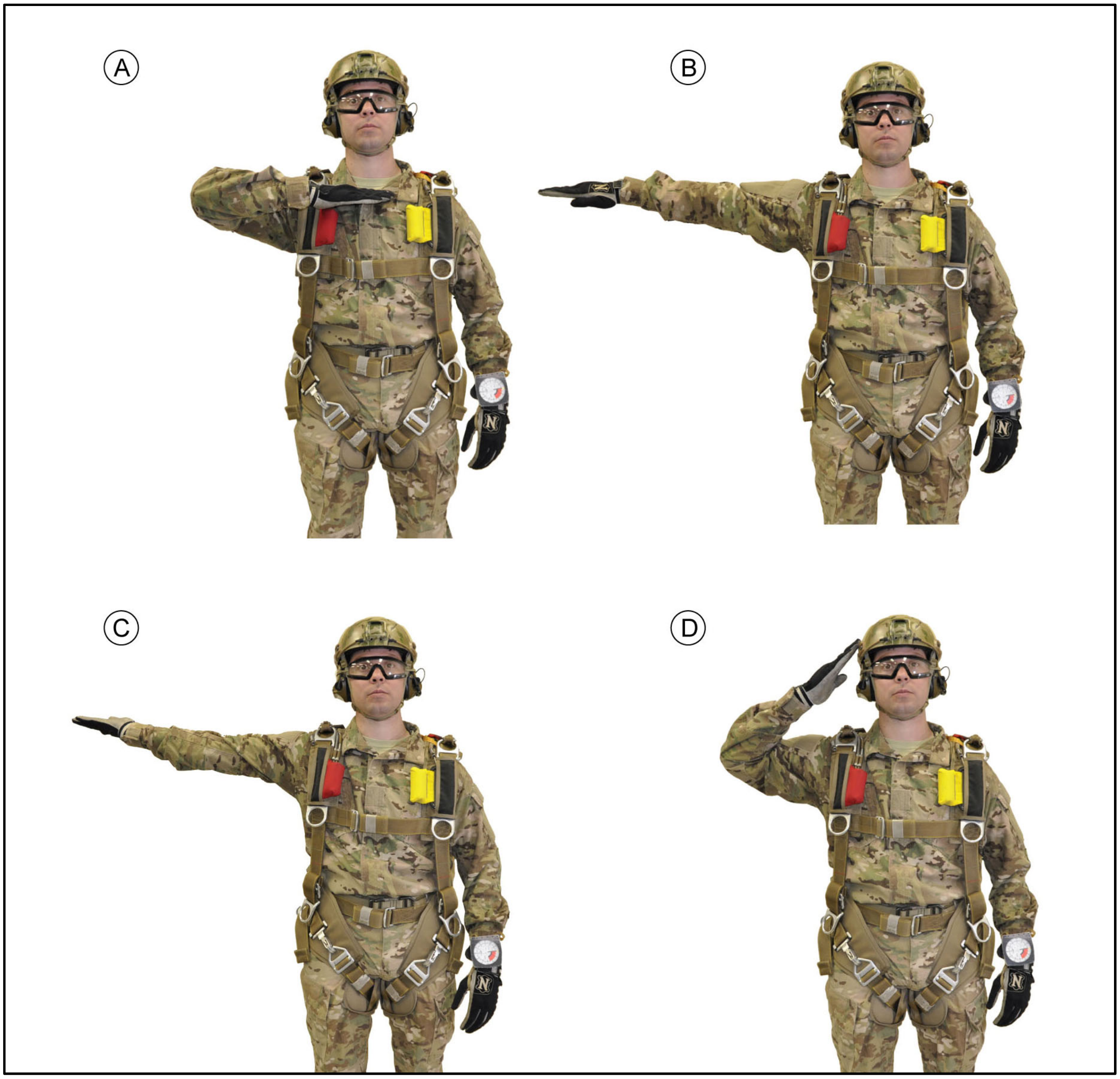

Figure 5-10. MOVE TO THE REAR command

STAND BY

5-10. The jumpmaster commands STAND BY (figures 5-11 and 5-12, page 5-9) about 15 seconds before the exit. Upon receiving this signal, the parachutist signifies readiness by returning the jumpmaster's signal and then moves to the edge of the jump door or the cargo ramp.

Figure 5-11. STAND BY command standing

Figure 5-12. STAND BY command kneeling

GO

5-11. The jumpmaster commands GO (figure 5-13, page 5-10) when the aircraft is over the release point and the green caution jump light is on. The jumpmaster crosses one arm across his chest and then moves one arm to point at the exit door or ramp. The GO command can be given from standing or kneeling position.

Figure 5-13. GO command

ABORT

5-12. The jumpmaster commands ABORT (figure 5-14) anytime an unsafe condition exists inside the aircraft, outside the aircraft (red jump light comes on), or on the DZ. The jumpmaster lowers his head with his arms to his side and moves his head from side to side. Upon receiving this command, the parachutist waits on instructions from the jumpmaster. If the jumpmaster instructs jumpers to return to their seat, the jumpers will reconnect to the OXCON. Jumpers will wait for follow on instructions from the jumpmaster.

Figure 5-14. ABORT command

CAUTION

If the jumpmaster has positioned his arm to give the command GO, he must NOT move it when he gives the ABORT command. Parachutists may incorrectly assume this means they should exit if the jumpmaster moves his arm away from the initial position for the GO command.

Chapter 6
Exit Procedures and Body Stabilization

The MFF jumper must be able to exit an aircraft in a stable, safe body position with his combat equipment. A jumper who is unstable, spinning, or tumbling is unsafe and will be a hazard to other jumpers around him. The jumper must fall on a designated heading and manually deploy his main parachute without losing stability. Body stabilization skills allow the jumper to conduct a controlled exit, group in free-fall, cover small lateral distances with combat equipment, move off a lower jumper's back in free-fall, turn to keep the DZ or group leader in sight, and deploy the canopy in a controlled manner. The MFF jumper maintains these skills through regular MFF jumps and periodic refresher training. This chapter addresses the exit and body stabilization skills needed to make a day or night tactical MFF jump with combat equipment.

AIRCRAFT EXITS

6-1. There are basically three types of aircraft exits commonly used by MFF jumpers:

- **Diving Exit.** The diving exit (figure 6-1, page 6-2) is executed by the jumper diving down at a 45-degree angle while extending the arms out in front; the body is arched at the pelvis. The head is held up looking at the horizon. The legs on exit are in the full outstretched position then transitioned by bending at the knees and bringing the heels of the boots to the parachute container. As the horizon comes into view, the jumper will transition into a neutral flying position.
- **Poise Exit.** The poise exit (figure 6-2, page 6-3) is executed upon exiting the aircraft, by either pivoting into the poised position or by hopping out already in the poised position and turning the body into the direction of flight. The jumper will arch the body with the pelvis pushed down. The legs should be positioned comfortably apart with the knees slightly bent. The head is held high as if looking up and the arms are extended to the rear and away from the body at a 45-degree angle. As the horizon comes into view, the jumper will transition into a neutral free-fall body position.
- **Box Man Exit.** The box man exit (figure 6-3, page 6-3) is similar to the poise exit except the jumper will start the exit with the chin up, head back, and hands and arms in the lazy W. The legs are positioned comfortably apart and relaxed as the jumper arches. Upon exiting the aircraft, the jumper will turn into the direction of flight while maintaining the box man until the horizon comes into view; the jumper will then transition into a neutral free-fall body position.

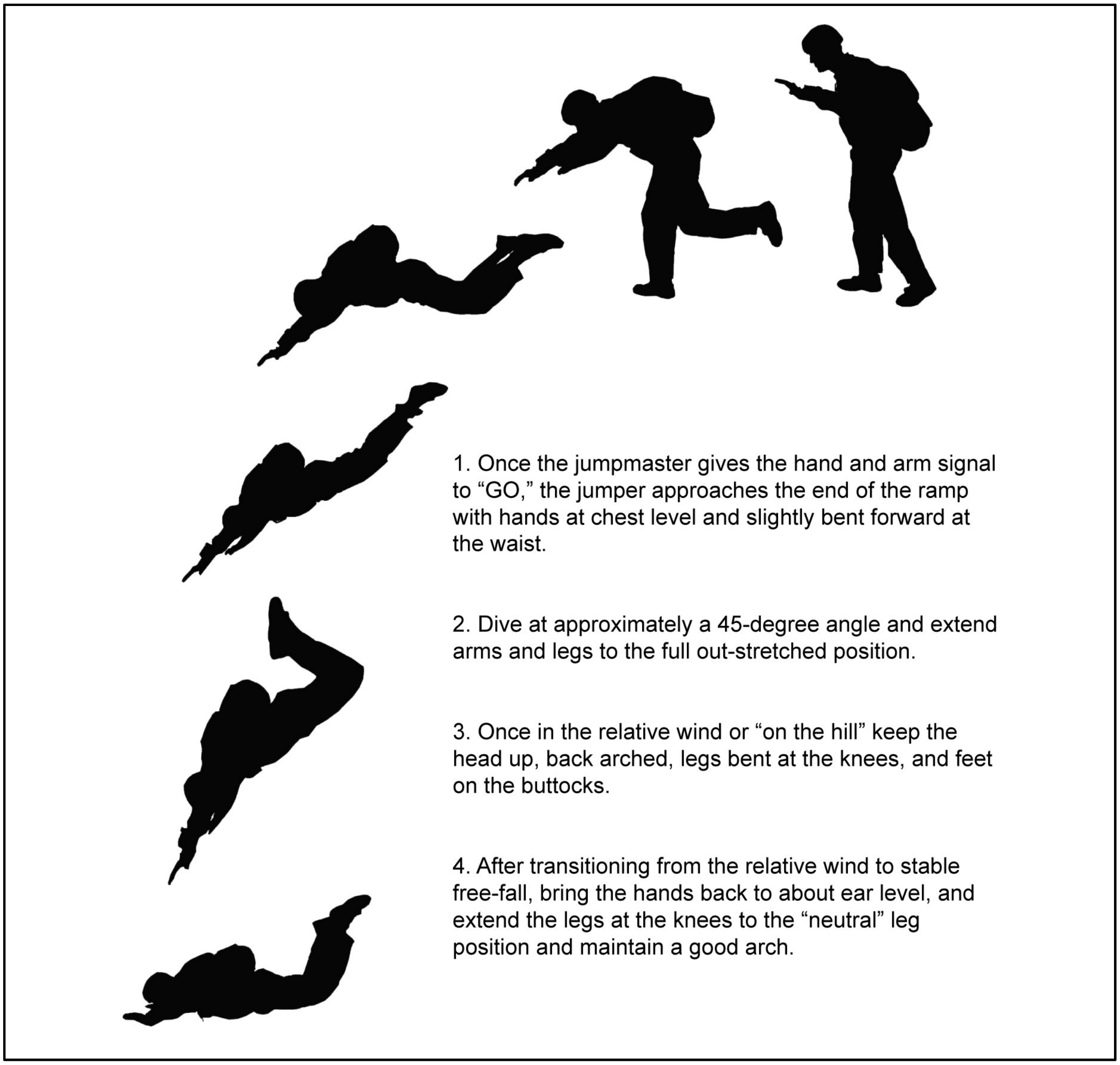

Figure 6-1. Diving exit position

Figure 6-2. Poised exit position

The "box man method" of poising out of an aircraft, by ramp or side door, is simply to exit in the normal box man free-fall position: chin up, hands and arms in the lazy "w," legs relaxed, and arch. This method eliminates the need for the jumper to transition from a "poise" position to a normal free-fall position.

Figure 6-3. Box man method

TABLETOP BODY STABILIZATION TRAINING

6-2. Any stable tabletop or flat surface can be used for body stabilization training. The jumper lies on his stomach on the tabletop. At the command GO, he lifts his arms and legs from the tabletop, and assumes the stable free-fall position (figure 6-4). Controlled movement positions during free-fall include turns (figure 6-5), gliding (figure 6-6, page 6-5), altimeter checks (figure 6-7, page 6-5), and tracking (figure 6-8, page 6-6).

In the stable free-fall position, the parachutist arches his back and holds his head up and back. He extends his arms horizontally with his elbows bent at 90-degree angles. He holds his hands at eye level, palms down and slightly cupped, with fingers spread. He holds his legs about shoulder width apart with his knees bent at 45-degree angles. His knees should be slightly higher than his thighs.

Figure 6-4. Stable free-fall position

To execute the right or left turn, the parachutist arches and looks in the direction of the turn while rotating his upper body (shoulder) in the direction of the turn to start the turn. Before reaching the desired heading, he counters and stops his turn on the desired heading. He resumes the stable free-fall position.

Figure 6-5. Body turn

The glide is a controlled lateral movement. It allows the parachutist to maintain relative position with a designated group leader or bundle. To glide, the parachutist brings his arms back with elbows held near his sides and forearms at about a 90-degree angle to his body. He rotates his shoulders up and forward to cup his upper body, then he straightens his legs from the knees. The straighter he holds his legs, the faster the glide will be. To stop the glide, he returns to the stable free-fall position.

Figure 6-6. Forward glide

The parachutist should check his altimeter before and after performing any maneuver during free-fall descent to maintain altitude awareness. He wears the altimeter on his left wrist. He reads the altimeter by glancing toward his wrist without altering his stable free-fall body position.

Figure 6-7. Altimeter check

6-3. In the stable free-fall position, the jumper arches his back and holds his head up and back. He extends his arms horizontally with elbows bent at 90-degree angles. He holds his hands at eye level, palms down and slightly cupped, with fingers spread. He holds his legs about shoulder-width apart with knees bent at a 45-degree angle. His knees should be slightly higher than his thighs.

6-4. To execute right or left turns, the jumper arches and looks in the direction of the turn while rotating his upper body (shoulder) in the direction of the turn to start the turn. Before reaching the desired heading, he counters and stops the turn on the desired heading. He then resumes a stable free-fall position.

6-5. The forward glide is a controlled lateral movement. It allows the jumper to maintain relative position with a designated group leader or bundle. To forward glide, the jumper brings his arms back with the elbows held near his sides and forearms at about a 90-degree angle to his body. He rotates his shoulders up and forward to cup his upper body. Then, he straightens his legs and knees. The straighter he holds his legs, the faster the glide will be. To stop the forward glide, he returns to a stable free-fall position.

6-6. The jumper should check his altimeter before and after performing any maneuver during free-fall descent in order to maintain altitude awareness. He wears the altimeter on the left wrist. He reads the altimeter by glancing toward his wrist without altering the stable free-fall body position.

TRACKING

6-7. Tracking is the technique of assuming a body position that allows the jumper to move horizontally while free falling. Although there are many variations of the basic body position, it essentially involves the jumper moving out of the traditional face-to-earth arched position, straightening the legs, bringing the arms to the sides at a 45-degree angle, rolling the shoulders forward, and cupping the air to provide maximum lift. There is, however, debate over what exactly constitutes the most efficient tracking position (providing the best glide ratio), especially concerning how far (if at all) the jumper's legs should be spread. An example of the tracking position (figure 6-8) works well for some individuals and not so well for others.

Figure 6-8. Tracking position

6-8. It is claimed that jumpers who are good at tracking can cover nearly as much ground as the distance they fall (approaching a glide ratio of 1:1). It is known that the fall rate of a jumper in an efficient track is significantly lower than that of a jumper falling in a traditional face-to-earth position—the former reaching speeds as low as 90 miles per hour and the latter averaging around 120 miles per hour. Inexperienced jumpers would expect such a position to increase the fall rate. If two jumpers begin with the same fall rate, one will appear to float at the same place relative to the other—neither appearing to drop below nor float above the other. If one jumper assumes a very good track position, the other jumper would see the tracking jumper not only accelerate quickly away but quickly upwards (relative to one another) as well.

6-9. Tracking is regarded as an essential lifesaving skill for all MFF jumpers engaging in grouping exercises, allowing the jumpers to gain horizontal separation before opening their parachutes or when the jumpers must cover great distance because of an incorrect spot determined by the jumpmaster. Accordingly, the greater the number of MFF jumpers on a jump, the better their tracking skills must be. In addition to the need for tracking a longer distance after break off (tracking away for separation before opening), jumpers also have to be more aware of other jumpers around them and must be able to track in a straight line away from the center of the formation (figure 6-9, page 6-7).

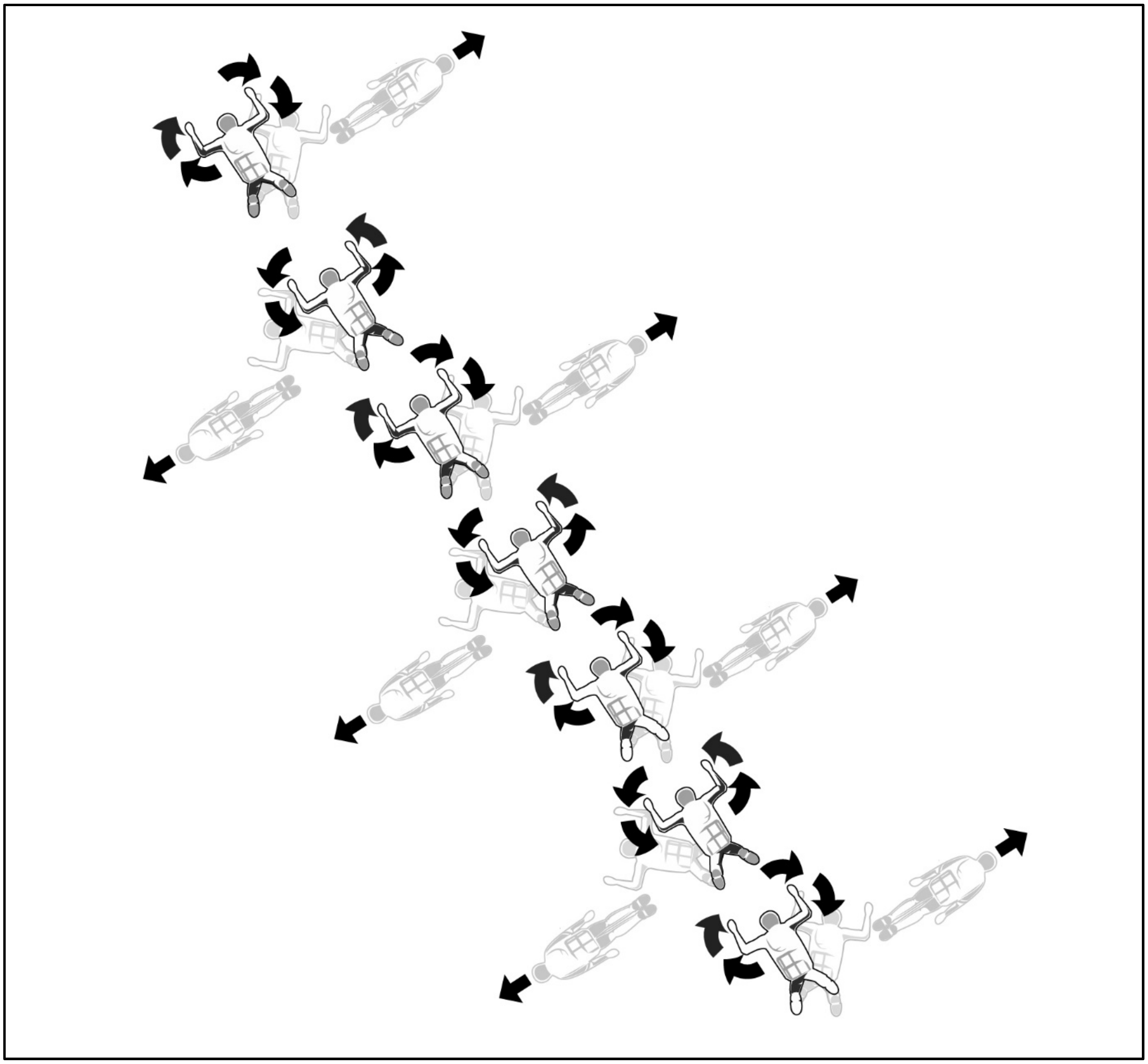

Figure 6-9. Example of tracking away for separation

6-10. Because a good track body position can lead to significant horizontal speed and because the body's curved and slightly head-down position can cause less-experienced jumpers to be aware of a reduced area around them, novice jumpers should train themselves to be aware of what is going on around them in all directions for a greater distance while tracking.

DANGER

The dangers associated with tracking should not be underestimated. An efficient track can reach horizontal speeds of over 100 mph; collisions with other MFF jumpers could result in serious injury or DEATH. Inexperienced jumpers should use the tracking position with caution and should hold the tracking position no longer than is needed to clear air space or gain ground.

RECOVERY FROM INSTABILITY

6-11. Instability creates a hazard to the jumper and to other jumpers in the air. Instability is the primary cause of MFF malfunctions. There are a variety of reasons for instability. In most cases, it is caused by a jumper who does not present a symmetrical body position to the relative wind, either on exit or in free-fall. A contributing factor to instability in free-fall is the inadvertent shift or release of combat equipment. Instability is characterized by a flat, spinning or tumbling body motion. Instability is dangerous not only to the jumper experiencing it, but often to other jumpers in free-fall with him. Instability prevents tactical grouping.

6-12. If a jumper encounters any or all of these situations discussed in the following paragraphs, he should maintain altitude awareness and pull at the prescribed pull altitude.

RECOVERY FROM A FLAT (HORIZONTAL) SPIN

6-13. If the jumper is spinning or falling on his back, he must first return to a face-to-earth free-fall attitude by arching his body. Depending upon the speed of his spin, sometimes this movement alone is enough to slow or stop a flat spin. If he is still spinning after facing the earth, he must counter the direction of the spin. He does this movement by looking in the opposite direction of the spin (for example, if spinning clockwise, he looks counterclockwise) and making a hard body turn in that direction. He holds this body position until the spin slows and stops. Depending on the amount of momentum he developed before he started countering the spin, he may have to hold this body position for several revolutions. Once the spin has stopped, he checks his body position, makes an altimeter check, gets back on heading, and continues with the mission.

6-14. If a shift of the combat pack causes a flat spin, the jumper may have to adjust his body position to obtain stability or maintain a heading. The severity of the shift (versus an inadvertent release) determines how much adjustment of the knees, the angle of the lower leg, hand and arm placement, or cocking of the hips he must make to counter the effect of a combat pack that is now not symmetrical or square to the relative wind.

6-15. Jumpers should correct spinning by arching, checking hands and feet, countering the spin in the opposite direction, and maintaining altitude awareness.

RECOVERY FROM TUMBLING

6-16. A bump during a group exit or breaking the arched body position normally causes tumbling. If tumbling, the jumper assumes the hard arch body position until facing the earth. Then, he relaxes the hard arch and assumes a stable free-fall body position. The time it takes to return to a face-to-earth position will vary with the severity of the tumble, the body area surface, and the jumper's combat equipment configuration. Presenting a symmetrical body position to the relative wind on exit from the aircraft is the most significant factor in preventing tumbling.

6-17. Jumpers should correct tumbling by arching, keeping their heads up, checking their hands and feet, and maintaining altitude awareness.

ALTITUDE AWARENESS

6-18. A jumper who is unstable must maintain altitude-awareness. The stress created by instability can cause a normal human phenomenon of temporal (time) distortion. The resultant effect varies from individual to individual. It can appear to be either time compression or a slowing down of perceived time passage. He must not get so caught up in his attempts to recover stability that he loses altitude awareness and forgets to manually activate his parachute. He must never sacrifice the pull altitude for stability or the continued attempts to obtain stability before the pull.

Note: An unstable jumper must remember that as he is falling, an area of low pressure is created above him. Any altimeter reading while in this low-pressure area will not reflect the correct altitude in feet AGL. An example is a jumper falling back to earth who looks at his altimeter while holding it in front of his face. Due to the low-pressure zone in which the altimeter is located, the jumper will read a higher altitude than where he actually is in feet AGL.

Note: Jumpers must remember that this pressure differential can cause the altimeter to be off as much as 1,000 feet.

CORRECTIVE ACTIONS DURING FREE-FALL

6-19. Primary movements to get off a fellow jumper's back include—

- Left or right turns into a safe direction.
- Forward glides (elbows into lazy W, legs extended) to clear airspace.
- Tracking (arms back to side, legs straight).

Note: A modification to a forward glide is the high-lift track. Only experienced HALO qualified jumpers should use this technique, and only qualified MFF instructors will train jumpers on this technique to gain separation before canopy deployment.

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Chapter 7

Delay and Deployment Sequence for Over-the-Shoulder Ripcord and Bottom of the Container Hand-Deployed Pilot Chute

The MFF parachutist uses a combination of delayed free-fall and HAHO techniques if making exits at an altitude above 25,000 feet mean sea level (MSL). While using the glide advantage of the RA-1 ARAPS, he can also deploy his parachute at intermediate altitudes to minimize the chance of parachute damage or injury to himself upon canopy deployment.

The commander should consider altitude requirements when conducting training at higher altitudes. It is recommended that routine MFF HAHO training be conducted at or below 19,999 feet MSL. Conducting training at lower altitudes eliminates the need for oxygen prebreathing and additional support personnel and minimizes the chance of parachute damage and injury to the parachutist due to opening forces. This will also reduce the chances of the parachutist encountering physiological problems and experiencing cold-weather injuries.

MFF HAHO stand-off parachuting requires extensive airspace clearance. In addition, this training must take place in areas having alternate DZs should the parachutist (or element) not be able to reach the primary DZ.

Note: Jumpmasters and aircraft pilots should ensure that the airspace notice to airmen for airspace clearance is approved for the duration of the MFF airborne operation being conducted. Reference USASOC Regulation 350-2 for submitting the request.

Note: A notice to airmen is a notice filed with an aviation authority to alert aircraft pilots of potential hazards along a flight route or at a location that could affect the safety of the flight. They are unclassified notices or advisories distributed by means of telecommunication that contain information concerning the establishment, conditions or change in any aeronautical facility, service, procedure, or hazard, the timely knowledge of which is essential to personnel and systems concerned with flight operations. A notice to airmen is not required reading for pilots and does not necessarily make the operation safer.

FREE-FALL DELAY

7-1. As an aircraft increases altitude, the aircraft's true airspeed must increase to maintain a constant indicated airspeed due to decreased air density. True airspeed is the actual speed of the aircraft through the air mass. When true airspeed exceeds terminal velocity, the parachutist must allow for longer delays to decelerate to a safe speed for parachute deployment (table 7-1, page 7-2).

WARNING

Failure to take the minimum required delay can result in serious injury to the parachutist and parachute damage.

Note: Jumpmasters must take into consideration the DZ (in feet AGL) for any delays in parachute opening during MFF operations.

Table 7-1. Required free-fall delays

Exit Altitude (Feet Mean Sea Level)	Delay
Below 20,000	4 seconds
Above 20,000	Pull altitude will be predetermined; pull altitude will be no less than 1,500 feet below drop altitude rather than a set time delay.

7-2. On the command GO, the group leader exits the aircraft. The remainder of the element exits the aircraft at designated intervals using the same exit technique as the group leader as follows:

- Each parachutist free-falls for the required delay or until reaching the predetermined pull altitude.
- The exit interval will be established to ensure canopy separation between parachutists at opening.
- The exit interval will be based on the type of aircraft, its speed, and the mission requirements.
- A parachutist experiencing a malfunction must immediately start emergency procedures to minimize loss of altitude.
- Upon deployment, the group leader checks with the element for malfunctions, then assumes the initial flight heading. Should a member of the element be beneath the group, the element must execute the rehearsed tactical plan (lose altitude to reform the group or follow the low parachutist).

OVER-THE-SHOULDER RIPCORD PULL

7-3. The jumper executes the main OTS ripcord pull (figure 7-1, page 7-3) at the predesignated altitude as follows:

- He looks at the main ripcord handle on the right main lift web.
- He extends his left arm beyond his head with his hand held palm down.
- He traces the main ripcord cable housing.
- He grasps the main ripcord handle with his right hand and pulls the handle from the ripcord pocket, pulling the main ripcord cable to full-arm extension.
- Then, he looks over his right shoulder to disrupt the partial vacuum to ensure the pilot chute has cleared.
- After canopy deployment, he slips the main ripcord handle over his wrist.

7-4. When the jumper uses NVG to assist him during a night jump, the pull sequence during opening will remain the same as without NVG (figure 7-1, page 7-3). The jumper will—

- "Arch-Look-Trace-Grab" as normal. The counter hand will extend slightly more forward to allow the head to be cradled under the jumper's arm in a manner that protects the NVG from inadvertent contact with the deploying pilot chute and risers.
- Pull the ripcord handle to full-arm extension with the counter arm in place to continue protecting the NVG from a deploying pilot chute and risers.

- Look below the NVG to read the altimeter and to identify the ripcord, main canopy release handle (red cutaway pillow), and reserve ripcord handle (yellow pillow), when required, during free-fall and canopy descent.

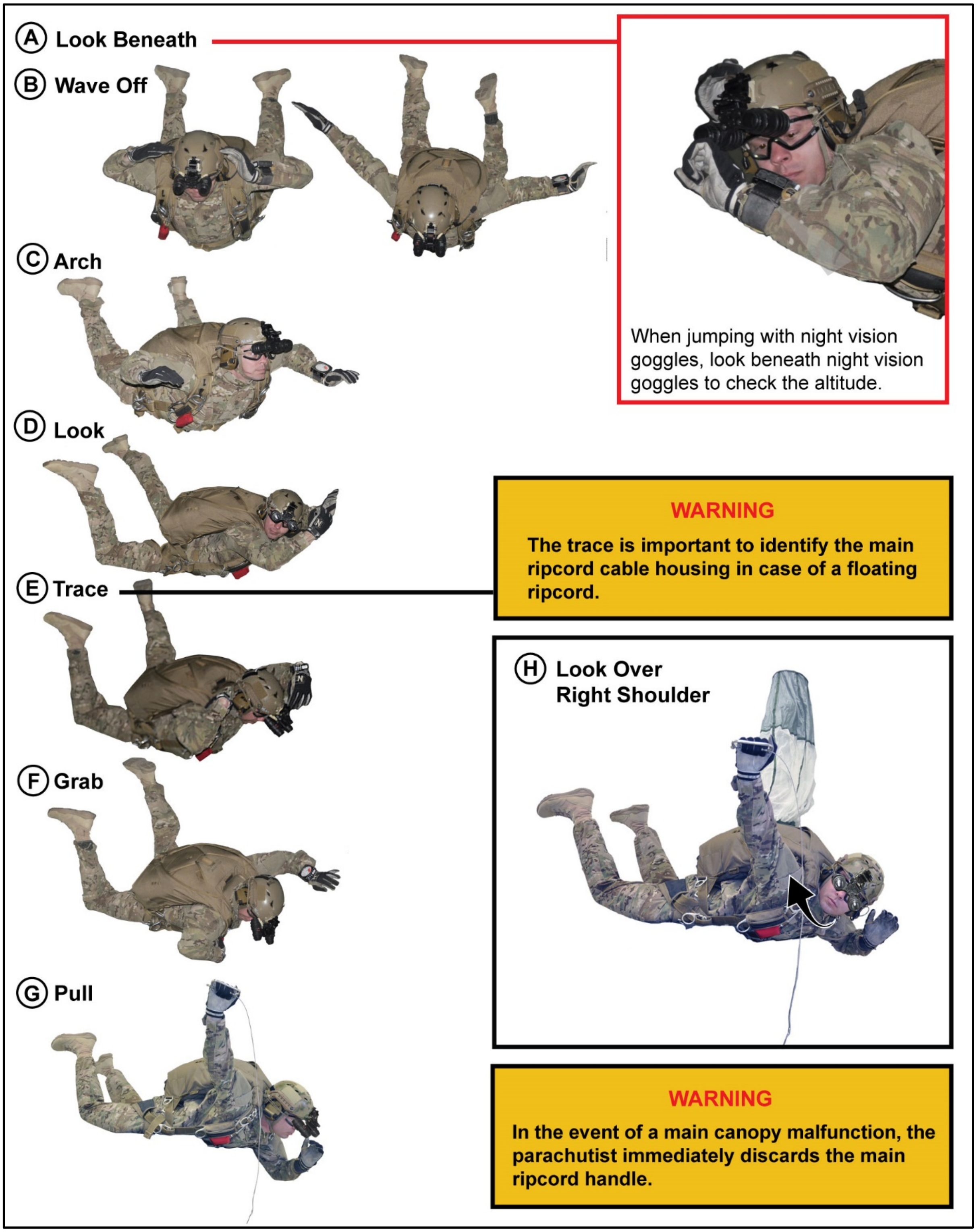


Figure 7-1. Main over-the-shoulder ripcord pull

7-5. The jumper **will** conduct a visual check of the pilot chute, and he will look over his right shoulder in an attempt to disrupt the partial vacuum. He will attempt this twice and only twice. If this is unsuccessful, he will perform cutaway procedures for a total malfunction.

Note: Before pulling the main ripcord, the jumper should ensure that he is not backsliding. Backsliding could cause the pilot chute to move forward of the jumper's head and body.

Note: There are no special emergency procedures associated with the use of NVG during MFF operations. If a horseshoe malfunction occurs, the jumper will not attempt to clear the malfunction and will immediately execute cutaway procedures. Appendix G provides more information on MFF operations using NVG.

7-6. Jumpers have the four following priorities during MFF operations:

- Pull.
- Pull at the designated altitude.
- Never sacrifice altitude for stability.
- Pull while stable.

CANOPY DEPLOYMENT SEQUENCE FOR OVER-THE-SHOULDER RIPCORD

7-7. At the prescribed parachute deployment altitude, the parachutist manually activates his parachute. He maintains arch, clears airspace, traces, looks, grabs, and unseats the main ripcord handle with his right hand and fully extends his right arm.

7-8. When the main ripcord pin clears the closing loop, the main spring loaded pilot chute opens the closing flaps, launches from the main parachute container, and extends the pilot chute bridle.

7-9. The spring loaded pilot chute and bridle extracts the deployment bag from the main container, and the suspension lines unstow from their retainer bands. When the suspension lines are fully extended, they pull the main parachute from the deployment bag, and the canopy begins to inflate (figure 7-2).

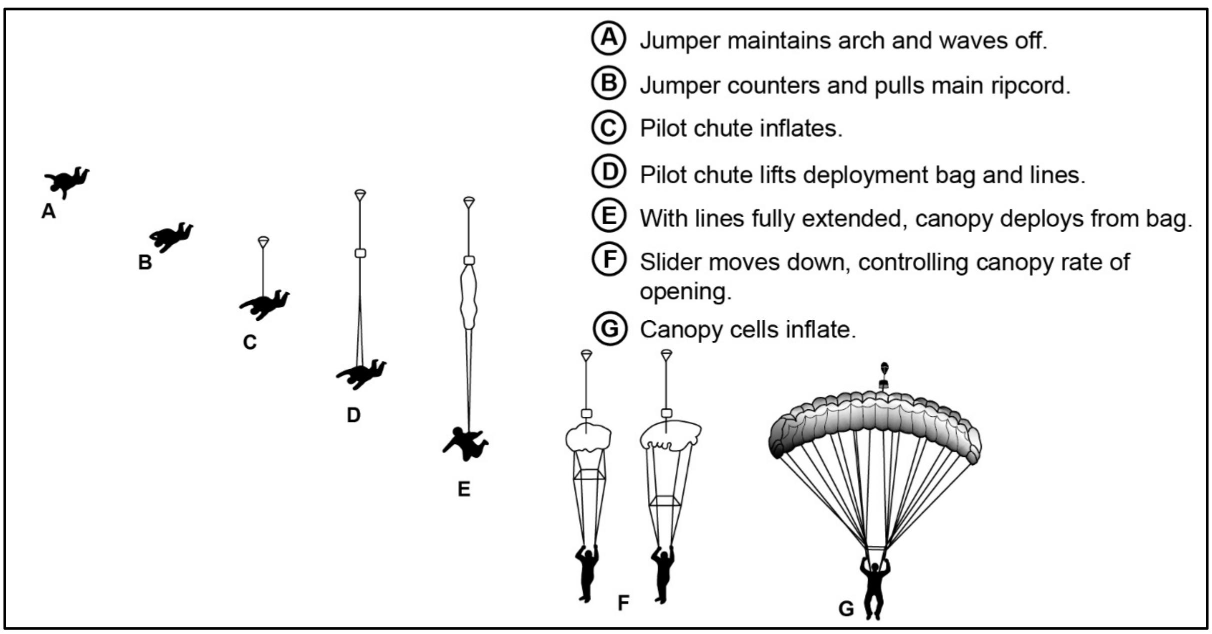


Figure 7-2. Military free-fall over-the-shoulder ripcord canopy deployment sequence

7-10. The slider retards the canopy's deployment. As the canopy inflates, it forces the slider down toward the risers as the suspension lines spread apart.

7-11. After complete canopy deployment, the parachutist pulls the steering toggles from the deployment brake loops to release the control lines from the deployment brakes setting to the full-flight setting.

BOTTOM OF THE CONTAINER HAND-DEPLOYED PILOT CHUTE DEPLOYMENT

7-12. The RA-1 ARAPS BOC modification was a pocket added to the bottom of the parachute container to stow the hand-deployed pilot chute. The pilot chute is deployed by hand into the free stream air (outside of the burble) to deploy the main parachute. To initiate deployment, jumpers counter with the left arm, reach, grab, and pull the hand-deployed pilot chute with the right hand and release it off to their right side, which causes the main parachute to deploy freely.

> ***Note:*** The main OTS ripcord will not be installed when jumping the RA-1 ARAPS in the BOC configuration with the hand-deployed pilot chute.

HAND-DEPLOYED PILOT CHUTE DEPLOYMENT

7-13. To execute the RA-1 ARAPS main parachute deployment when jumping the hand-deployed pilot chute from BOC, the jumper maintains good arch from the pelvis, maintains positive legs, and keeps head and eyes up on the horizon. The jumper (figure 7-3, page 7-6) reaches for and grabs the handle of the hand-deployed pilot chute with his right hand while countering with the left hand. At the predetermined deployment altitude, the jumper then pulls the hand-deployed pilot chute out of the BOC pouch and turns the right hand palm to the rear. He extends his right arm to a full-arm extension to release the hand-deployed pilot chute into the relative wind, thus beginning the deployment sequence of the main canopy. During free-fall, the jumper will—

- Maintain arch, clear airspace, and wave off to pull.
- Arch, maintain positive legs, keep head and eyes on the horizon and maintain heading. The jumper will not look back for the hand-deployed pilot chute handle when reaching for it. If the jumper's shoulders and container is tilted as the canopy deploys, this can cause off-heading openings, line twists, and hard openings.
- Counter with left hand when reaching for the hand-deployed pilot chute handle with the right hand.
- Reach back with the right hand and grab the hand-deployed pilot chute handle to ensure he has control of the handle.
- At the predetermined deployment altitude, pull the hand-deployed pilot chute from the BOC pocket using the pilot chute handle and turn the palm to the rear, while moving his right arm to full extension away from the right side of the body, to release the hand-deployed pilot chute. After releasing the hand-deployed pilot chute, the jumper brings his arms back into a neutral free-fall position, while maintaining arch and positive legs and with his head and eyes on the horizon.
- Look over his right shoulder to disrupt the partial vacuum to ensure the pilot chute has cleared. The jumper should maintain a stable flying position and heading until deployment of the main canopy.

7-14. When the jumper uses NVG to assist him during a night jump, the sequence during opening will remain the same as without NVG (see figure 7-3, page 7-6). The jumper will—

- Look below the NVG to read the altimeter and to identify the main canopy release handle (red cutaway pillow) and reserve ripcord handle (yellow pillow), when required, during free-fall and canopy descent.
- Arch and maintain stability and heading as normal. The counter hand will extend slightly more forward to allow the head to be cradled under the jumper's arm in a manner that protects the NVG from inadvertent contact with the deploying pilot chute or risers.
- With the counter arm in place, counter, reach, grab, pull, and release the pilot chute by the handle at full-arm extension to continue protecting the NVG from the deploying pilot chute and risers.

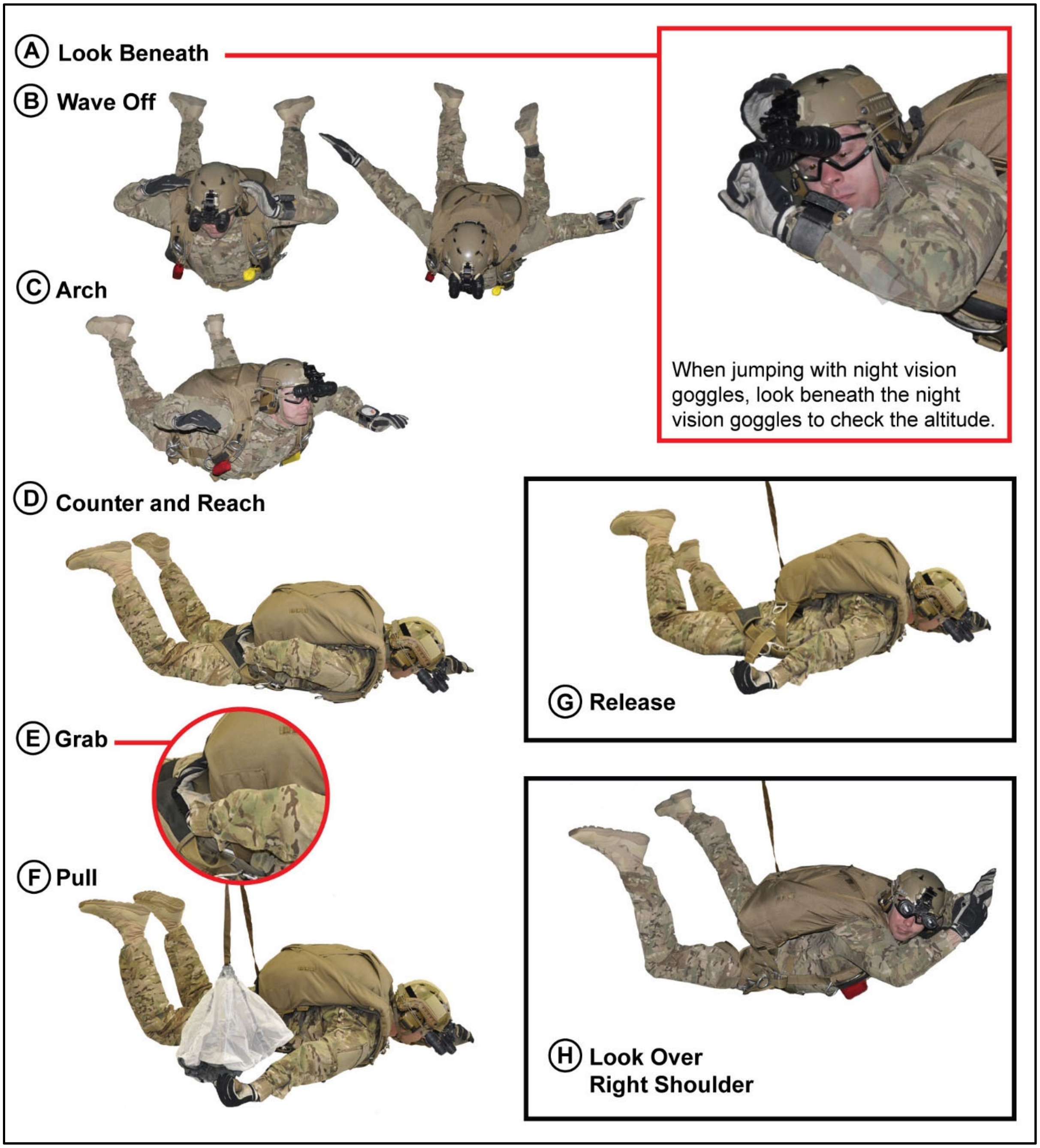


Figure 7-3. Main hand-deployed pilot chute from bottom of the container

WARNING

Do not wave off to clear airspace with the hand-deployed pilot chute in hand. The pilot chute bridle could wrap around the jumper or his equipment, causing a horseshoe malfunction.

WARNING

Before reaching back to grab the hand-deployed pilot chute handle, the jumper should ensure that he is not backsliding. Backsliding could cause the hand-deployed pilot chute and bridle to move forward of the jumper's head and body when pulled from the BOC pouch and released.

WARNING

Jumper should release the hand-deployed pilot chute as soon as the right arm reaches full extension away from the right side of the body.

WARNING

Before a jumper uses a hand-deployed pilot chute system, the jumper must be fully trained and should rehearse the procedures under a qualified current jumpmaster's supervision during sustained airborne training.

WARNING

Before any jumper conducts an airborne operation with any parachute system, the jumper must be fully trained and current on all procedures related to that parachute system by a qualified current jumpmaster on the system being jumped.

WARNING

When jumping MFF in the BOC configuration with the hand-deployed pilot chute, the lowering line will be attached to the left side of the jumper's equipment attachment ring.

Canopy Deployment Sequence for Hand-Deployed Pilot Chute

7-15. At the prescribed parachute deployment altitude, the jumper manually activates his parachute. The jumper maintains good arch from the pelvis, maintains positive legs, and keeps his head and eyes up on the horizon. The parachutist reaches for and grabs the handle of the hand-deployed pilot chute with his right hand while countering with the left hand. At the predetermined deployment altitude, the parachutist then pulls the hand-deployed pilot chute out of the BOC pouch and turns the right hand palm to the rear. The jumper extends his right arm to a full-arm extension to release the hand-deployed pilot chute into the relative wind, thus beginning the deployment sequence of the main canopy.

7-16. When the hand-deployed pilot chute is released, the pilot chute lifts the bridal, pulling the main ripcord pin from the closing loop and opening the closing flaps on the main parachute container.

7-17. The hand-deployed pilot chute and bridle extracts the deployment bag from the main container, and the suspension lines unstow from their retainer bands. When the suspension lines are fully extended, they pull the main parachute from the deployment bag, and the canopy begins to inflate (figure 7-4).

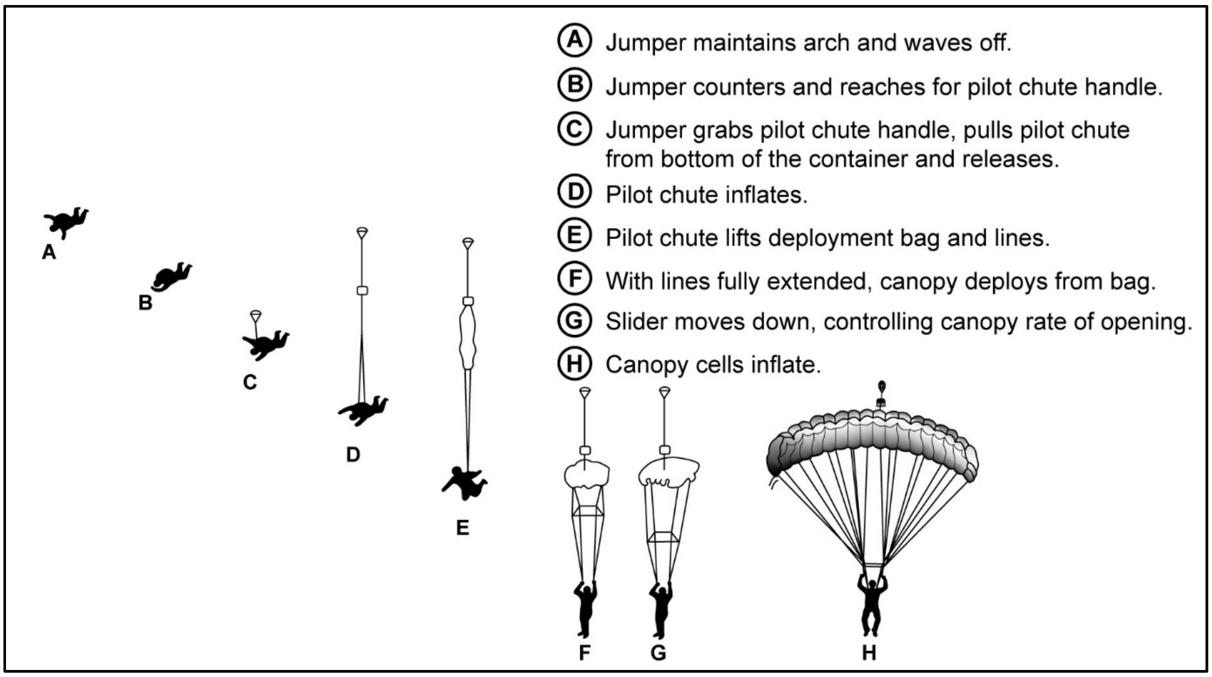


Figure 7-4. Military free-fall hand-deployed pilot chute canopy deployment sequence

7-18. The slider retards the deployment of the canopy. As the canopy inflates, it forces the slider down toward the risers as the suspension lines spread apart.

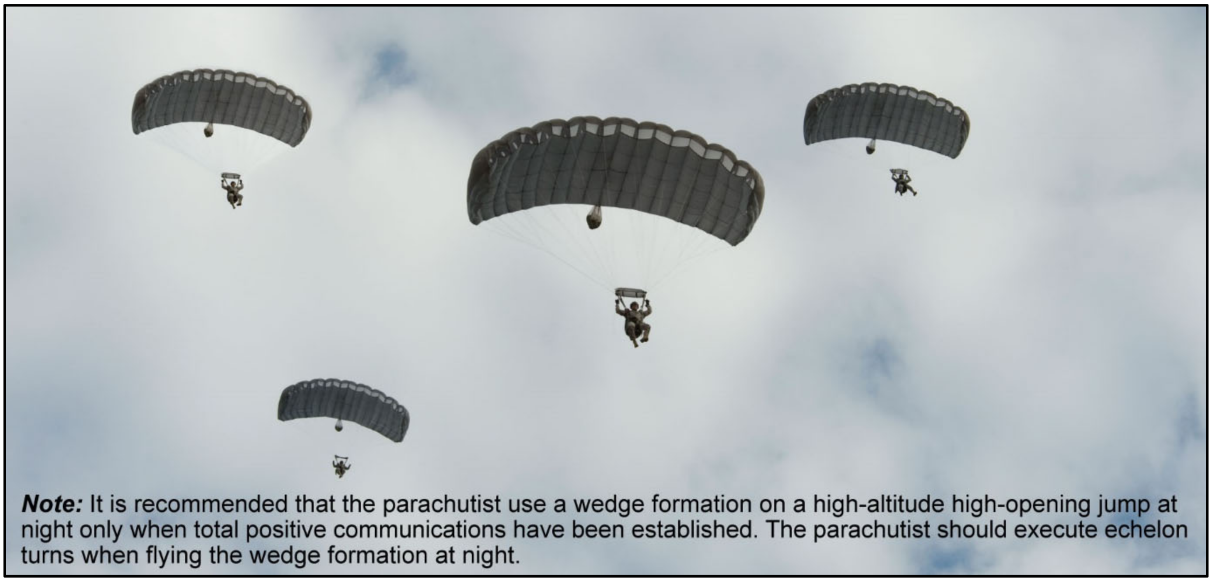
7-19. After complete canopy deployment, the parachutist pulls the steering toggles from the deployment brake loops to release the control lines from the deployment brakes setting to the full-flight setting.

Military Free-Fall Assembly Under Canopy

7-20. The opening altitude should be a minimum of 1,000 feet above any cloud layer to allow enough altitude for the element to assemble under canopy. Each parachutist maneuvers his canopy to his rehearsed position within the formation. Each parachutist assumes the group leader’s heading. Upon deployment, the group leader checks with the element for malfunctions then assumes the initial flight heading. Should a member of the element be beneath the group, the element must execute the rehearsed tactical plan (lose altitude to reform the group or follow the low parachutist).

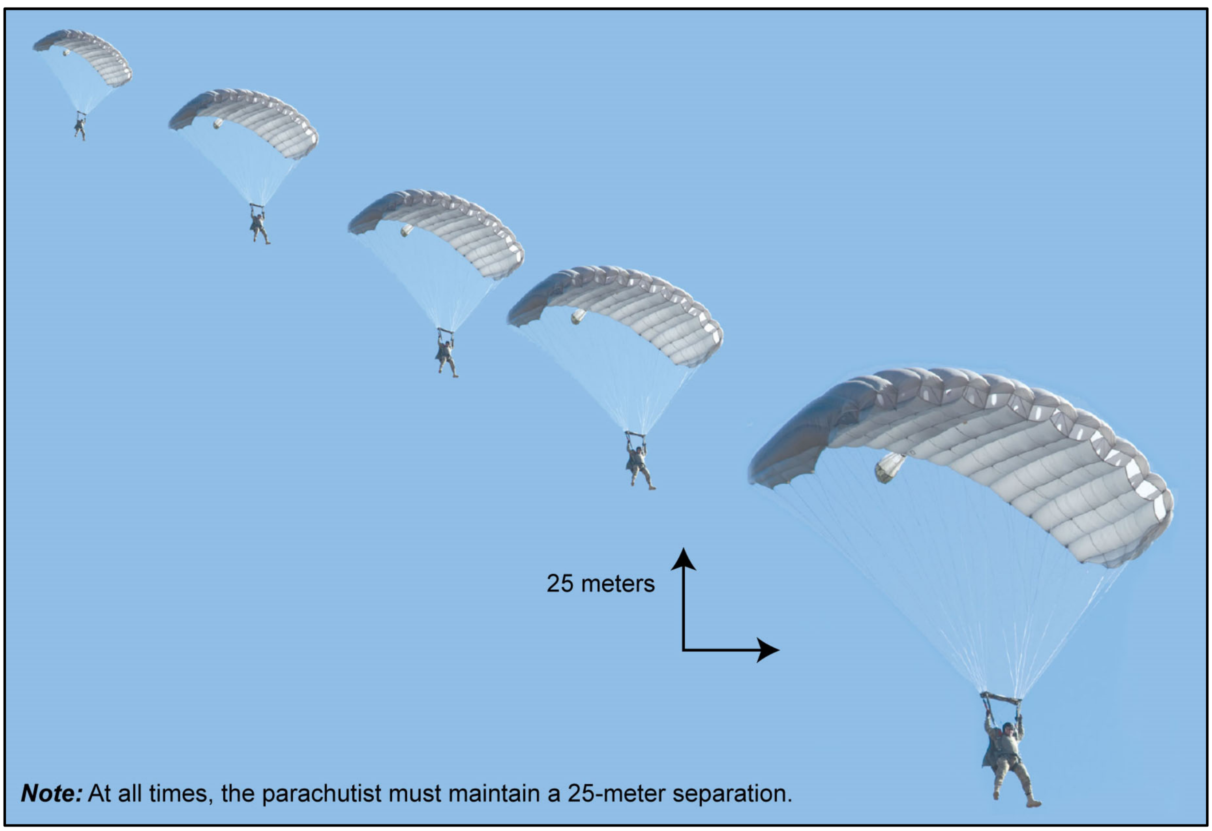
MILITARY FREE-FALL FLIGHT IN FORMATION

7-21. The wedge and the trail formations are the easiest to control and to maintain in flight (figures 7-5 and 7-6). The group leader (low parachutist) has the primary responsibility for navigation. All parachutists should be equipped with navigation aids and communications devices during each jump.



Note: It is recommended that the parachutist use a wedge formation on a high-altitude high-opening jump at night only when total positive communications have been established. The parachutist should execute echelon turns when flying the wedge formation at night.

Figure 7-5. Wedge formation



Note: At all times, the parachutist must maintain a 25-meter separation.

Figure 7-6. Trail formation

7-22. During MFF HAHO operations, element members in the formation maintain relative airspeed and position with the group leader. They accomplish this maneuver by trimming their canopies by using the trim tabs on the front risers and by braking. Doing so changes the angle of attack in order for a lighter jumper to stay in the stack with heavier jumpers, thus eliminating the need for a jumper to pull on the front risers during the entire canopy flight. Steering corrections can be made with body-weight shifts or minor rear or front riser turns until the toggles are released.

7-23. Under limited visibility conditions, such as when passing through a cloud layer, each parachutist uses the rear risers or if toggles are deployed, he goes to half brakes and maintains the compass heading until he regains visual contact with the formation or he follows the method stated in his unit's SOPs. Each parachutist must maintain altitude awareness and keep a sharp lookout for other parachutists.

Chapter 8

Canopy Control

This chapter provides information on canopy control procedures that are used to assist the jumper in understanding the full performance range for the canopy during MFF operations, from opening to landing. As the jumper spends more time under the main canopy, his canopy control skills improve. The idea of canopy control is to learn the details of the equipment and the various inputs used to move the parachute around its environment in specific ways. This empowers the jumper to fly more safely and confidently in dynamic, challenging environments.

ADVANCED RAM-AIR PARACHUTE SYSTEM THEORY OF FLIGHT

8-1. The ARAPS is an inflated and pressurized fabric airfoil that generates lift by moving forward through the air. The relative lengths of the suspension lines maintain the airfoil's trim angle. In flight, the parachutist keeps the wing's leading edge (nose) at a slightly lower angle than the trailing edge (tail). Thus, this angle forces the canopy's airfoil-shaped surface to glide or plane through the air—very much like a glider in descending flight. The wing-shaped ram-air parachute generates lift caused by the reduced pressure of the airflow over the curved upper surface.

8-2. The ram-air parachute's leading edge is open or physically missing, forming intakes that allow the cells to be ram-air inflated. Internal air pressure pushes a small amount of stagnant air ahead of the airfoil, forming an artificial leading edge. The focal point of this stagnant air acts as a true leading edge, deflecting the relative air above and below the airfoil. The relative lengths of the suspension lines maintain the airfoil's angle of attack in such a manner that the leading edge (nose) of the airfoil is slightly lower than the trailing edge (tail).

8-3. Drag is the only force that retards the canopy's forward motion through the air. Drag is created by the friction of air passing over the canopy fabric, the suspension lines, the parachutist, and his equipment. Gravity, plus the resultant sum of these aerodynamic forces on the upper surface, acts to pull the ram-air parachute through the air and contributes to the flat glide angle of the canopy (figure 8-1).

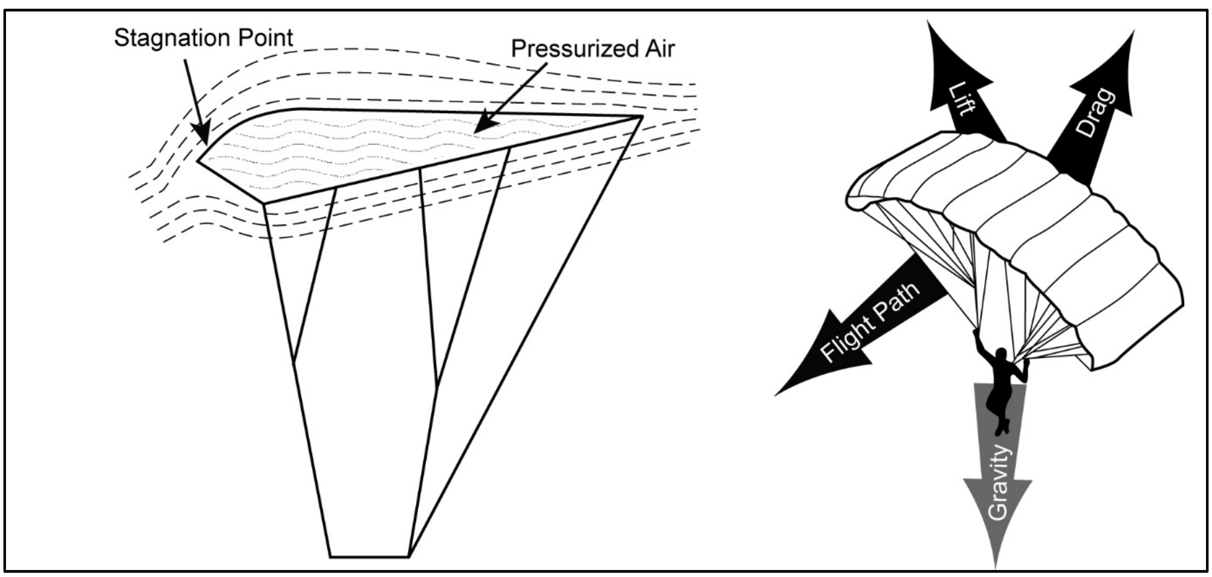


Figure 8-1. Ram-air parachute theory of flight

8-4. The travel of the control lines on the ram-air parachute is the same as on a conventional parachute, except that the parachute controls nearly three times the airspeed. Full flight is obtained when the toggles are in the uppermost position. A flare occurs when the toggles are in the lowermost position. The toggles can be moved from one position to another between full flight and flare. The positions are quarter brakes, half brakes, three-quarter brakes, and full brakes.

8-5. Uniformly depressing the toggles (control lines) causes the tail of the canopy to be pulled downward. The distortion of the tail causes a change in the airflow across the canopy chord that results in additional drag and a decrease in the canopy's angle of attack. Decreasing the angle of attack results in a corresponding decrease in the forward speed of the canopy. This also produces an increase or decrease in the rate of descent, depending on the amount of brakes applied and the existing wind conditions.

8-6. Applying brakes on the ram-air parachute causes the trailing edge to deflect downward, creating additional drag (figure 8-2). This drag produces a proportionate loss of airspeed but generates a slower vertical descent. The glide angle increases with the application of toggles. As full brakes are reached, the wing generates less dynamic lift. Differential application of brakes (one side only or one side more than the other) produces an unbalanced lift and drag force at one side of the canopy more than the other. The side of the canopy with the toggle depressed has decreased lift and decreased drag. This differential in lift and drag results in a yaw-type turn toward the side with the highest drag and lowest lifts.

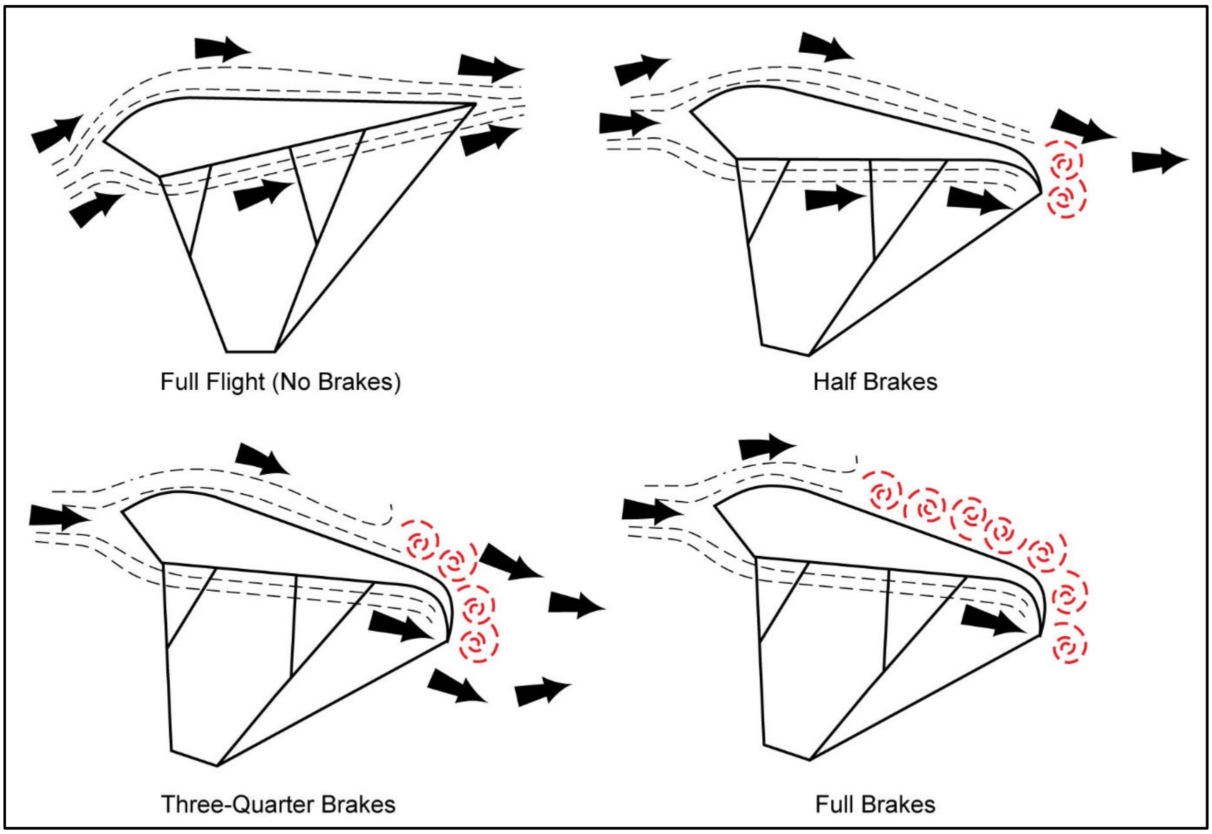


Figure 8-2. Applying brakes

8-7. Because the slow side generates less lift, it tends to drop slightly in a shallow banking motion, much like an airplane. This bank angle increases as differential toggle displacement increases.

CANOPY PERFORMANCE FACTORS

8-8. The ram-air parachute is not overly complicated. It is basically a fabric wing section. The parachutist must have a very basic knowledge of aerodynamics to better understand its flight and handling characteristics. The performance of a ram-air canopy is primarily affected by the weight of the jumper, winds and airspeed, and turbulence.

WEIGHT OF THE JUMPER WITH EQUIPMENT

8-9. The forward speed and descent rate of the ram-air parachute is affected by the weight of the jumper and his equipment. A heavier jumper will have greater forward speed and a higher descent rate than a lighter jumper. A jumper has some control over how much gear is carried and thus his jump weight.

WINDS AND AIRSPEED

8-10. The flying speed is called airspeed and remains constant regardless of whether the parachute is headed upwind, downwind, or crosswind. The only variation in flying upwind or downwind is a change in ground speed that is often mistaken for a change in airspeed.

8-11. The RA-1 ARAPS has a constant airspeed of 26 to 44 miles per hour. It always flies at this speed regardless of wind conditions, except when the parachutist applies brakes. If the parachutist points the ram-air parachute downwind with a 10-miles per hour wind, the ground speed will be 36 to 44 miles per hour. If he turns the ram-air parachute into the wind and the winds are 10 miles per hour, the airspeed remains the same but the ground speed reduces by 10 miles per hour (figure 8-3). If the ram-air parachute faces into 20-miles per hour winds, the ground speed will be 6 miles per hour.

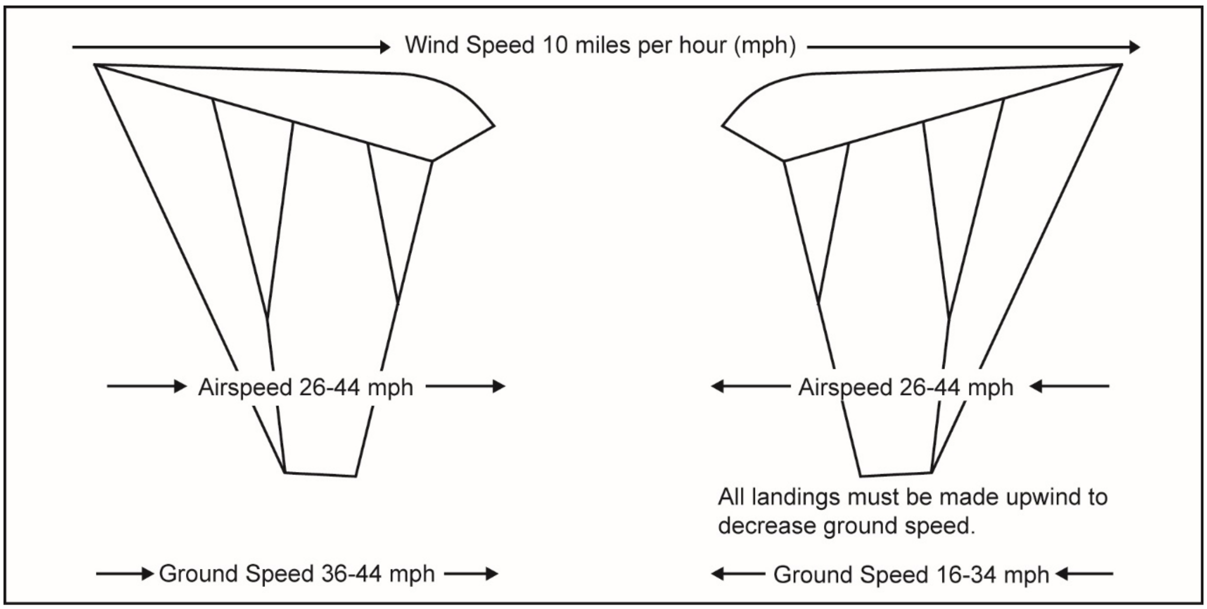


Figure 8-3. Controlling ground speed

8-12. Wind affects ground speed only and has no effect on airspeed. Brakes applied with conventional control lines and toggles control the ram-air parachute's airspeed. Fifty percent of toggle travel on a ram-air parachute will cause a speed reduction of close to 16 miles per hour.

8-13. The parachutist must remember that, in controlling the canopy's flight, how fast he moves the toggles from one position to another is as critical as the relative position of the toggles. As a rule, rapid and generous (more than 30 percent) application of both toggles will cause a rapid decrease in airspeed, decelerating into the flare range at about 0 to 3 miles per hour. (Depending on the wind speed, the ground speed could still be very high.)

8-14. There is almost no surge on deployment, and there is no wind noise at all until after releasing the brakes. A parachutist who has not been previously exposed to the flight characteristics of the ARAPS can use the wind noise created by forward speed as a rough airspeed indicator. A reduction in the wind noise level can provide an altitude descent warning.

8-15. After the parachutist becomes accustomed to the canopy, he may fail to notice the wind noise. By this time he should have learned to fly the canopy by feel, and he should notice the flare warning point and determine this point at altitude under his canopy controllability check. The parachutist will feel the canopy shudder as it loses lift and begins to lose altitude. The parachutist should remember that angle of attack, cross wind, and wind turbulence can increase his altitude without warning.

TURBULENCE

8-16. Turbulence also affects canopy performance. Knowing the factors and conditions that can cause turbulence can enable a parachutist to avoid this hazard, leading to a successful canopy flight and landing.

8-17. Turbulence is the result of wind flowing over natural and man-made obstacles, such as trees, hills, large parked vehicles, buildings or structures, and so on. The effects of turbulence are usually experienced at the most critical time of canopy flight—500 to 200 feet on final descent during preparation for landing. Turbulence can often be experienced 500 feet above and 500 feet past the obstacle.

8-18. Air turbulence can cause the jumper to stop descending or to even gain altitude. Air turbulence can collapse all or part of the jumper's canopy. It can double the rate of descent or make the parachute appear to fly sideways. Factors that affect the intensity of turbulence are wind velocity, air density (temperature and humidity), and the shape and size of obstructions in the path of the wind (trees, buildings, terrain). Turbulence may be encountered up to several hundred meters downwind from an obstruction and may be caused by—

- Thermal actions due to heat rising from asphalt.
- Ocean breeze coming to shore.
- Channeled winds from valleys and mountains.

CANOPY CONTROL DURING HIGH-ALTITUDE HIGH-OPENING PROCEDURES

8-19. During extended flights, the parachutist has the option to leave the toggles stowed. If the toggles remain stowed (which is about equivalent to applying 50-percent brakes), this will allow the parachutist to keep his hands at waist level for improved blood circulation to the hands and arms and to lessen fatigue. The parachutist will simply steer the parachute using the risers, when needed, to make corrections. Another steering technique would be for the jumper to use his weight to make body weight shifts in the HAHO seat to make minor heading adjustments. Shifting body weight to the right side of the harness while lifting weight off of the left side of the harness will cause the canopy to slowly turn right, shifting body weight to the left side of the harness will cause the canopy to slowly turn left. If necessary, extreme cold weather gloves can be put on after canopy deployment to keep the parachutist's hands from numbing and to increase circulation.

CANOPY CONTROL

8-20. The overall objective of MFF operations is to land personnel and equipment intact to accomplish the assigned mission. The parachutist must know and employ the principles of canopy control as they relate to the use of the ram-air parachute. Wind action, direction of canopy flight, and manipulation of the control toggles primarily control the movement of the ram-air parachute. Maneuvering the parachute requires more than simply turning the canopy. A properly executed parachute maneuver requires correct canopy manipulation to combine the wind's force and the canopy's flight to move the parachute in a given direction. The parachutist may have to hold into the wind, run with the wind, or crab to the left or right while holding or running. Upon canopy deployment, the parachutist grabs the control toggles and performs a controllability check of the parachute. The purpose of this check is to determine if the parachutist's canopy is capable of landing him safely. Figure 8-4, page 8-5, provides a condensed guide to good canopy control.

8-21. The parachutist must first know wind direction and approximate speed since the direction of his canopy's flight, as determined by his toggle manipulation, is in relation to wind action. The canopy's shape, design, span, and chord generate the ram-air parachute's 26 to 34 miles per hour glide. The flow of air over and under the canopy's wing shape provides the lift and forward flight of the parachute. By specific manipulation of the toggles, the parachutist may distort the trailing edge and cause the canopy to turn, to vary forward speed, and to increase the rate of descent.

8-22. Canopy control involves the coordination of wind direction and speed, canopy flight and penetration, and the parachutist's own selective manipulation and distortion of the canopy.

Parachutist's Guide to Good Canopy Control

- Checks canopy and ground position after opening.
- Keeps a sharp lookout for other parachutists.
- Checks his altitude and his first ground reference points.
- Picks out intermediate ground references between himself and the target.
- Determines wind direction (on the ground and at altitude).
- Checks the holding pattern and penetration of his canopy.
- Uses the upwind toggle to turn his canopy.
- Locates the wind line and determines the direction in which he wants to move.
- Always maneuvers toward the wind line.
- Checks his progress at halfway and three-quarter points and makes necessary adjustments.
- Turns into the wind at a minimum altitude of 300 feet above ground level for final approach.
- Controls his canopy all the way to the ground.
- Always lands facing into the wind.

Figure 8-4. Parachutist's guide to good canopy control

Determining Wind Direction

8-23. Due to the penetrating capability of the RA-1 ARAPS, it is often difficult to determine wind direction without the aid of a windsock, flag, streamer, or smoke on the ground. The wind flow will distribute the displayed smoke on a downwind course. Jumpers must recognize this direction in order to land his parachute into the direction of the wind origin. All landings should be made facing into the wind.

8-24. At altitude, jumpers can determine the wind direction by allowing the ram-air parachute to naturally seek its inherent downwind path. Leave the toggles at the guide rings, full-flight position. It is faster, however, for the jumper to manipulate the steering lines to the full-brakes position and visually observe his position over the ground. Ground movement will display the parachute's actual drift. Drift will then be easily observed. You may affect this canopy drift by performing a 90-degree turn of the parachute to the left, performing a full-brakes setting, and observing the ground movement. You may perform this procedure repeatedly for assurance and verification of drift.

Crabbing Maneuver

8-25. The parachutist performs a crabbing movement by pointing the canopy at any given angle to the wind direction (figure 8-5, page 8-6). The force of the wind from one direction and the flight of the canopy at an angle to it allows the canopy to move at an angle in the direction of flight. The direction of flight varies with the wind speed and the angle at which the parachutist points the canopy. A canopy pointed at a downwind angle makes a sharper angle than one pointed upwind.

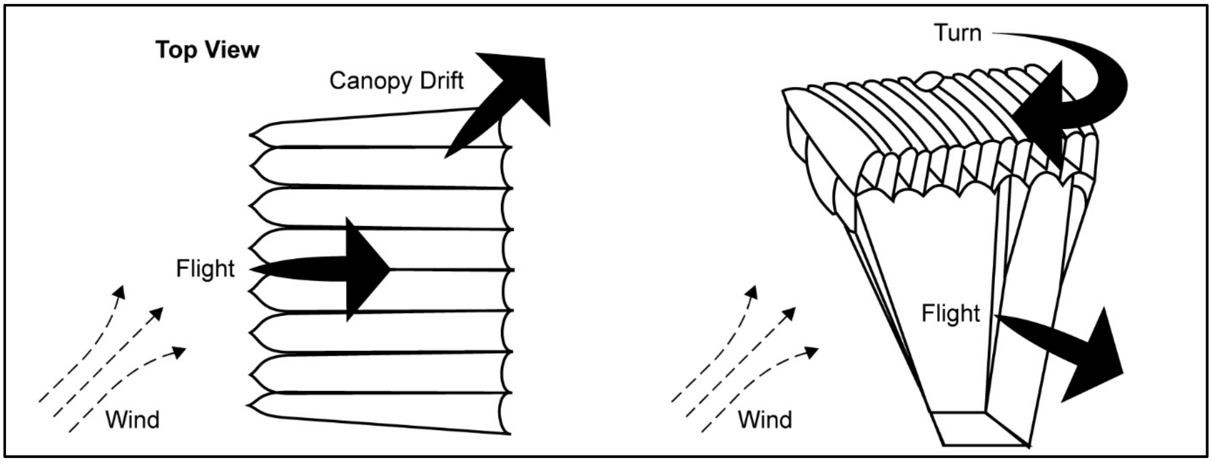


Figure 8-5. Crabbing maneuver

RUNNING MANEUVER

8-26. Running is when the parachutist points the canopy with the wind—the combined glide speed of the canopy and the wind speed produce an increased overall ground speed (figure 8-6). He manipulates the toggles to maintain the canopy in position. To crab while running, the parachutist turns the canopy slightly in the desired direction and maintains the position until he completes the maneuver.

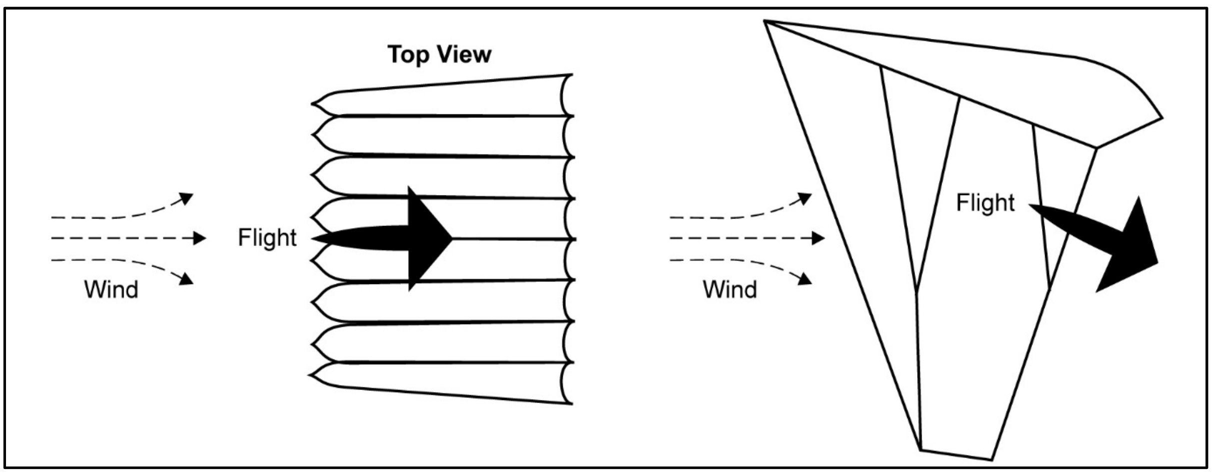


Figure 8-6. Running maneuver

HOLDING MANEUVER

8-27. When the parachutist points the canopy into the wind or holding (figure 8-7, page 8-7) the wind speed minus the glide speed of the canopy produces a decreased overall ground speed and slows the canopy movement. The parachutist manipulates the toggles to maintain the position. To crab to either direction while holding, he turns the canopy slightly in the direction in which he wants to move. Turning the canopy too far may cause it to become wind-cocked and move with the wind. As the parachutist's canopy begins to move in the desired direction, he manipulates the toggles to keep it in position until he completes the maneuver.

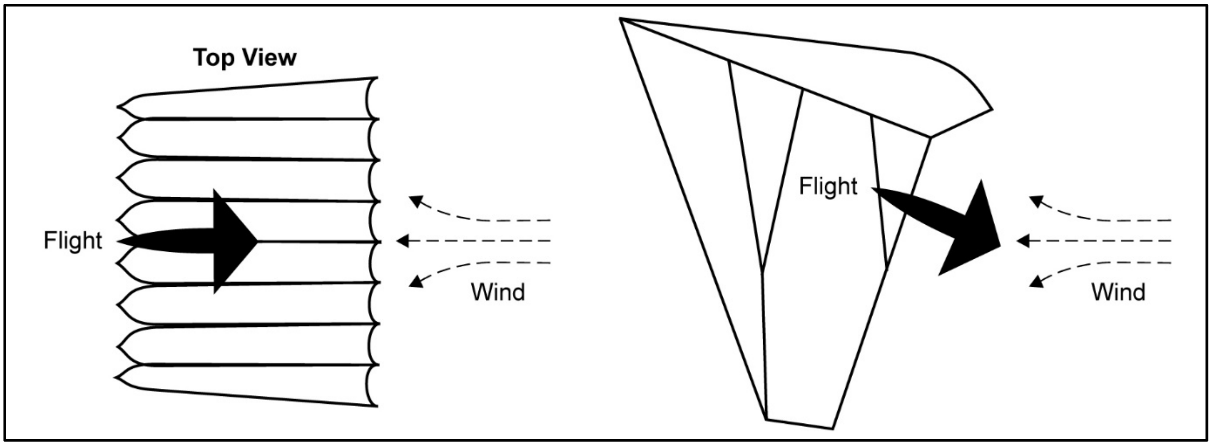


Figure 8-7. Holding maneuver

8-28. The effective canopy range and the wind line determine the course (direction of movement) the parachutist follows in maneuvering toward the target area. The effective canopy range is the maximum distance from which the parachutist can maneuver the canopy into the target area from a given altitude. It is greater at high altitudes and decreases proportionately at lower altitudes, forming a cone- or funnel-shaped area (figure 8-8). Changes in wind direction and conditions may cause this range to shift in any direction.

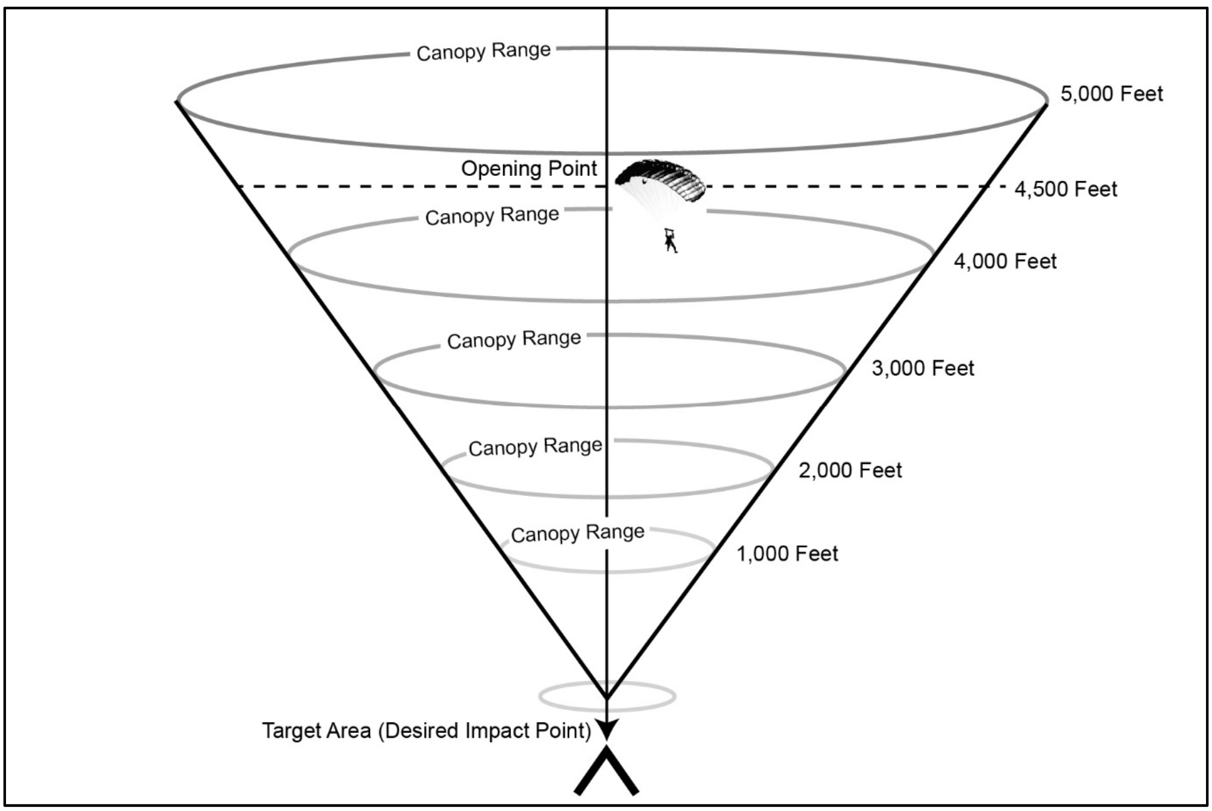


Figure 8-8. Effective canopy range

8-29. A wind line is an imaginary line extending upwind from the target area into the prevailing wind. A wind line can be marked by ground references. The wind line can change as the direction of the wind changes. Accurate reference points are essential to an effective parachute maneuver.

8-30. The wind cone is an imaginary area representing that area around the wind line in which you can maneuver a parachute left, right, upwind, and downwind and still be able to land in the target area.

8-31. Once you have determined the wind line and the wind cone (figure 8-9), you may attempt to maintain a 60-degree angle down to the target. If you must lose altitude to maintain the angle, you may S-turn within the wind cone.

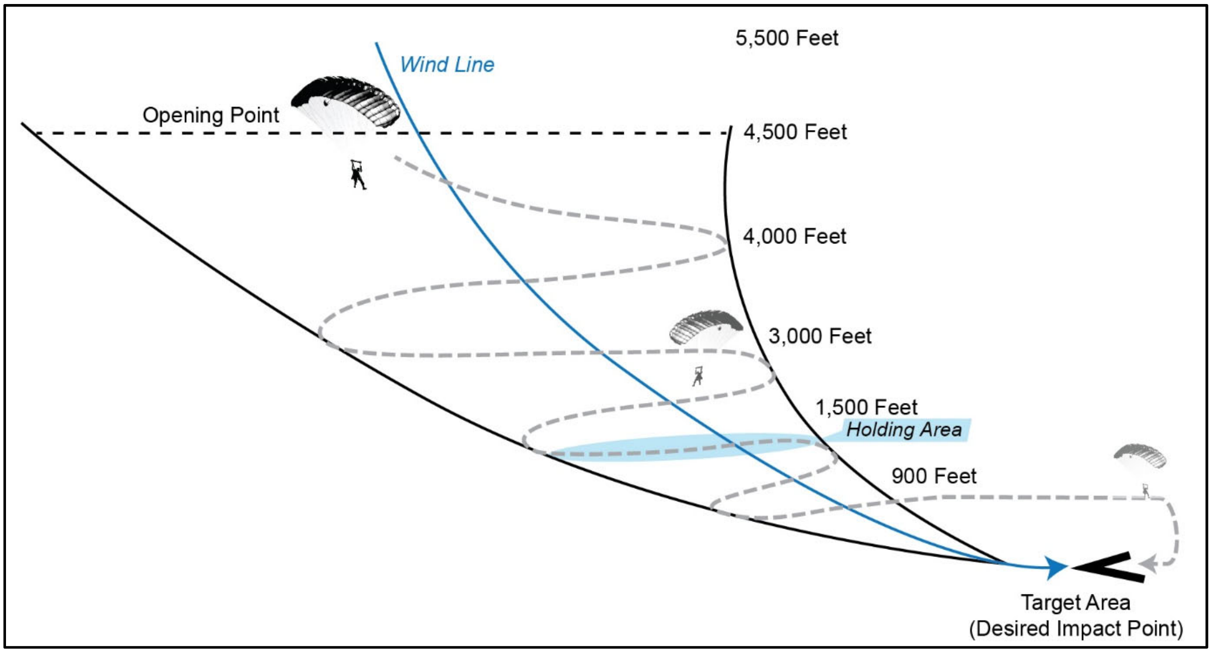


Figure 8-9. Wind line and wind cone

8-32. The parachutist checks his movement in relation to the ground. Winds at altitude may be from different directions than those at the desired impact point.

8-33. For the half method, the parachutist picks a ground reference point on the wind line that is halfway between the opening point and the target area. This point is the first checkpoint that he can reach in half the opening altitude with correct canopy manipulation. The second checkpoint is a reference point halfway between the first checkpoint and the target area that he should reach in half the remaining altitude.

8-34. The horizon method allows a parachutist to determine his flight progress by looking at his target and watching if it rises or descends in his line of sight. If it is rising, he will not make it to that point; if it is descending, he will probably have enough altitude to get back into the wind cone. It is also important to note that the parachutist always tries to maintain the upwind advantage. This advantage is a margin in his canopy range in which he will not be blown behind his target area and become unable to recover and land with his group.

8-35. The RA-1 ARAPS is a highly maneuverable canopy capable of 360-degree turns in 2 to 4 seconds under normal conditions. Its maneuverability comes from the parachutist's use of its capabilities to vary forward speed, rate of descent, turn, and crosswind movement.

8-36. Under normal conditions, the parachutist varies his forward speed and rate of descent by using the canopy's toggles. Immediately upon canopy deployment, he clears the toggles from the deployment brakes setting and performs a controllability check. His toggle position at the stall point will be at a different position as wind speed increases and when he is carrying heavy equipment loads.

WARNING

Before attempting any maneuvers or turns, the parachutist must be alert to prevent collisions with other parachutists. This maneuver is especially critical below 500 feet AGL.

8-37. Upon opening, the jumper will use the following procedures:

- Move hands to the rear risers.
- Clear airspace and turn right to avoid collision, unless left is closer.
- Release the brakes and gain control of the canopy. If controllability is questionable, perform a controllability check.
- Orient himself to the DZ.
- Locate other jumpers and achieve separation.
- Maintain altitude awareness.
- Check rate of descent with other parachutists.
- Activate the strobe light, as required.

Note: If the malfunction cannot be resolved and if the canopy is uncontrollable, the decision to cutaway must be made by 2,500 feet AGL and performed by 2,000 feet AGL. Jumpers must not initiate cutaway procedures below 1,000 feet AGL. If the malfunction cannot be resolved and cutaway procedures have not been initiated by 1,000 feet AGL, the jumper must immediately deploy his reserve parachute.

CANOPY MANEUVERS

8-38. The various straight-ahead maneuvers are used to affect the glide angle of the canopy. Canopy flight angles can be changed by manipulating either the steering toggles or the risers. Toggle and riser inputs change ground speed and descent angle depending on whether the parachutist is flying with the wind or into the wind. Figure 8-10 shows the flight angles for a ram-air canopy at the various toggle settings and riser inputs as the parachutist is flying into the wind as if on the final leg of the landing pattern. As toggles are applied, the glide angle decreases and there is increased drag at the tail of the canopy, making the ground speed slow.

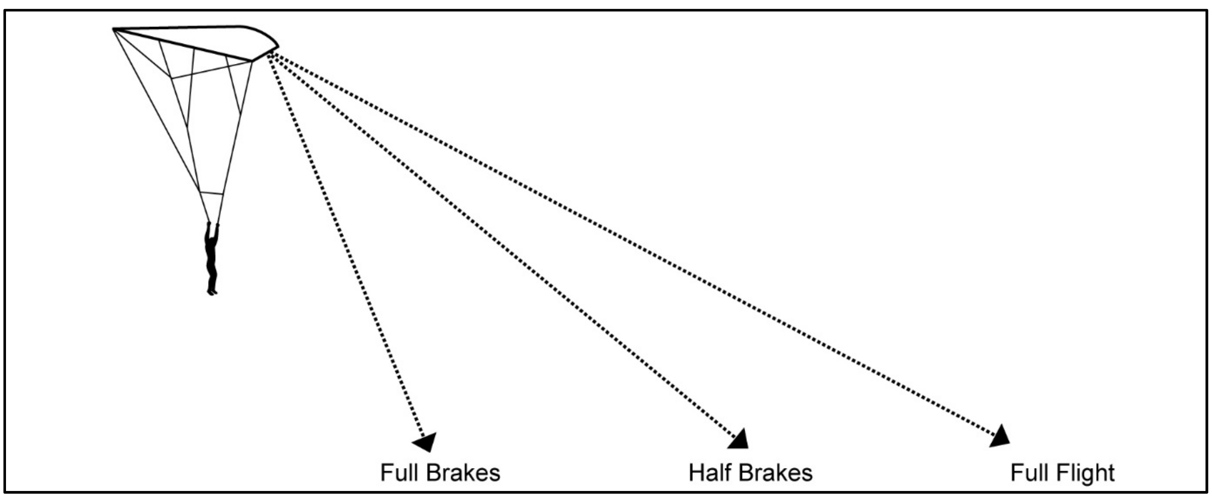


Figure 8-10. Brake-setting flight angles

FULL FLIGHT

8-39. Full flight (no brakes) is the quickest way to get from point A to point B when retention of altitude is not a concern. If getting blown backwards on final approach, it will allow a jumper to land closer to the spot than any other toggle setting. The canopy is least susceptible to turbulence at full flight because the canopy has the higher airspeed, which gives more pressurization to the canopy making it a more rigid wing. Applying brakes depressurizes the canopy by forcing air out of the wing and slowing the canopy (less airspeed equals less pressure). Also, the higher airspeed gets the canopy out of turbulence faster.

8-40. The maximum canopy flight and penetration for maneuvering are obtained using full flight. The toggles are in the all-up position behind the rear risers (figure 8-11). Full flight maneuvering includes the following:

- Toggles are all the way up.
- Greatest forward speed of any toggle setting is 26 to 34 miles per hour.
- Greatest descent rate of any toggle setting aside from sink/flare is 8 to 10 feet per second.
- It is not an acceptable toggle position for landing.

Figure 8-11. Full flight

HALF BRAKES

8-41. The parachutist grasps the toggles and pulls them down to about shoulder or chest level for the half-brake position (figure 8-12, page 8-11). The canopy speed will decrease to about a 13 to 17 miles per hour flight, and the rate of descent will increase. This brake setting and both forward speed and descent rates are acceptable for landing. Half brakes also give a jumper the maximum flexibility to adapt to changing wind conditions, which is especially useful on final approach. Higher in the pattern, this brake setting is useful as it allows a jumper more time to make decisions, and it allows for higher margins of error than do one quarter brakes or full flight. The half-brakes position includes the following:

- Toggle position is halfway between full flight and full brakes.
- Forward speed is 13 to 17 miles per hour.
- Descent rate is 7 to 10 feet per second.
- It is an acceptable toggle position for landing.
- It is the safety position.

FULL BRAKES

8-42. The parachutist pulls the toggles to about waist level for full brakes (figure 8-12). The canopy stops moving forward and the rate of descent increases. In the full-brakes position, the canopy is actually on the verge of a full vertical descent. The full-brakes setting is an extremely useful tool for making an accurate jump, but it is dangerous if used inappropriately. Many jumpers have been injured by using this brake setting at too low of an altitude. All canopies are prone to surging when coming out of this flight mode. The canopy can transition unexpectedly into a loss of altitude in the presence of turbulence, and sustained use can result in the canopy transitioning into a fast descent rate. The full-brakes position includes the following:

- Forward speed is 0 to 5 miles per hour.
- Descent rate is 7 to 10 feet per second.
- Variance between canopies can be significant.
- It is an extremely unacceptable toggle position for stand-up landings, but safe parachute landing falls can be conducted at deeper brake settings.

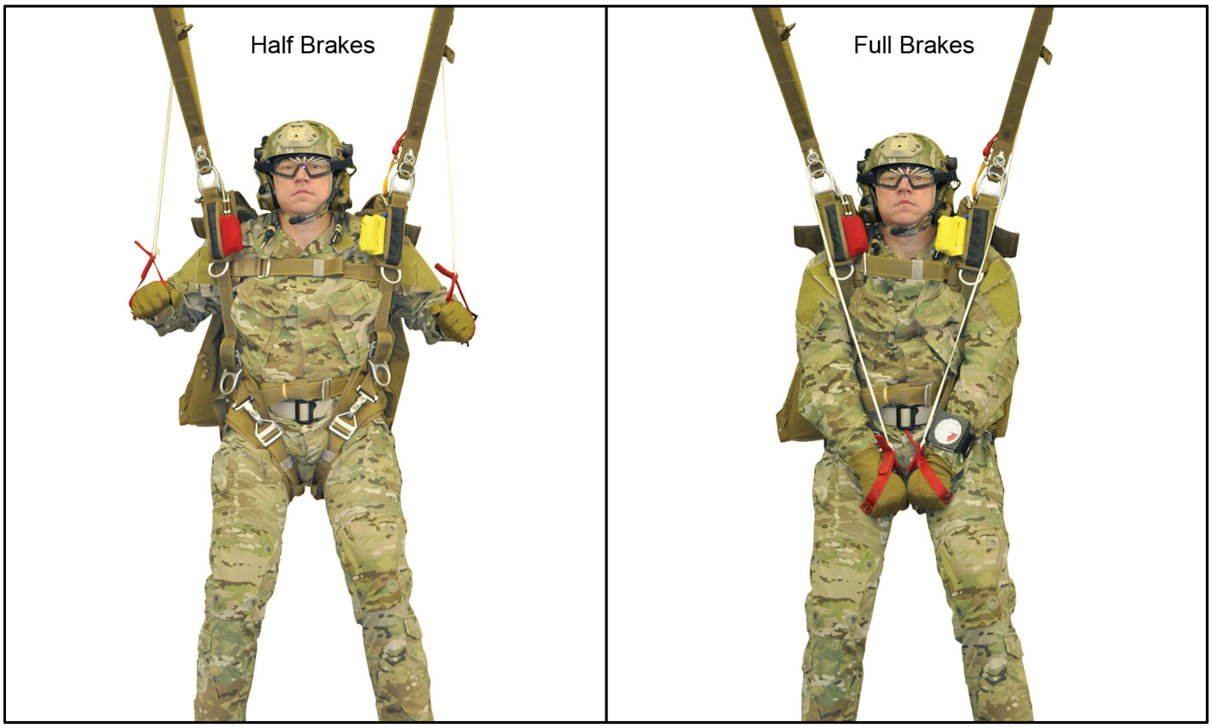


Figure 8-12. Brakes (half and full)

TOGGLE TURNS

8-43. The parachutist can make turns from the full-flight, half-brake, and full-brake positions. Turns from full flight are very responsive, but because of the high forward speed, the turns will cover a wide arc. The parachutist makes these turns by depressing either toggle, leaving the other one at the guide ring. In this type of turn, the parachute will bank and actually dive, causing the parachute to lose altitude quickly. The further the parachutist depresses the toggle, the steeper the bank angle becomes.

FLAT TURNS

8-44. The reduced banking associated with flat turns (off-hand) makes it the preferred type of turn for many parts of the jump. Using flat turns while turning between legs of the pattern helps to minimize altitude loss. Using flat turns for making corrections on final approach will result in a better sight picture. Also, gentle flat turns can be safely used to avoid obstacles near or on the ground. Turns from the half brakes position result in almost flat turns. Flat turns (figure 8-13) are generally preferred over spiral turns. Flat turns include the following:

- They are initiated while flying in a partially braked mode.
- Toggle is raised on opposite side from desired turn direction.
- Canopy banks much less compared to a full-glide turn.
- Canopy turns tighter.
- They will consume little altitude.
- Parachutist will remain close to vertical underneath the parachute.

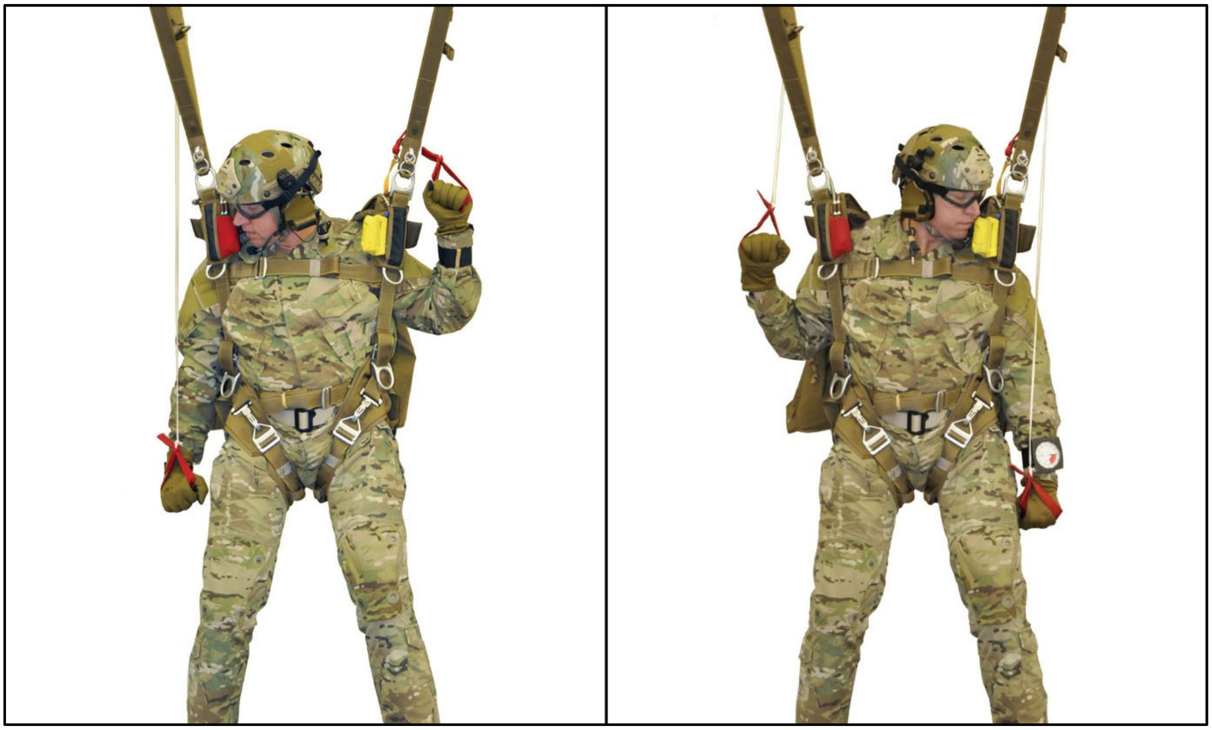


Figure 8-13. Flat turn (right and left)

SPIRAL TURNS

8-45. Spiral turns (full-glide turns) are basically turns from full flight but maintained (figure 8-14, page 8-13) for more than 360 degrees of rotation. The parachute will begin diving in a spiral. The first turn will be fairly slow, with shallow bank angles, but the turn speed and bank angle will increase rapidly while the parachutist maintains the spiral. Spiral turns are effective tools for turning but subject the jumper to more banking than flat turns. Sustained spiral turns are an effective maneuver to lose altitude. Common mistakes made while employing the spiral turn include losing track of altitude and coming out of the turn in the wrong direction. This maneuver can often result in a jumper becoming dizzy, disoriented, and off target. It is extremely important that the jumper ensures the airspace is clear below and downwind prior to executing the turn. The spiral turn includes the following:

- Toggle is pulled all the way down on the side the jumper wants to turn while the other toggle is left at full run.
- Canopy banks similar to an aircraft.
- Canopy takes 2 to 4 seconds for the first 360-degree turn.
- Turn rate, degree of bank, and descent rate will increase with time.
- Turns are held beyond a full revolution.
- The jumper will feel increased pressure in the harness and an increase in airspeed.

Figure 8-14. Spiral turns (right and left)

Front Riser Turns

8-46. Sustained front riser turns are an effective tool for gaining vertical separation early in a jump. The same maneuvers listed under spiral turns apply to sustained front riser turns. Front riser turns are an effective maneuver to lose altitude. Common mistakes made while employing the front riser turn include losing track of altitude and coming out of the turn in the wrong direction. This maneuver can often result in a jumper becoming dizzy and disoriented. It is extremely important to ensure that the airspace is clear below and downwind of the jumper prior to executing the turn. Sustained front riser turns put the canopy in a dive with a significant amount of pitch and roll. The canopy will turn to the jumper's blind spot, and the jumper will not be able to control the wing until the canopy is midway through the recovery arc. Front riser turns include the following:

- Toggles are to remain in the jumper's hands.
- Toggles should be put in full-flight position.
- Turns are initiated by pulling down either riser on the side of the desired turn.
- Jumper can grab any upper part of the front riser.
- Canopy will bank significantly.
- Turn rate, descent rate, and speed will be very high and increase over time.

Rear Riser Turns

8-47. Rear riser turns (figure 8-15, page 8-14) should be used in every jump to orient the canopy to the DZ after opening. If a jumper is faced with an imminent canopy collision after opening, an opposite riser turn will result in a quicker turn than unstowing the brakes and making a toggle turn. The second situation demanding rear riser turns would occur in the case of a broken brake line or detached toggle. The jumper can choose to either steer with rear risers or with the sole functioning steering line and one rear riser. Rear riser turns are similar to toggle turns because they deflect the rear sections of the canopy. They require more force to execute because the jumper is pulling down a larger area of the canopy with force that causes the jumper's arms to fatigue. Pulling down a rear riser will pull all of the C and D lines on that side compared with just the trailing edge for a toggle turn. Rear riser turns include the following:

- Jumper leaves toggles stowed if used in case of imminent collision after opening.
- Jumper releases toggles from stows if used in the case of a broken control line.
- Turns are initiated by pulling either rear riser down on the side of the desired turn.
- Jumper grabs the upper part of the rear riser.
- Turns are effective but require more force than pulling down a toggle.

Note: Canopy will flare much quicker using rear risers than when using the toggles. In the event of a broken control line, jumpers should practice this landing technique above 1,000 feet before actually trying to land with it.

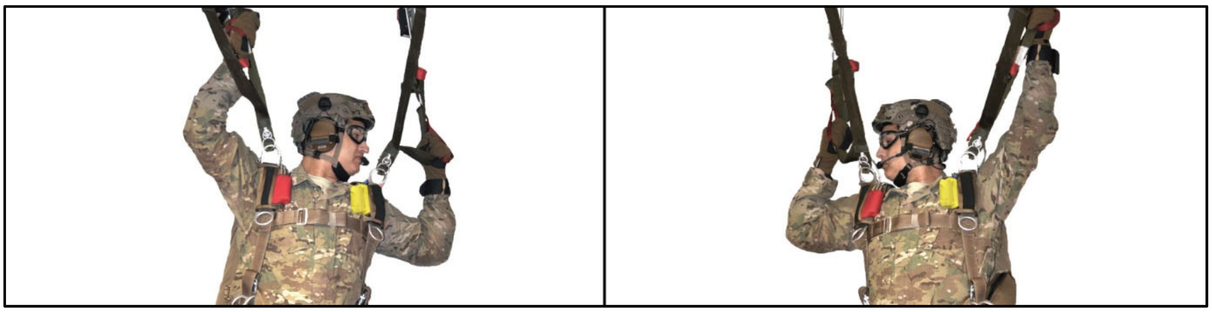


Figure 8-15. Rear riser turn (left and right)

LANDING MANEUVERS

8-48. One of the most common sources of injury is during landing maneuvers. The jumper's judgment during this maneuver while flaring his canopy, if incorrect, could result in a high-speed impact with the ground or other hazards on the ground. Additional hazards that could contribute to bad landing maneuvers are changing wind conditions, turbulence during hot days, downdrafts close to the ground, crosswinds, and limited visibility. The following maneuvers will assist the parachutist during his landings.

FULL-BRAKE LANDINGS

8-49. Full-brake landings with the RA-1 are often the best choice for jumps at night, as well as days consisting of low visibility, and for rough terrain spots that require a high degree of accuracy and/or have turbulence present. Virtually no timing is required so it is an easy maneuver to execute. Accuracy is increased due to the ease of maintaining a consistent sight picture. The canopy is more susceptible to turbulence at full brakes than full flight. If the jumper encounters turbulence close to the ground, he should prepare for a parachute landing fall. The full-brakes setting—

- Provides for an acceptable landing due to the low descent rate and moderate forward speed.
- Allows for the greatest accuracy.
- Provides less chance of misjudging ground due to poor visibility.

FLARE

8-50. The parachutist makes flared landings into the wind. He starts them at an altitude of approximately 10 to 15 feet above the ground, with room ahead for the actual touchdown. At 200 feet AGL, he eases both toggles to the full flight position, allowing airspeed to build. At about 10 to 15 feet above the ground (depending on wind conditions), he slowly pulls both toggles downward, timing the movement to coincide with the full-brakes position at touchdown. The flared landing, when properly executed, practically eliminates forward and vertical speed for a short period. If the parachutist slows down the ram-air parachute before the flare point, depressing the toggles will result in a sink. On high-wind days, the parachutist must be aware that the canopy will react quicker during the flare; therefore, the flare should be conducted slightly lower to the ground. On low-wind or no-wind days, the parachutist must be aware that the canopy will react slower during the flare; therefore, the flare should be conducted slightly higher from the ground. If the flare is conducted too low on a low-wind or no-wind day, the parachutist may not have slowed the canopy down enough to perform a safe landing.

TWO-STAGED FLARE

8-51. The two-staged flare is a good compromise between half-brake landings and dynamic flares. Landings can be lighter than with a half-brake landing, and a two-staged flare has two significant advantages over a dynamic flare. First, the two-staged flare does not require as much precision to execute. Second, the two-staged flare can be terminated and a safe brake setting can be held if timing is off and/or turbulence is encountered. In addition, the two-staged flare helps a jumper develop his timing for executing a dynamic flare.

8-52. Proper altitudes to initiate are very dependent on density altitude, with high-density altitudes requiring the jumper to initiate at a higher altitude than at low-density altitudes. The first stage, plane-out, can and should be practiced at a higher altitude. While at altitude, the jumper should practice the procedure by giving himself nine seconds of full flight as if he were coming in for a landing. The jumper pulls the toggles down to the point at which the canopy planes out or glides straight forward. This is the first stage. The plane-out turns vertical, downward movement into horizontal movement across the ground. The jumper holds this stage of flare until the canopy starts losing lift and momentum. When the jumper loses forward momentum, he executes the second stage.

8-53. The jumper then moves the toggles to the full-brake position. This stops the horizontal movement that remains from the first stage and aids in a soft landing. The jumper should also see himself plane out in relation to the horizon when he is at altitude.

Note: Jumpers should use caution when trying to execute a two-stage landing during limited visibility. Jumpers should perform a half-brake landing and a parachutist's landing fall if they are not confident that they can properly time their two-stage landings.

REAR RISER FLARE

8-54. In the event of a broken control line, the parachutist should practice flaring the canopy with the rear risers at a safe altitude (above 1,000 feet AGL) before using this landing technique.

8-55. The parachutist makes rear riser flared landings into the wind. He starts the rear riser flare at an altitude of approximately 10 to 15 feet above the ground, with room ahead for the actual touchdown. At 200 feet AGL, he eases both risers to the full glide position, allowing airspeed to build. At about 10 feet above the ground (depending on wind conditions), he slowly pulls both rear risers downward, timing the movement to coincide with a smooth controlled landing. The rear riser flared landing, when properly executed, practically eliminates forward and vertical speed for a short period.

Note: Canopy will flare much quicker using rear risers than when using the toggles.

LANDING APPROACHES

8-56. The RA-1 ARAPS landing approach is similar to standard aircraft practice consisting of a downwind leg, a base leg, and a final approach upwind into the target. The pattern can be left or right hand and defined by the direction of turns used in the pattern. For example, a jumper flying a left-hand pattern would be making left-hand turns when turning between the legs of the pattern. The standard pattern offers many advantages to the jumper in the areas of accuracy and safety. The standard pattern allows for a good inspection of the jump spot and makes it easy to monitor changes in wind direction or speed during the jump. It also lends itself well to adjusting for changing conditions. Most importantly, it provides an orderly landing sequence for multiple jumpers in the air. Components of the pattern include holding area, downwind leg, base leg, and final approach. The parachutist uses his altimeter to assist his visual altitude determination during the pattern for the landing approach.

HOLDING AREA

8-57. The holding area is when the jumper is upwind of the landing area. The holding area—

- Is the point at which the jumper starts to set up before entering the downwind leg.
- Begins approximately 1,500 feet AGL upwind from the landing area.

DOWNWIND LEG

8-58. The parachutist turns onto the downwind leg at approximately 900 feet AGL and flies the downwind leg along the wind line, passing the target area at an altitude of 900 to 800 feet AGL (depending on winds) and about a 60-degree angle (view point) to the side of the target area. He continues the downwind leg about 300 to 400 feet AGL downwind of the target (again, depending on winds). Jumper will end the downwind leg at approximately 600 feet AGL (again, depending on winds). The downwind leg—

- Begins at holding area, approximately 1,500 to 1,000 feet AGL.
- Starts downwind leg at approximately 900 feet AGL.
- Ends with turn onto base leg, approximately 600 feet AGL.

BASE LEG

8-59. When 300 to 400 feet AGL past the target, the parachutist begins a gentle 90-degree turn to fly the base leg across the wind line. He usually flies this leg at 30- to 60-percent brakes, depending on the wind conditions. He may either shorten or extend the base leg to reach the turning altitude. Under low-wind conditions, he flies the base leg to a turning point about 300 feet AGL directly downwind of the target and at an altitude of 600 feet. The base leg—

- Begins at the end of the downwind leg, approximately 600 feet AGL.
- Ends with turn onto final approach, approximately 300 feet AGL.

FINAL APPROACH (LEG)

8-60. Under light wind conditions (0 to 5 knots) and 300 feet AGL directly downwind of the target, the parachutist makes a braked turn to turn toward the target. He completes the final turn at approximately 300 feet AGL. The parachutist performs any major control corrections immediately to avoid obstacles only or to follow established landing direction while there is enough altitude and distance to the target. He lowers his equipment after turning on final approach and no lower than 200 feet AGL. For the final approach (leg) (figure 8-16, page 8-17, and figure 8-17, page 8-18), the jumper—

- Begins at the end of the base leg (setup point), approximately 300 feet AGL.
- Lowers his equipment after turning on final and no lower than 200 feet AGL.
- Ends with landing at the desired impact point.

WARNING

The parachutist avoids the turbulent air directly behind and above a ram-air parachute by flying offset to a parachute to his front or by flying a minimum of 25 meters to the rear and above. He does not make sharp or hook turns on the final approach and he does not attempt a 360-degree turn.

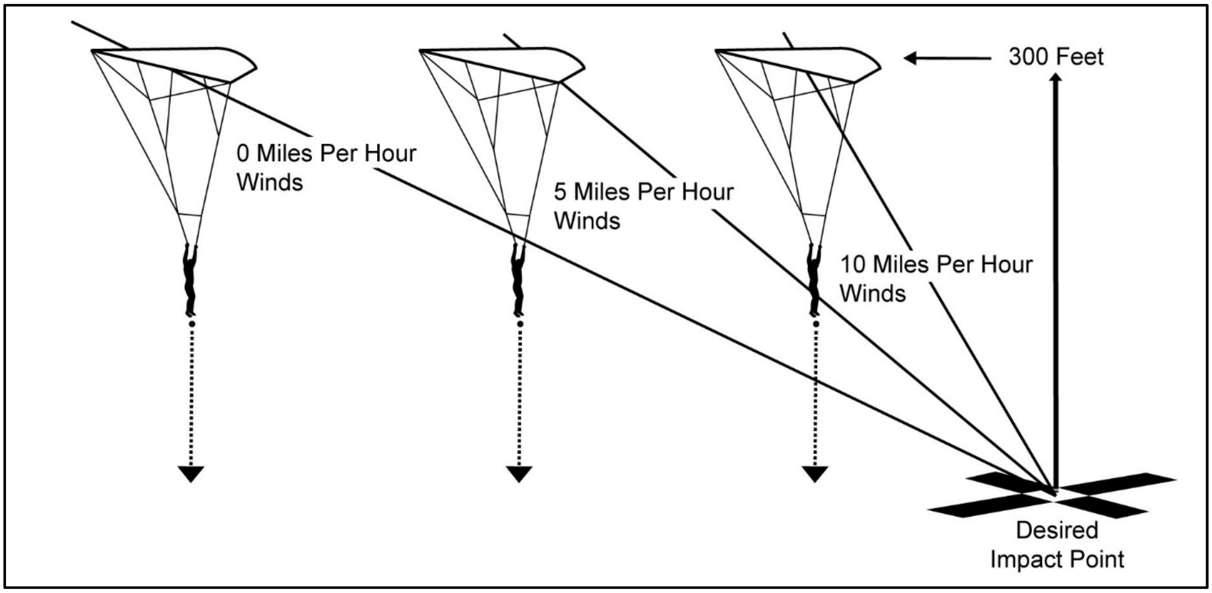


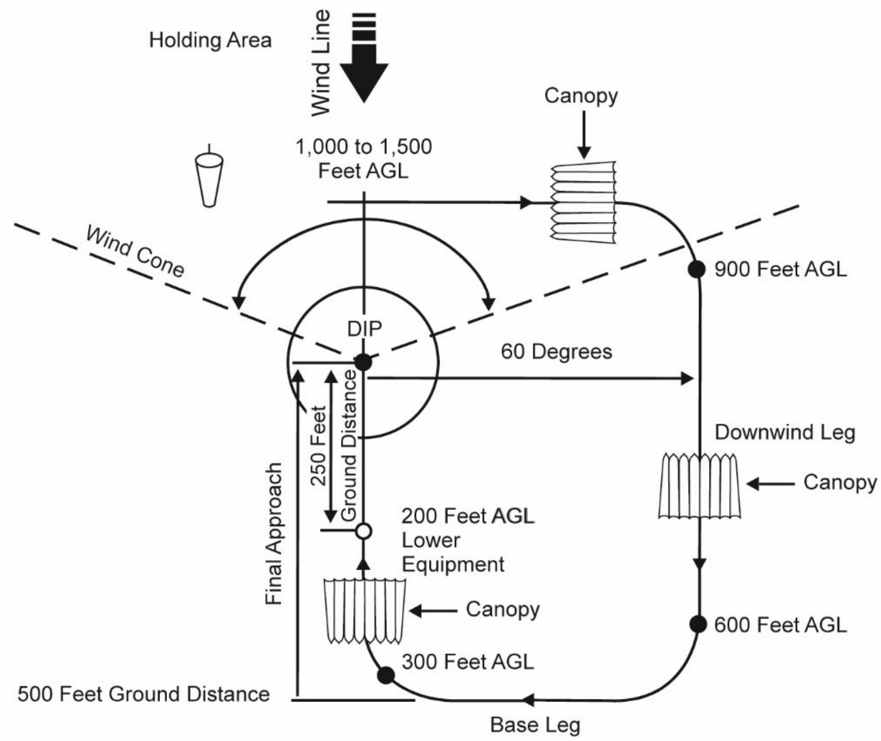
Figure 8-16. Flight angles for a final approach

WARNING

The preferred direction for landing is into the wind, but it is far more important to have all the canopies land in the same landing direction and to follow the established pattern than it is to land into the wind. Any wind that is a quartering headwind is safe for jumpers of any level to land in.

WARNING

The parachutist maintains a sharp lookout for fellow parachutists at 300 feet AGL and below to avoid canopy collisions and entanglements. The lower parachutist has the right-of-way.



Note: Ground distance varies with wind speed. Example shown is 0 to 5 knots.

Legend:

AGL above ground level
DIP desired impact point

Figure 8-17. Landing approaches

WINDS

8-61. One of the most important factors to a parachutist conducting MFF operations is wind conditions. The RA-1 planes or glides through the air at about 26 to 34 miles per hour. This forward speed allows the parachutist great maneuverability. On a day with no wind, a parachutist can move at a forward speed of 26 to 34 miles per hour in whatever direction they prefer. When the wind is blowing, the parachutist must take into consideration the wind speed and direction in order to land at the desired impact point. The paragraphs below provide details of how the parachutist can adjust his forward speed for specific wind patterns.

High and Low Wind Patterns

8-62. The parachutist will tighten the pattern as wind speed increases; downwind leg should be closer to the wind line (figure 8-18), and the base leg will move closer to the desired impact point.

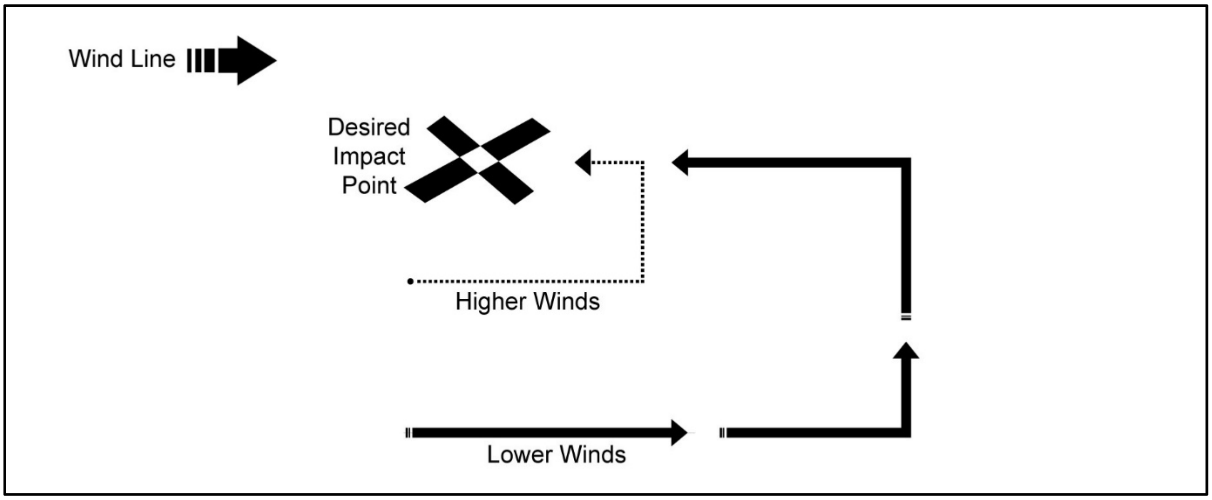


Figure 8-18. High and low wind patterns

Adjusting for Changes in Wind Direction

8-63. It is not uncommon for the wind to change during the course of MFF operations. Most changes are minor and can be corrected for by slight adjustments on final approach. If the change in wind direction is significant (figure 8-19, page 8-20) and it is recognized prior to entering the pattern, it may be preferable to shift the entire pattern. Shifting the pattern will increase the potential for landing directly into the wind, but jumpers should be cautious to avoid chasing the wind sock with light and variable wind conditions.

Turbulence

8-64. Turbulence is the result of an air mass (wind) flowing over obstructions on the earth's surface. Common obstructions are irregular terrain (bluffs, hills, mountains), man-made features (buildings, elevated roadways, overpasses), or natural features, such as tree lines. A disturbance of the normal horizontal wind flow causes turbulence. As the air mass moves around and over the obstruction, it transforms into a complicated pattern of eddies and other irregular air movements. Turbulence generally affects the flight of the parachute at the most critical time for the parachutist—the last 200 feet of canopy flight.

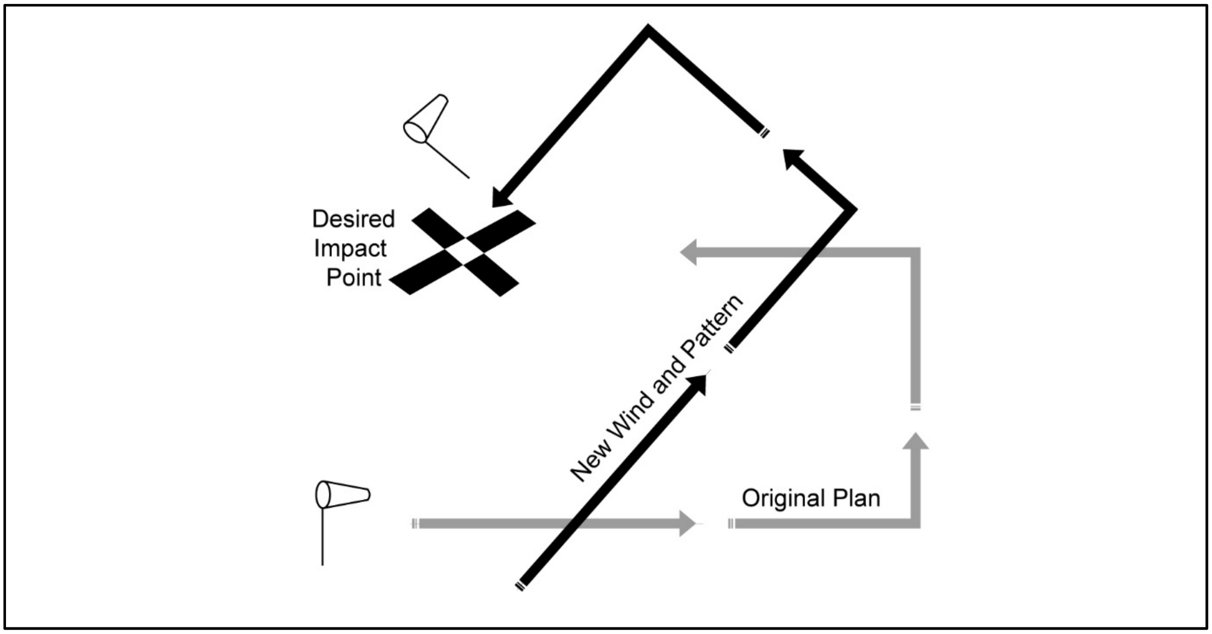


Figure 8-19. Significant change in wind direction

8-65. In general, with ground wind speeds less than 10 knots, both the windward and leeward sides of an obstruction cause small eddies 10 to 50 feet in depth. When wind speeds are between 10 and 20 knots, obstructions can cause currents that are several hundred feet in depth. In addition, there will still be eddies on the windward and leeward sides near the obstruction. At wind speeds greater than 20 knots, currents formed on the leeward side are carried considerable distances beyond the object that created them. Only minor eddies and currents form over smooth water surfaces. Turbulence is worse over choppy swells closer to the surface of the water because of the wind flow over a constantly changing surface configuration. Over mountains, even light winds (moving air masses) pushed up mountainsides or redirected down valleys can form major eddies and air currents that have violent, abrupt characteristics. In addition, in MFF HAHO operations in mountains or around hilly terrain, unstable air masses form currents that continue to grow in size and complexity. The resultant turbulence can extend up to thousands of feet AGL. Turbulence is also caused by heat rising off roads, concrete, and urban built-up areas and clearings.

8-66. An example of turbulence is the vortex created by aircraft taking off or landing. The turbulence created by these aircraft can invert smaller aircraft landing too closely behind them. Another example is the turbulence behind another parachutist's canopy. The parachutist who finds himself behind this canopy will feel the turbulence it creates. Turbulence can exist around any cloud mass. Individual clouds probably will not create turbulence. Clouds that mark the leading edge of an air mass probably will contain strong downdrafts. Cloud decks and capping mountain ridges will contain very strong downdrafts and abrupt turbulence. These types of cloud formations will contain rapid pressure differentials. Altimeter readings should be suspect because the parachutist could be 1,000 feet lower than the indicated altitude on the altimeter. At all costs, the parachutist should avoid clouds that contain thunderhead activity because of the violent turbulence associated with those formations.

Adjusting for Changes in Wind Velocity

8-67. When winds increase during the jump, it is important to recognize the change and make the necessary adjustments (figures 8-20 through 8-22, page 8-21). Most adjustments are fairly straightforward and entail reducing the distance traveled on the downwind leg or cutting corners of the base leg. Adjusting for a decrease in winds does not always require changing the pattern. Sinking from the original setup point will usually result in an acceptable sight picture. Extending the base leg is acceptable if the parachutist is the last jumper in the stick, but the potential for airspace conflicts increases.

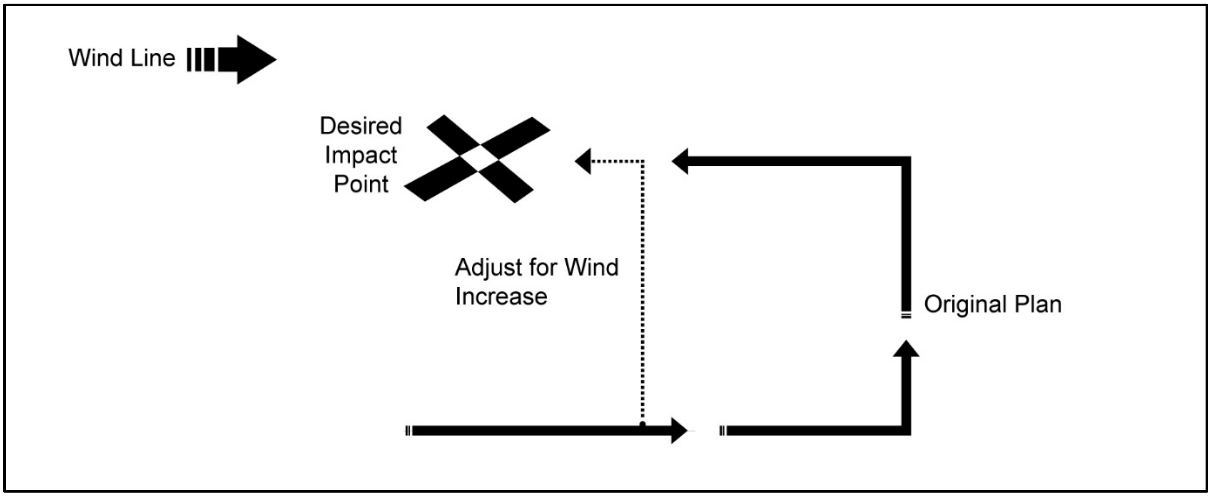


Figure 8-20. Adjusting for increase in winds on downwind leg

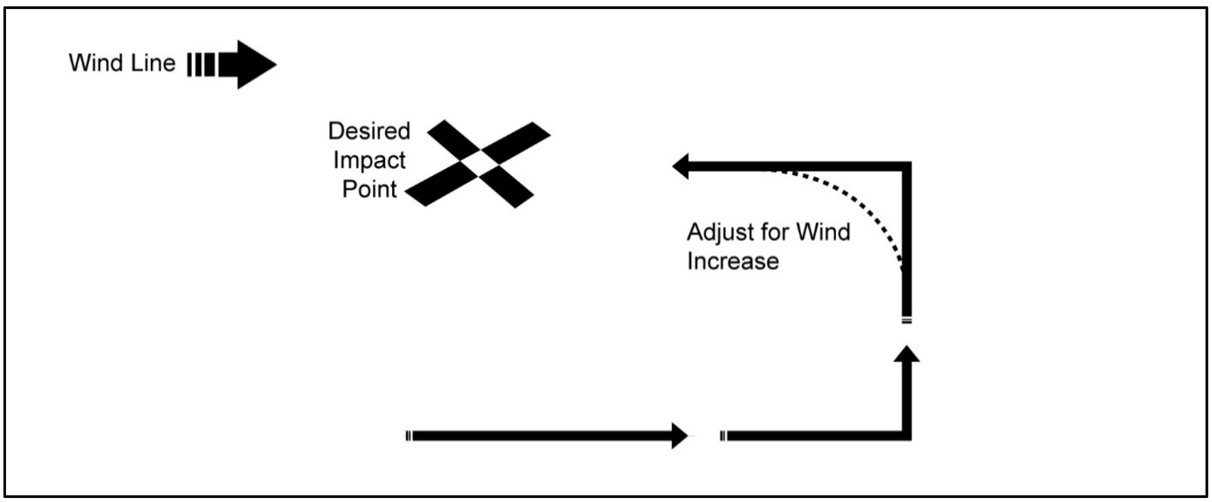


Figure 8-21. Adjusting for increase in winds on base leg

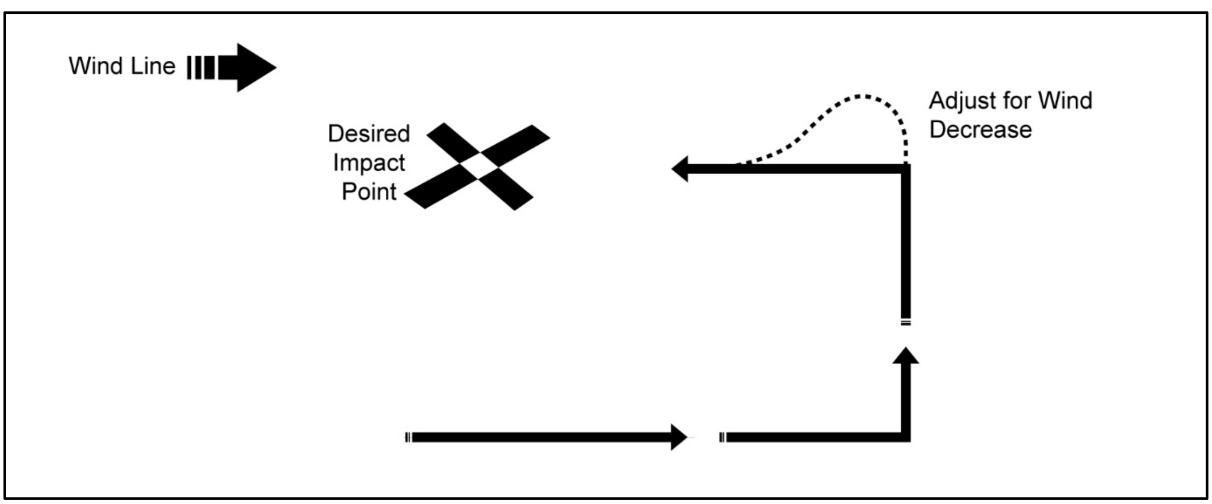


Figure 8-22. Adjusting for decrease in winds on base leg

Land and Sea Breezes

8-68. The thermal differences of air masses associated with the interface along shorelines (oceans, lakes, and rivers) causes land and sea breezes. In the daytime, landmasses warm up faster than water. The air above the land rises, causing a lower air density than over the water. The air flows from the water over the land to replace the lower air density there. This phenomenon creates onshore breezes known as sea breezes (or lake breezes). It is most evident on clear, summer days in lower latitudes. The same phenomenon occurs in reverse in the evening because of the more rapid cooling of the landmass. The reversed process creates land breezes. The airflow over obstacles near shoreline DZs creates turbulence; when farther away from the coast, turbulence might not exist.

Note: If turbulence is encountered at altitude, the parachutist should maintain full flight.

Valley and Mountain Breezes

8-69. Winds generally flow upslope on warm days in mountainous terrain. They flow downslope in the evening as the air masses cool. During the day, the winds create valley breezes; at night, the reverse process creates mountain breezes. These breezes, coupled with the airflow over obstacles, can cause strong and unpredictable turbulence.

Chapter 9

Military Free-Fall Emergency Procedures

Most MFF jumpers recognize that jumping involves risk, but that risk is not limited to the jump itself. It also involves boarding an aircraft and riding to exit altitude. While aircraft accidents involving jumpers are rare, they do occur and are almost always preventable. This section depicts the emergency procedures that will be used with the RA-1 ARAPS during emergency situations when in the MFF configuration and jumping with the main OTS ripcord or the hand-deployed pilot chute from the BOC.

The conditioned response executed as the correct procedure for a particular emergency is a highly perishable skill. Refresher training must include performance-oriented training with special emphasis on emergency procedures and the actions required to respond successfully to any situation. This training must take place before each MFF airborne operation. The duration of the training should be commensurate with the time between airborne operations and, at the very least, until each parachutist is confident in his emergency procedure skills.

The procedures established in this publication in response to emergency situations have proven to be the most successful in both MFF training and tactical environments.

EMERGENCY PROCEDURES PRIOR TO EXIT

9-1. The following paragraphs provide the emergency procedures prior to the jumper exiting from the aircraft.

ON THE GROUND AND PRIOR TO TAKEOFF

9-2. For an emergency prior to takeoff, the jumper—

- Takes all commands from the primary jumpmaster.
- Exits the aircraft and assembles 100 meters in a safe direction, as directed by the primary jumpmaster. Once assembled, the jumper reports to the primary jumpmaster.
- Learns the location of emergency exits and how to open them.
- Secures all loose items.
- Wears helmet.
- Fastens seat belt securely.
- Has an orientation and an egress plan for all emergencies.

CRASH LANDING (TAKEOFF TO 1,000 FEET AGL)

9-3. For an emergency during takeoff to 1,000 feet AGL, these procedures will be followed:

- Prepare for a crash landing. The signal will be six short rings of the alarm bell or verbal warning to alert jumpers. One long continuous bell from the aircrew will indicate that a crash is imminent.
- Jumpers prepare for the crash by remaining seated, fastening their seat belts, and assuming the emergency landing position (placing their heads between their legs and covering their heads with their arms and bracing for impact).
- Wait for the aircraft to come to a complete stop; unfasten seat belts.

- Exit and assemble upwind **100 meters** off the nose of the aircraft or upwind of the aircraft in a safe distance and direction indicated by the primary jumpmaster.
- Conduct a head count, administer first aid, and signal for help.

EMERGENCY BAILOUT (1,001 TO 3,000 FEET AGL)

9-4. The jumpmaster will give the emergency bailout signal by extending his arm straight up and moving it in a circular motion with index finger pointed. He will then place a clinched fist by his reserve ripcord handle and thrust his arm out to the side. Follow these procedures:

- Prepare for an emergency bailout. The signal will be three short rings of an alarm bell or a verbal warning to alert jumpers to prepare for an emergency bailout.
- The jumpmaster will give the emergency bailout signal by extending his arm over his head with the index finger pointed and moving it in a circular motion.
- He will then place a clenched fist over his reserve ripcord handle and thrust it out to the side indicating that jumpers will exit on their reserve.
- The jumpmaster may issue abbreviated jump commands if time permits.
- On the jumpmaster's command, conduct a dive exit opposite of the jumper in front of you.
- Clear the aircraft and deploy the reserve canopy.
- Complete the canopy controllability check, attempt to land with other jumpers, and assemble for a head count.

Note: The above procedures are for OTS ripcord and BOC MFF airborne operations.

EMERGENCY BAILOUT (3,001 FEET AGL AND ABOVE)

9-5. If jumping OTS ripcord, the jumpmaster will give the emergency bailout signal by extending his arm straight up and moving it in a circular motion with index finger pointed. He will then place a clinched fist by his main ripcord and thrust his arm out to the side. If jumping BOC, the jumpmaster will give the emergency bailout signal by extending his arm straight up and moving it in a circular motion with index finger pointed. The jumpmaster will then point to the BOC. If time permits, jump commands or abbreviated jump commands will be given. The jumpers will stand up and exit on the jumpmaster's command. Once under canopy, jumpers will attempt to land with other jumpers and assemble for a head count. If time does not permit, the jumpmaster will give the emergency bailout signal for jumpers to exit on their reserve parachute. Follow these procedures:

- Prepare for an emergency bailout. The signal will be three short rings of an alarm bell or verbal warning to alert jumpers to prepare for an emergency bailout.
- The jumpmaster may issue abbreviated jump commands if time permits.
- The jumpmaster will give the emergency bailout signal by extending his arm over his head with the index finger pointed and moving it in a circular motion.
- The jumpmaster will then place a clenched fist over his main OTS ripcord handle and thrust it out to the side or point to the BOC indicating that jumpers will exit on their main canopy.
- On the jumpmaster's command, execute a dive exit opposite of the jumper in front of you.
- Clear the aircraft and deploy the main canopy with no more than a 5-second delay.
- Complete the canopy controllability check, attempt to land with other jumpers, and assemble for a head count.

PREMATURE DEPLOYMENT INSIDE THE AIRCRAFT

9-6. In the event a main parachute, reserve parachute, or pilot chute prematurely deploys inside the aircraft with ramp or doors open or closed, the first person to notice will shout PILOT CHUTE and attempt to contain the pilot chute or parachute. Follow these procedures:

- Shout, "PILOT CHUTE", contain it, and notify the jumpmaster (to ensure the ramp or doors do not open). If the pilot chute activates or the container comes open, the container will be closed and the jumper will be seated, put seat belt on, and land with the aircraft. If the deployment bag and the suspension lines fall out, disconnect the RSL, then cutaway the main and place it in the kit bag; the jumper will land with the aircraft.
- If the reserve pilot chute is deployed, the jumper will be moved to the front of the aircraft. The jumper will remove his equipment and place the parachute system inside the kit bag. He will fasten his seat belt and he will land with the aircraft.
- With the ramp or doors open, shout "PILOT CHUTE" and attempt to contain the pilot chute and canopy.
- Once the parachute is contained, move away from the open exit to a safe area forward in the aircraft, and then conduct the procedures mentioned above for pilot chute activation.
- If the pilot chute or parachute is pulled outside the aircraft, the jumper and jumpers in front of that jumper must exit immediately.

WARNING

If a parachutist is standing in the vicinity of an open door or ramp and he experiences a premature deployment, he tries to contain it. If any portion of the parachute goes out of the aircraft, he exits immediately to minimize or avoid serious injury.

ALTIMETER FAILURE PRIOR TO EXIT

9-7. If the jumper's altimeter fails on the aircraft, these procedures will be followed:

- If altimeter failure occurs prior to exit, inform a jumpmaster and the defective altimeter will be exchanged with an onboard spare.
- If the onboard spare is in use or both altimeters fail prior to exit, the jumper will be moved to the front of the aircraft to a safe location, be seated, and land with the aircraft.

Note: The jumper can exit the aircraft in an emergency situation only.

EQUIPMENT MALFUNCTION

9-8. If a jumper experiences an equipment malfunction on the aircraft, these procedures will be followed:

- The jumper gets the attention of the jumpmaster by extending his arm straight out with his thumb pointing down.
- The jumpmaster will correct the malfunction or make the determination for the jumper to land with the aircraft.

EMERGENCY PROCEDURES DURING EXIT

9-9. The following paragraphs provide the emergency procedures when jumper's exit the aircraft.

JUMPER IN TOW BY EQUIPMENT

9-10. If a jumper is being towed by his equipment, these procedures will be followed:

- The jumpmaster will try to free the hung equipment or cut the towed jumper free. As the towed jumper feels himself falling free, he will—
  - Attempt to regain stability.
  - Check his altimeter.
  - Check his ripcord handles or BOC.
- If the towed jumper has sufficient altitude, he will orient himself towards the DZ and continue the free-fall as planned until he reaches the prescribed pull or throw-out altitude.
- If the main parachute fails to deploy when the OTS ripcord is pulled (or the hand-deployed pilot chute from the BOC is released), the jumper immediately executes cutaway procedures.
- If the jumper is unconscious the jumpmaster will attempt to pull the jumper into the aircraft.

COLLISION ON EXIT

9-11. If a jumper experiences a collision with another jumper on exit, these procedures will be followed:

- The jumper will maintain his arch and gently push off the other jumper with an open hand.
- All jumpers involved will regain their stability, check their altimeters, check their handles, and continue the free-fall as planned.
- Jumpers making contact with other jumpers during exit will not grab any part of the other jumper or equipment if contact is made.

EMERGENCIES DURING FREE-FALL

9-12. The following paragraphs provide the emergency procedures during free-fall.

INSTABILITY IN FREE-FALL: SPINNING

9-13. The jumper will relax, arch, counter in the opposite direction of the spin, check his hands and feet, and maintain altitude awareness. If the jumper is unable to maintain altitude awareness or control the spin, the jumper waves off and pulls the main OTS ripcord, or deploys the hand-deployed pilot chute from the BOC.

INSTABILITY IN FREE-FALL: TUMBLING

9-14. The jumper will arch, keep his head up, check his hands and feet, and maintain altitude awareness. If the jumper is unable to maintain altitude awareness or control the tumbling, he will wave off and pull the main OTS ripcord or deploy the hand-deployed pilot chute from the BOC at the prescribed altitude even if he is still in the clouds.

ENTERING A CLOUD OR LOSS OF VISIBILITY IN FREE-FALL

9-15. The jumper will stop all movement, maintain arch, return to a relaxed and stable free-fall position, watch for other jumpers, and maintain altitude awareness. The jumper will pull the OTS ripcord or deploy the hand-deployed pilot chute from the BOC at the prescribed altitude even if he is still in the clouds.

PREMATURE ACTIVATION OF PARACHUTE IN FREE-FALL

9-16. In the event of a premature activation of a parachute in free-fall, the jumper must first determine which parachute has activated as follows:

- **Premature Opening of the Main Parachute.** If the jumper has a premature opening of the main parachute, he will be able to determine that it is the main parachute by the three-ring assembly, deployment bag, and pilot chute. The jumper will conduct a controllability check and continue as planned.
- **Premature Opening of the Reserve Parachute.** If the jumper has a premature opening of the reserve parachute, he will be able to determine that it is the reserve parachute because there will be no three-ring

assembly (snowman) on reserve risers (figure 9-1), no deployment bag, no pilot chute, and no trim tabs (figure 9-1) on risers. In addition, the center of the reserve slider will have mesh materials and the bottom skin of the reserve canopy (figure 9-1) will have square holes. The jumper will conduct postopening procedures and continue the jump operation as planned. The jumper will not activate the main parachute.

Collision Avoidance During Free-Fall

9-17. To avoid a collision during free-fall, jumpers will use the following rules:

- Lower jumper has the right-of-way.
- Never get over the top of another jumper.
- Use forward glide, back slide, or side slide to get off a jumper's back.

Figure 9-1. Reserve risers and reserve parachute identification during premature activation

Lost or Broken Altimeter (in Free-Fall)

9-18. During both day and night, jumpers will observe other jumpers during free-fall and deploy their main canopy when the other jumpers do. If a jumper is unable to observe other jumpers, the jumper will immediately clear airspace, wave off, and deploy his main canopy by pulling the main OTS ripcord or by pulling the hand-deployed pilot chute from the BOC.

Lost or Broken Goggles

9-19. The jumper will maintain his arch, maintain altitude awareness, reach up with both hands symmetrically (keeping elbows high), and find and replace the goggles. If the jumper is unable to find the goggles, the jumper will squint his eyes and maintain altitude awareness. If unable to maintain altitude awareness, the jumper waves off and pulls the main OTS ripcord or deploys the hand-deployed pilot chute from the BOC.

Rucksack Shifts

9-20. The jumper will counter any turn caused by the rucksack shifting in free-fall by turning in the opposite direction. If the rucksack strap moves below his knee, the parachutist makes one attempt to replace it while maintaining stability. If unsuccessful, he relaxes and attempts to fly. If the jumper loses altitude awareness and is unable to gain control, he will wave off and pull the main OTS ripcord or deploy the hand-deployed pilot chute from the BOC.

EMERGENCY PROCEDURES FOR OVER-THE-SHOULDER RIPCORD

9-21. The following paragraphs provide parachute deployment emergency procedures for the OTS ripcord configuration.

DECISION ALTITUDE FOR EMERGENCY PROCEDURES

9-22. If canopy controllability is ever in question, the jumper must perform a canopy controllability check. If the canopy is uncontrollable, the decision to cutaway must be made by 2,500 feet AGL. The jumper must not initiate cutaway procedures below 1,000 feet AGL. If the malfunction cannot be resolved and cutaway procedures have not been initiated by 1,000 feet AGL, the jumper must immediately deploy his reserve parachute in an attempt to slow the rate of his descent.

CANOPY CONTROLLABILITY CHECK

9-23. The jumper conducts the canopy controllability check, after opening, to verify the canopy is controllable and to determine if it is safe to continue flight. To perform a canopy controllability check, the jumper—

- Grasps both toggles and pulls down to release the brakes and attempts to fly the canopy straight at full flight.
- Pulls the brakes down to the full-brake position and determines the canopy’s flare points.
- Returns to full flight.
- Looks right and turns 90 degrees to the right.
- Looks left and turns 90 degrees to the left.

Note: If the canopy requires more that 50-percent opposite toggle to keep the canopy flying straight, or if the canopy stalls prior to the 50-percent brake setting, the canopy is uncontrollable. Execute cutaway procedures.

EMERGENCY CUTAWAY PROCEDURES FOR OVER-THE-SHOULDER RIPCORD JUMPS

9-24. Follow these procedures for a malfunction while jumping OTS ripcord:

- Maintain arch.
- Throw away the main ripcord.
- Counter with the left hand.
- Look to identify the red cutaway pillow on the right main left web, chest high, inboard.
- Grab the red cutaway pillow with the right hand.
- Pull the red cutaway pillow to a full-arm extension.
- Throw away the red cutaway pillow.
- Counter with the right hand.
- Look to identify the reserve ripcord handle (yellow pillow/metal handle) on the left main web, chest high, inboard.

Note: Some older RA-1 parachutes may have a metal reserve ripcord handle.

- Grab the reserve ripcord handle (yellow pillow/metal handle) with the left hand.
- Pull the reserve ripcord handle (yellow pillow/metal handle) to a full-arm extension.
- Throw away the reserve ripcord handle (yellow pillow/metal handle).
- Check over the right shoulder to ensure the reserve pilot chute deploys.

HIGH-SPEED MALFUNCTIONS

9-25. A high-speed malfunction is defined as a malfunction that occurs when the jumper's rate of descent does not slow below EAAD activation speeds due to the fast rate at which the jumper is travelling. These malfunctions drastically reduce the jumper's decision time when reacting to an emergency. The following malfunctions are considered high-speed malfunctions.

Floating Ripcord or Unable to See Ripcord

9-26. The jumper maintains an arch and looks at the OTS ripcord pocket. If the jumper cannot see the ripcord, or if it is floating, the jumper locates the cable housing on his right shoulder with his right hand and traces the cable housing down to where the ripcord cable protrudes outward. The jumper then makes a circle, with his index finger and thumb, around the cable and pulls the cable to full-arm extension. The jumper only makes one attempt. If this attempt is unsuccessful, the jumper performs cutaway procedures.

Hard Ripcord Pull (Main Over-the-Shoulder Ripcord)

9-27. If the jumper pulls the main ripcord and the pull is unsuccessful, the jumper comes across with the left hand in a punching motion and pushes the right hand and ripcord out. If unsuccessful, the jumper performs cutaway procedures.

Pack Closure

9-28. If no pilot chute deploys after the jumper pulls the ripcord and checks over his right shoulder, the jumper pulls the ripcord and checks over his right shoulder again. If this does not correct the problem, the jumper performs cutaway procedures.

Pilot Chute Hesistation

9-29. The jumper looks over his right shoulder to disrupt the partial vacuum to clear the burble. If the main parachute does not deploy, the jumper performs cutaway procedures.

Horseshoe Malfunction

9-30. In a horseshoe malfunction the main parachute or suspension lines are snagged on the jumper or his equipment. The jumper initiates cutaway procedures immediately.

Bag Lock

9-31. In a bag lock the pilot chute deploys and lifts the deployment bag out of the container. The suspension lines fail to unstow properly and the canopy remains in the deployment bag. The jumper initiates cutaway procedures immediately.

Spinning Malfunction with Less Than Half the Canopy Inflated

9-32. If the main parachute is spinning and less than 50-percent inflated, the jumper initiates cutaway procedures immediately.

LOW-SPEED MALFUNCTIONS

9-33. A low-speed malfunction is defined as when the main parachute is out of the deployment bag and at least five cells are inflated. For all low-speed malfunctions, the jumper must first ensure that he is **not** twisted then, perform a canopy controllability check. If the canopy is uncontrollable, he performs cutaway procedures for a low-speed malfunction. The following are considered low-speed malfunctions.

Line Over

9-34. Line over occurs when the parachute deploys and one or more lines are trapped across the top of the canopy and deforms the shape of the canopy. This may cause the canopy to spin, stall, or act erratically.

The jumper conducts a canopy controllability check. If the canopy is uncontrollable, he initiates cutaway procedures by 2,500 feet AGL.

Line Twists

9-35. When the parachute deploys, if the risers and suspension lines are twisted, the jumper—

- Reaches up with both hands (thumbs pointed downward) and separates the risers.
- Uses a bicycle motion or kicks with both legs in the opposite direction of the twist to untwist the lines.
- Does not unstow the brakes until the line twists are cleared.
- Maintains altitude awareness and if unable to clear twists (or if the twists are still above the cascades by 2,500 feet AGL) initiates cutaway procedures.

Hung Slider

9-36. If the slider remains above the cascades, it will deform the canopy and degrade lift and drive performance to an unacceptable level. The jumper follows these procedures for a hung slider:

- Pulls both rear risers vigorously to move the slider downward.
- Releases both sets of toggles and pulls vigorously to bring the slider down completely if the rear risers are not successful. The slider must travel at least half way down (past the suspension line cascades) before he attempts a canopy controllability check.
- If unable to clear the slider past the cascades, or if unable to pass a canopy controllability check by 2,500 feet AGL, initiates cutaway procedures.

Streamer/Snivel

9-37. The jumper reaches up and releases the brakes and pulls the toggles down to the full-brake position which he holds for 3 to 4 seconds. The jumper then lets up slowly to the 50-percent brake setting. If the malfunction is not clear, the jumper makes one more attempt to pull the toggles down to the full-brake position for 3 to 4 seconds. If the malfunction still is not cleared, the jumper performs cutaway procedures.

Closed End Cells

9-38. For closed end cells, the jumper—

- Pulls the toggles down to full-brake position, holds for 4 seconds, and lets up quickly.
- Repeats the procedure if end cells do not open.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Pilot Chute Over the Nose

9-39. For pilot chute over the nose, the jumper—

- Attempts to flip the pilot chute back over the top of the canopy by bringing toggles to full brakes and letting the toggles up abruptly.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Tension Knots

9-40. For tension knots, the jumper—

- If turning, stops the turn with opposite rear riser input.
- Snaps the riser of the affected line group by pulling down and releasing.
- After two attempts, conducts a canopy controllability check.

- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Premature Brake Release

9-41. For a premature brake release, the jumper—
- Releases the opposite toggle.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Broken Suspension Lines

9-42. If suspension lines (A, B, C, or D) break during opening, the jumper—
- Stops the turn with rear riser input. (It may be difficult to identify the broken lines and the canopy may look deformed.)
- If there are two or more broken lines, or if there are any A lines broken, immediately performs cutaway procedures.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Broken Control Lines

9-43. For broken control lines, the jumper—
- Releases the good control line.
- Steers using the good control line and opposite rear riser.
- At a safe altitude, determines the flare point using only the rear risers (the canopy responds much quicker when using the rear risers).
- Flares and lands using both rear risers only.

Rips or Tears

9-44. If the jumper notices rips or tears in the bottom or top skin of the canopy during a canopy check, he—
- If possible, checks his rate of descent with the other jumpers.
- If descending faster than the other jumpers, executes cutaway procedures.
- If not descending faster than the other jumpers, conducts a canopy controllability check.
- If there is a rip or tear in the top skin of the canopy, executes cutaway procedures.

EMERGENCY PROCEDURES FOR BOTTOM OF CONTAINER

9-45. The following paragraphs provide parachute deployment emergency procedures for the BOC configuration.

DECISION ALTITUDE FOR EMERGENCY PROCEDURES

9-46. If canopy controllability is ever in question, the jumper must perform a canopy controllability check. If the canopy is uncontrollable, the decision to cutaway must be made by 2,500 feet AGL. The jumper must not initiate cutaway procedures below 1,000 feet AGL. If the malfunction cannot be resolved and cutaway procedures have not been initiated by 1,000 feet AGL, the jumper must immediately deploy his reserve parachute in an attempt to slow his rate of descent.

Note: For commercial, off-the-shelf (non-standard) systems, the cutaway decision altitude is 1,800 feet AGL.

CANOPY CONTROLLABILITY CHECK

9-47. The jumper conducts the canopy controllability check, after opening, to verify the canopy is controllable and to determine if it is safe to continue flight. To perform a canopy controllability check, the jumper—

- Grasps both toggles and pulls down to release the brakes and attempts to fly the canopy straight at full flight.
- Pulls the brakes down to the full-brake position and determines the canopy's flare points.
- Returns to full flight.
- Looks right and turns 90 degrees to the right.
- Looks left and turns 90 degrees to the left.

Note: If the canopy requires more than 50-percent opposite toggle to keep the canopy flying straight, or if the canopy stalls prior to the 50-percent brake setting, the canopy is uncontrollable. Execute cutaway procedures.

TOTAL MALFUNCTION EMERGENCY CUTAWAY PROCEDURES FOR BOTTOM OF CONTAINER JUMPS

9-48. Follow these procedures for a total malfunction while jumping BOC:

- Maintain arch.
- Counter with the left hand.
- Look to identify the red cutaway pillow on the right main lift web, chest high, inboard.
- Grab the red cutaway pillow with the right hand.
- Pull the red cutaway pillow to a full-arm extension.
- Throw away the red cutaway pillow.
- Counter with the right hand.
- Look to identify the reserve ripcord handle (yellow pillow/metal handle) on the left main lift web, chest high, inboard.
- Grab the reserve ripcord handle (yellow pillow/metal handle) with the left hand.
- Pull the reserve ripcord handle (yellow pillow/metal handle) to a full arm extension.
- Throw away the reserve ripcord handle (yellow pillow/metal handle).
- Check over the right shoulder to ensure that the reserve pilot chute deploys.

HIGH-SPEED MALFUNCTIONS

9-49. A high-speed malfunction is defined as a malfunction that occurs when the jumper's rate of descent does not slow below EAAD activation speeds due to fast rate at which the jumper is travelling. These malfunctions drastically reduce the jumper's decision time when reacting to an emergency. The following malfunctions are considered high-speed malfunctions.

Missing Pilot Chute Handle

9-50. The jumper maintains his arch and while using his right hand, traces his thigh and sweeps up to the bottom of the container to attempt to locate the pilot chute handle. The jumper will only make two attempts to locate the hand-deployed pilot chute handle. If unsuccessful, the jumper performs cutaway procedures.

Pilot Chute Hesitation

9-51. The jumper looks over his right shoulder to disrupt the partial vacuum to clear the burble. If the main parachute does not deploy, the jumper performs cutaway procedures.

Hard Pull Hand-Deployment Chute (Bottom of Container)

9-52. In the event of a hard pull using the BOC with the hand-deployed pilot chute, the jumper (on the second attempt) uses his right elbow on the side of the container as leverage to pull the pilot chute from the BOC. If the jumper is unsuccessful, he performs cutaway procedures.

Hand-Deployed Pilot Chute in Tow (Bottom of Container)

9-53. In the event that the main container assembly does not open after the hand-deployed pilot chute has been released and the pilot chute remains in tow, the jumper performs cutaway procedures.

Horseshoe with Main Pilot Chute on Right Arm

9-54. If the main pilot chute is entangled with the jumper's right arm, he makes one attempt to clear the entanglement from his arm. If unsuccessful, the jumper performs cutaway procedures.

Horseshoe Malfunction

9-55. This occurs when the main parachute or suspension lines are snagged on the jumper or his equipment. The jumper initiates cutaway procedures immediately.

Bag Lock

9-56. This occurs when the deployment bag comes out of the container, the suspension lines fail to unstow properly, and the canopy remains in the deployment bag. The jumper initiates cutaway procedures immediately.

Spinning Malfunction with Less Than Half the Canopy Inflated

9-57. If the main parachute is spinning and less than 50-percent inflated, the jumper initiates cutaway procedures immediately.

LOW-SPEED MALFUNCTIONS

9-58. A low-speed malfunction is defined as when the main parachute is out of the deployment bag and at least five cells are inflated. For all low-speed malfunctions, the jumper must first ensure that he is not twisted and then perform a canopy controllability check. If the canopy is deemed uncontrollable, he performs cutaway procedures for low-speed malfunctions.

Line Over

9-59. Line over occurs when the parachute deploys and one or more lines are trapped across the top of the canopy and deforms the shape of the canopy. This may cause the canopy to spin, stall, or act erratically. The jumper conducts a canopy controllability check. If the canopy is uncontrollable, he initiates cutaway procedures by 2,500 feet AGL.

Line Twists

9-60. When the parachute deploys, if the risers and suspension lines are twisted, the jumper—

- Reaches up with both hands (thumbs pointed downward) and separates the risers.
- Uses a bicycle motion or kicks with both legs in the opposite direction of the twist to untwist the lines.
- Does not unstow the brakes until the line twists are cleared.
- Maintains altitude awareness and if unable to clear twists (or if the twists are still above the cascades by 2,500 feet AGL) initiates cutaway procedures.

Hung Slider/Snivel

9-61. If the slider remains above the cascades, it will deform he canopy and degrade lift and drive performance to an unacceptable level. In the event of a hung slider, the jumper—

- Pumps both rear risers vigorously to move the slider downward.
- Releases both sets of toggles and pumps vigorously to bring the slider down completely if the rear risers are not successful. The slider must travel at least half way down (past the suspension line cascades) before attempting a canopy controllability check.
- If unable to clear the slider past the cascades, or if unable to pass a canopy controllability check by 2,500 feet AGL, initiates cutaway procedures.

Streamer/Snivel

9-62. The jumper reaches up and releases the brakes and pulls the toggles down to the full-brake position which he holds for 3 to 4 seconds. The jumper then lets up slowly to the 50-percent brake setting. If the malfunction is not clear, the jumper makes one more attempt to pull the toggles down to the full-brake position for 3 to 4 seconds. If the malfunction still is not cleared, the jumper performs cutaway procedures.

Closed End Cells

9-63. For closed end cells, the jumper—

- Pulls the toggles down to full-brake position, holds for 4 seconds, and lets up quickly.
- Repeats the procedure if end cells do not open.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, make the cutaway decision by 2,500 feet AGL.

Pilot Chute Over the Nose

9-64. For pilot chute over the nose, the jumper—

- Attempts to flip the pilot chute back over the top of the canopy by bringing toggles to full brakes and letting the toggles up abruptly.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Tension Knots

9-65. For tension knots, the jumper—

- If turning, stops the turn with opposite rear riser input.
- Snaps the riser of the affected line group by pulling down and releasing.
- After two attempts, conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Premature Brake Release

9-66. For a premature brake release, the jumper—

- Releases the opposite toggle.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Broken Suspension Lines

9-67. If suspension lines (A, B, C, or D) break during opening, the jumper—

- Stops the turn with rear riser input. (It may be difficult to identify the broken lines and the canopy may look deformed.)
- If there are two or more broken lines, or if there are any A lines broken, immediately performs cutaway procedures.
- Conducts a canopy controllability check.
- If the canopy is controllable, flies and lands as planned.
- If the canopy is uncontrollable, makes the cutaway decision by 2,500 feet AGL.

Broken Control Lines

9-68. For broken control lines, the jumper—

- Releases the good control line.
- Steers using the good control line and opposite rear riser.
- At a safe altitude, determines the flare point using only the rear risers (the canopy responds much quicker when using the rear risers).
- Flares and lands using both rear risers only.

Entering a Cloud Under Canopy

9-69. When entering a cloud while under canopy, the jumper—

- Stops all turns and stays alert.
- Uses 50-percent brakes.
- Maintains heading and pickup reference points, if possible, prior to entering the cloud.
- Maintains altitude and air awareness.

POSTOPENING PROCEDURES

9-70. Jumpers will use the following postopening procedures:

- Upon opening, move hands to the rear risers.
- Clear the airspace. Turn right to avoid collision unless left is closer.
- Release the brakes and gain control of the canopy. If controllability is questionable, perform a controllability check.
- Orient themselves to the DZ.
- Locate other jumpers and achieve separation.
- Maintain altitude awareness.
- Check rate of descent with other jumpers.
- Activate the strobe light, as required.

Note: If the malfunction cannot be resolved and if the canopy is uncontrollable, the decision to cutaway must be made by 2,500 feet AGL and cutaway must be performed by 2,000 feet AGL. Jumpers must not initiate cutaway procedures below 1,000 feet AGL. If the malfunction cannot be resolved and cutaway procedures have not been initiated by 1,000 feet AGL, the jumper must immediately deploy his reserve parachute.

DUAL-CANOPY DEPLOYMENT EMERGENCIES

9-71. In the event an MFF jumper experiences the deployment of both canopies, the jumper must identify the dual-deployment scenario at hand and take corrective action to resolve the problem. Various scenarios can result in having both parachutes deploy with one of the following outcomes. The emergency techniques discussed below and knowing how to perform the correct procedures will assist the jumper in achieving the desired effects upon correcting the dual-deployment emergency.

COMMON CAUSES OF DUAL DEPLOYMENTS

9-72. There can be several different causes of dual deployments. Some common reasons are as follows:
- Dislodged reserve ripcord pin due to aircraft seating or movement inside the aircraft prior to exit.
- EAAD activation due to improper setting.

COMMON RESULTS OF DUAL DEPLOYMENTS

9-73. Some common results of dual deployments include the following:
- Canopies fight for the same airspace.
- Pilot chutes can take any route available.
- Second pilot chute to launch from jumper's back can pass through lines, risers, or slider of other parachute.
- Deployment devices can be entangled in the other canopy or with the deployment devices of the other canopy.

COMMON CONFIGURATIONS OF DUAL DEPLOYMENTS

9-74. Dual deployments consist of side-by-side, biplane, down plane, and partially deployed as depicted in figure 9-2, page 9-15.

Side-By-Side

9-75. Follow these procedures when both canopies have fully deployed and are flying next to each other:
- Ensure both canopies are not entangled by tracing all eight risers and suspension lines through their sliders and to their respective canopies. It may be difficult to make this determination at night. Do not assume they are clear. Take the time to make sure, as it is imperative to make the correct determination.
- Do not release the brakes on either canopy. If the brakes are already released on one canopy, fly in half-brake to match the forward speed of the other canopy.
- If the canopies are not entangled, place the left hand on the left rear riser of the left canopy.
- Place the right hand on the red cutaway pillow.
- Separate the canopies into a down plane positon, with the left hand on the left rear riser of the left canopy.
- Peel and pull the main canopy release handle (red cutaway pillow) with the right hand to a full-arm extension and let go of the left rear riser and main canopy release ripcord (red cutaway pillow) simultaneously.
- If the canopies are entangled (or if unsure whether they are entangled, or when below 1,000 feet AGL), steer the most controllable canopy toward the other with the rear risers, making all turns gently toward the other canopy to prevent them from going into a down plane configuration.
- Steer the canopy that is the most inflated or does not have line twists. If the brakes have already been released on a canopy, then steer toward the other canopy with the toggles in hand, maintaining half brakes so that one canopy does not try to outrun the other canopy with the brakes still set.
- Match the speed of the other canopy. Steer into the wind if possible.
- Do not attempt to flare either or both canopies. Just land them as they are and conduct a parachute landing fall. If both canopies are touching end cell to end cell, they should be descending very slowly.

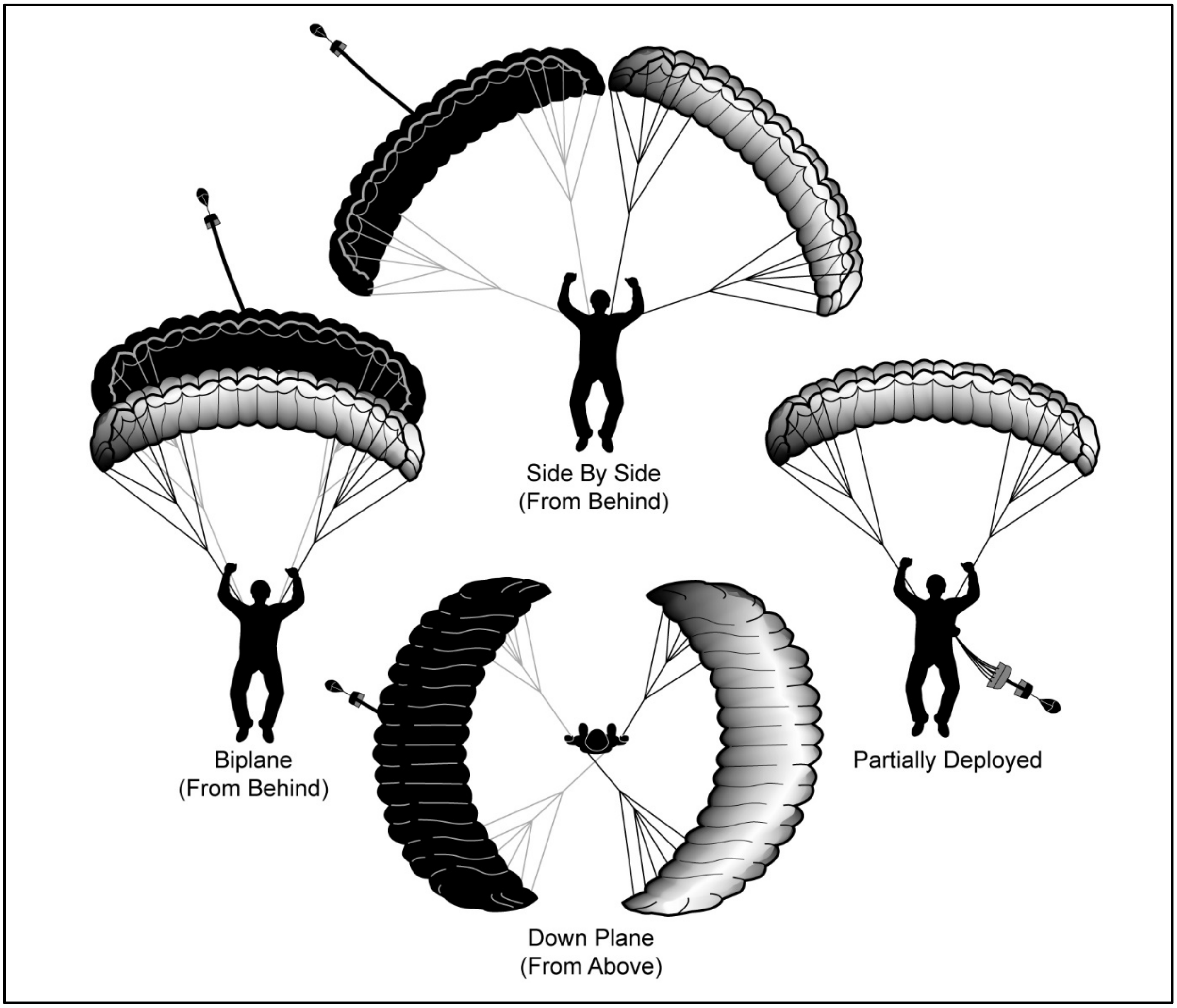


Figure 9-2. Dual deployments

Biplane

9-76. The most likely canopy configuration from a simultaneous or near simultaneous deployment is a biplane with the main canopy in front and the reserve canopy in the rear. During a biplane, both canopies will be flying in the same direction with one behind the other. The shorter rear canopy's leading edge will rest against the steering lines below the trailing edge of the taller front canopy. Follow these procedures when both canopies have fully deployed and are flying in the same direction:

- Ensure both canopies are not entangled by tracing each of the eight risers and suspension lines through its respective slider to its respective canopy.
- Do not release the brakes on either canopy.
- Separate the canopies into a side-by-side configuration by grasping and pulling down on the rear canopy's left rear riser.
- Use the left rear riser of the left canopy and continue to separate the canopies into a down plane configuration.
- Release the rear riser in the left hand as the red cutaway pillow is pulled with the right hand.
- If the canopies are entangled or below 1,000 feet, steer the front canopy with the rear risers, making all turns gently; the trailing canopy will follow. Steer into the wind if possible. Do not attempt to flare either or both canopies; just land them as is and conduct a parachute landing fall.

Down Plane

9-77. Follow these procedures when one canopy fully inflates and the other inflates possibly with line twists, and both canopies are diving toward the ground, one on either side of the jumper:

- Ensure both canopies are not entangled by tracing all eight risers and suspension lines through their sliders and to their respective canopies.
- Pull the main canopy release handle (red cutaway pillow) with your right hand.
- Clear any line twists, unstow the toggles, and find a safe place to land.
- If the canopies are entangled or below 1,000 feet, steer the most controllable canopy toward the other with the rear risers. Attempt to steer the two canopies together to get them overhead. Make all turns gently toward the other canopy.
- Do not attempt to flare either or both canopies; just land them as they are and conduct a parachute landing fall.

Partially Deployed

9-78. Follow these procedures when one canopy is completely deployed and the reserve or main partially deploys:

- Do not unstow the brakes.
- If the brakes have already been unstowed, slow the main to prevent the reserve from fully deploying.
- If the canopy begins to inflate, make sure the suspension lines or risers do not become entangled with you or your equipment.
- Allow the canopies to settle into a configuration; continuously inspect the canopies and lines for entanglements.
- Ensure both canopies are not entangled by tracing the risers and suspension lines to their respective canopies.
- If not entangled, use the rear risers to configure the canopies into a side-by-side configuration. Follow side-by-side procedures.
- If the canopies are entangled or below 1,000 feet, fly the most controllable canopy with the rear risers, making all turns gently toward the other canopy.
- If the reserve is still in the deployment bag, carefully gather and coil the suspension lines in one hand while lifting the bagged canopy to secure the reserve from inflating.
- Attempt to prevent the locking stows from popping open and allowing the reserve canopy to slide out of the deployment bag.
- Continue until the bagged canopy is in hand. Maintain a firm grip on the bagged canopy.
- Steer the main canopy by leaning in the harness or reaching up with one hand to make rear riser turns.
- At 15 feet AGL, drop the bagged canopy to the ground and flare the canopy with the rear risers while simultaneously conducting a parachute landing fall.

CANOPY COLLISION EMERGENCIES

9-79. Most canopy collisions occur during limited visibility or during the landing phase of the MFF operation. This is a result of too many parachutists maneuvering their canopy to get into one small area. A jumper may also lose awareness of his surroundings. Vigilance in maintaining canopy control, observing the surroundings, and choosing a less congested area can help avoid a canopy collision. The following paragraphs provide canopy collision emergency procedures.

ACTIONS TO AVOID A CANOPY COLLISION

9-80. Follow these procedures to avoid a canopy collision:

- Steer with the rear risers.
- Always turn right to avoid head-on collisions with another jumper if collision is imminent.

- Avoid body-to-body contact.

Note: Sometimes a left turn may be the best option to avoid a collision or to avoid body-to-body contact.

Note: The lower jumper has the right of way.

- If a collision is imminent, assume the spread-eagled position while covering the emergency handles with your left arm.
- Be prepared for a violent impact.

ENTANGLEMENT WITH ANOTHER JUMPER

9-81. Follow these procedures if entangled with another jumper:

- Always attempt to steer clear of other jumpers. The lower jumper has the right away.
- If a collision with another jumper is imminent, steer to avoid body-to-body contact, and assume the modified spread-eagled position.
- Protect the emergency handles with the left arm and attempt to bounce off the other jumper's canopy and/or suspension lines.
- If entanglement occurs, stay calm and do not grab the cutaway pillows.
- Check the altitude and look for the other jumper.
- Assess the situation before acting in any way. Communication between jumpers and altitude awareness are critical to successful disengagement. Jumpers—
  - Communicate positive commands only, such as "Hold on to me," or "4,000 feet, are you okay?"
  - Only use the word "cutaway" when the other jumper should cutaway.
- If covered in fabric, assume that you are the higher jumper and probably have a good canopy above that is supporting both jumpers.
- Never say "cutaway" unless you are telling the other jumper to execute cutaway procedures. If you intend to cutaway, use the words: "I'm executing emergency procedures."

Entanglements Above 2,000 Feet AGL

9-82. Follow these procedures for entanglements above 2,000 feet AGL:

- If the higher jumper has a good canopy, he should attempt to clear the entanglement while protecting the emergency handles (pillows).
- If possible, the jumpers should follow their suspension lines out of the entanglement.
- If the entanglement can be cleared, the lower canopy should reinflate within 150 to 200 feet. Both jumpers should complete a canopy controllability check and inspect their parachutes and harnesses thoroughly for damage, then decide whether it is safe to continue to fly and land.
- If the canopy cannot be cleared, the engulfed jumper fails to respond or appears to be going unconscious, or the altitude is approaching 2,000 feet AGL, the lower jumper should communicate his intention to cutaway by saying "2,000 feet AGL" followed by, "I'm cutting away." The lower jumper should then initiate cutaway procedures by 2,000 feet AGL. The higher jumper should clear the canopy from his face and controls so that he can see and steer the canopy. He should continue to clear the canopy if possible, keeping his cutaway pillows protected. If the canopy cannot be cleared safely, the jumper should fly slowly with brakes to diminish the drag of the other canopies and the potential for interference in flight and control.

Entanglements Between 2,000 Feet and 1,000 Feet AGL

9-83. Follow these procedures for entanglements between 2,000 feet and 1,000 feet AGL:

- Jumpers should communicate altitudes and positive commands, such as "1,500 feet, hold on to me," or "1,000 feet, I got you."
- The lower jumper has two options. He can perform cutaway procedures after disconnecting his RSL or he can land with the higher jumper.
- If the lower jumper decides to land with the higher jumper, the lower jumper should jettison his combat equipment, if worn.
- The higher jumper should maintain control of the lower parachutist and fly the final approach at half brakes if possible.
- The higher jumper lands at full brakes; both jumpers should execute a parachute landing fall.

Entanglements Below 1,000 Feet AGL

9-84. Follow these procedures for entanglements below 1,000 feet AGL:

- The higher jumper should make every effort to maintain the lower jumper's canopy.
- The higher jumper should maintain control of the lower jumper and fly the final approach at half brakes if possible.
- The lower jumper should jettison his combat equipment, if worn.
- Both jumpers should be prepared to execute a parachute landing fall.

Neither Jumper Has a Good Canopy

9-85. Follow these procedures when neither jumper has a good canopy:

- Jumpers should attempt to establish communication such as altitudes and positive commands.

Note: If both canopies are uncontrollable and/or collapsed, it may be difficult to establish which jumper is higher and which is lower and it may be alternating repeatedly.

- If a jumper is entangled in his suspension lines, he should attempt to free himself and cutaway first.
- The lower jumper should cutaway after the higher jumper.
- The higher jumper could be fatally engulfed in the lower jumper's suspension lines and canopy if the lower jumper were to cutaway first.
- If impact with the ground is imminent, both jumpers should deploy their reserves to increase the amount of fabric exposed and to create extra drag.
- If both reserve canopies deploy, both jumpers will perform cutaway procedures to clear from the entanglement to prevent a down plane.

Actions if Combat Equipment Will Not Lower

9-86. If combat equipment will not lower, jumpers maintain altitude awareness under canopy. If the jumper cannot lower his equipment to his feet by 500 feet AGL, he ensures he is facing into the wind and makes one attempt to free the equipment by kicking his legs. If still unable to free the equipment, the jumper will land with his equipment. The jumper flies his canopy and flares as normal (during daylight) or at 50-percent brakes (during night hours) into the wind. The jumper should be prepared to conduct a parachute landing fall.

Note: All manipulation of the PDB must stop at 200 feet AGL. The jumper must ensure he is at full flight and be prepared to land and conduct a parachute landing fall, if necessary. Any controllability issues or malfunctions take precedence over lowering procedures.

Collision or Entanglement With the Bundle

9-87. These procedures are intended to correspond with personnel entanglement emergency procedures so individual jumpers will not have to memorize a different set of emergency procedures if entanglement occurs with a JPADS or bundle:

- If the jumper's canopy is entangled with the JPADS and the JPADS has a good canopy, the jumper should cutaway no lower than 2,500 feet AGL.
- If the jumper has a good canopy but the JPADS canopy is entangled with the jumper, the jumper should clear the canopy entanglement from himself and his equipment.
- If the jumper and the JPADS are entangled and neither has a good canopy, the jumper should clear himself from the entanglement and cutaway regardless of position in the entanglement.
- If impact with the ground is imminent, the jumper should deploy the reserve in an attempt to slow his rate of descent.

HAZARDOUS LANDING PROCEDURES

9-88. There are many landing obstacles that are potentially hazardous to parachutists, such as trees, water obstacles, power lines, and high winds. The parachutist, under canopy and at altitude, should use this time to evaluate the landing area before making his final approach to the DZ. Prior to every MFF operation, parachutists should be briefed on the DZ hazards and alternate landing areas. The following paragraphs provide procedures for hazardous landings.

Tree Landings

9-89. Follow these procedures for tree/cactus landings:

- Look away; steer away to avoid obstacle(s).
- Do not lower combat equipment for extra protection.
- Jettison combat equipment if it has already been lowered.
- Keep your goggles and oxygen mask on for protection.
- Face into the wind to lower your ground speed.
- Attempt to land vertically with brakes.
- For shorter trees of 30 feet tall or less, attempt to land between them in an effort to make it to the ground.
- For trees that are taller than 30 feet, attempt to land directly in the center of one in order to be caught by it. This will provide large enough limbs to support the suspended jumper and make it safer and possible to climb down.
- Keep the toggles in hand and protect the face with the forearms.
- Keep the feet and knees together and prepare for several parachute landing falls as contact with limbs and eventually the ground is made.
- If suspended, wait for assistance.

Water Landings

9-90. Follow these procedures for water landings:

- Attempt to land as close to shore as possible.
- Jettison rucksack/PDB, helmet, and oxygen mask if worn.
- Disconnect the RSL and unfasten the chest strap and waistband if time permits.
- Turn the canopy into the wind, flare normal, and prepare for a parachute landing fall.
- Once in the water, release leg straps and slide free of the harness.

- If being dragged, pull the red cutaway pillow.
- If trapped under the canopy, push the canopy up and get some air, then follow a seam to the edge. If required—
  - Push suspension lines up over your head or down under your legs as needed.
  - Move slowly and do not thrash or panic as this will cause floating suspension lines to wrap around your arms and legs.

Note: If the jumper lands with the harness attached and is being pulled through the water, he cuts away the main canopy, releases the leg straps, and swims free of the harness.

WIRE LANDINGS

9-91. Power lines are nearly invisible from above. Never fly between two telephone poles, as there is usually a wire there you cannot see. Never fly over power lines at an altitude less than 1,000 feet AGL; fly the canopy to an alternate landing area to avoid power lines. Almost every building has a power line running to it. Try to determine where it is coming in from and avoid landing in that area. Power lines usually follow roads and are also located in swaths cut through forests. Follow these procedures for wire landings:

- Look away; steer away.
- If a wire landing is imminent and time permits, disconnect the RSL, turn off the oxygen, and jettison the PDB/rucksack.
- Land downwind or in a braked turn as a last resort to avoid contacting a wire.
- Attempt to parallel the wires in a braked position to attain a vertical descent.
- If contact with a wire is made, try to avoid contacting a second wire.
- Be prepared to execute a parachute landing fall if the wires are cleared and contact with the ground is made.
- If contact with the ground is made—
  - Cutaway the main canopy and move away.
  - If suspended, remain motionless until power is turned off.
  - Do not let anyone touch you and do not cutaway.

Note: If time permits and altitude permits, throw away the main ripcord, jettison the PDB/rucksack, turn off the oxygen, and disconnect the POM.

OBSTACLES IN THE LANDING AREA

9-92. Jumpers should attempt to steer clear of all other obstacles, including trees, cacti, buildings, and vehicles (on or off the DZ). If unable to avoid the obstacle, jumpers attempt to make contact with both feet and perform a parachute landing fall. If a jumper lands on the road or field landing strip, he should gather the canopy and evacuate the road or field landing strip immediately. Follow these procedures when obstacles are in the landing area:

- Look away; steer away.
- Go to full brakes and full flare if appropriate.
- If contact with the object is imminent, contact feet first and perform a parachute landing fall.
- When landing near a road, quickly gather your canopy and move away.

HIGH-WIND LANDINGS (11–18 KNOTS)

9-93. Jumpers should always attempt to land into the wind with the canopy level with the ground. When landing in high winds, the jumper should follow these procedures:

- Disconnect the RSL at 1,500 feet AGL.
- Flare slowly and gently. A complete flare may not be required to arrest the descent and prevent going backward.
- Upon touchdown, release one toggle pivot in the direction of the pulled toggle and pull the other toggle hand-over-hand until the canopy collapses.
- Once the canopy has collapsed, attempt to contain the tail of the canopy.

Note: If the jumper encounters extreme high winds under canopy before landing, the jumper should disconnect the RSL to keep the reserve from deploying when cutting away the main parachute if being dragged.

TURBULENT AIR

9-94. Jumpers should stay alert under canopy for signs of swirling or erratic wind conditions. The DZ safety officer may use red smoke or flares to warn of visible turbulence, such as dust devils. Jumpers should avoid turbulence at all costs by maneuvering away under canopy. If the jumper is unable to avoid the turbulence, he should maintain full flight and remove all slack from the brake lines to prepare for a possible canopy collapse. If the canopy begins to collapse, the jumper should quickly conduct a 12- to 24-inch strike on the toggles to prevent collapse. Depending on the altitude, the jumper should attempt this procedure again until the canopy reinflates or landing is imminent. As the jumper approaches the ground, he should be prepared to conduct a parachute landing fall.

9-95. If the jumper lands and is overtaken by a dust devil, he should—

- Try to gather up the canopy.
- Lay down on top of the canopy.
- If unable to control the canopy, disconnect the RSL and cutaway.

DANGER

Jumpers should use caution when disconnecting the RSL snap shackle below 1500 feet AGL. When disconnecting the RSL from the RSL shackle, serious injury or death may result if the yellow RSL connected to the snap shackle is pulled instead of the red static line release lanyard.

ACTIONS FOR OFF-DROP-ZONE LANDINGS

9-96. If jumpers are unable to make it to the DZ, they identify a landing area with enough altitude to permit a safe into-the-wind landing. They land on high ground and avoid landing uphill or downhill and in gullies and ravines. Jumpers land along the side of the slope, then they gather their equipment and move in the direction of the DZ or nearest road. If the road must be crossed, the jumper crosses on the high ground where traffic can be observed.

RECOVERY FROM A DRAG

9-97. Follow these procedures for recovery from a drag:

- Release one toggle completely.
- Pull the other toggle and steering line in hand-over-hand until the canopy collapses or canopy fabric is in hand.
- If you cannot get to your feet or you cannot collapse the canopy because of injury or other issue, disconnect the RSL (if not already disconnected), and pull the red cutaway pillow.

Chapter 10

MA-10 Altimeter

This chapter provides information on the use of the altimeter that meets the needs and requirements for MFF operations for HALO and HAHO operations.

OVERVIEW

10-1. The parachutist wears the MA-10 altimeter on his left wrist during MFF operations. The altimeter displays the altitude above the ground during free-fall. It permits the parachutist to determine when he has reached the proper altitude for deploying the main parachute.

10-2. The altimeter must be transported and stored with care. It must be chamber-tested for accuracy. The altimeter must be rechecked after an unusually hard landing or after accidentally dropping it. If the altimeter is not waterproof, it must be replaced if it has been submerged in water.

10-3. The jumpmaster/assistant jumpmaster should carry a spare altimeter in a PDB or uniform cargo pocket for MFF operations, and it must be easily accessible, if needed. The jumpmaster and/or assistant jumpmaster will not place the spare altimeter in any location that might interfere with him pulling the main ripcord or which will keep him from performing any emergency procedure. As stated in USASOC Regulation 350-2, the spare altimeter will not be worn on the right wrist of any jumper.

DESCRIPTION

10-4. The MA-10 altimeter (figure 10-1) is a solid-state electronic device with manufacturer-updatable embedded software and a stepper motor that moves the pointer on an analog display. The 12,000-foot linear scale can read up to 40,000 feet above MSL with the pointer rotating 12,000 feet per revolution (3 and 1/3 revolutions to 40,000 feet). The face is highlighted with a red warning arc that begins at 2,500 feet AGL.

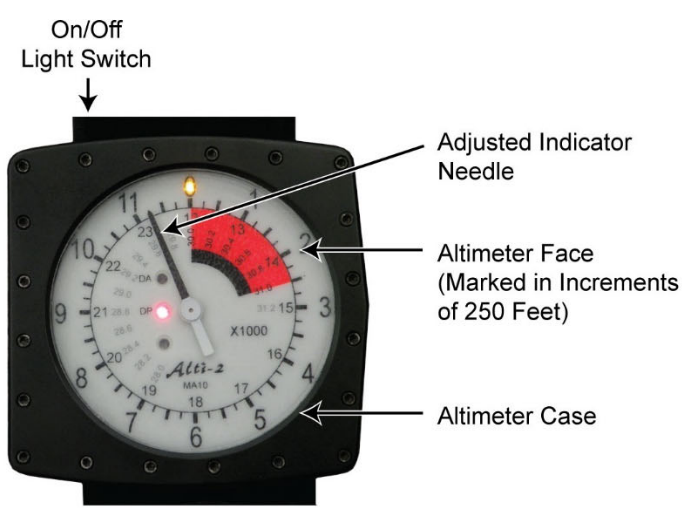


Figure 10-1. MA-10 altimeter

10-5. The MA-10 can be comfortably worn with a Velcro wrist-mounted band, and it is waterproof to a depth of 6 feet for 1 hour. The aluminum housing measures 3.27 x 3.20 x 1.37 inches and the face has a 2.50-inch dial. The electroluminescence face automatically turns on and provides backlighting during low light conditions. The manufacturer-replaceable lens is protected by a self-adhesive lens protector that can be replaced by a designated parachute rigger.

BUTTONS

10-6. The MA-10 altimeter has a total of five buttons (figure 10-2):

- **I/O.** The needle parks at approximately 10,000 feet when the unit is off. To turn the unit on, press and hold the Activate Button marked "SEL" and then press ON/OFF button marked "I/O" (figure 10-3, page 10-3).The needle will first show battery status:
  - 7 - 3 (White) = OK.
  - 2.5 - 3 (Yellow) = Be ready to change battery.
  - <2.5 (Red) = Change battery before next jump.

  The needle will move to the current altitude/pressure. The Power On light-emitting diode (LED) at the 12 o'clock position will be illuminated. The Power On LED intensity adjusts automatically based on ambient light levels. In very low light conditions, the LED is turned off to prevent loss of night vision and the electroluminescent backlight indicates that the unit is active.

Note: If the needle pauses at the 6 o'clock position, this indicates that the DZ altitude and pressure have been set.

- **PRG.** The PRG button programs the setup for the DZ.
- **DWN.** The DWN button is used to decrease the altimeter setting.
- **UP ZERO.** The UP ZERO button is used to zero the altimeter or to increase the altimeter setting.
- **SEL.** The single button marked SEL near the 6 o'clock position simply activates the other buttons. This eliminates the possibility of accidental button pushes.

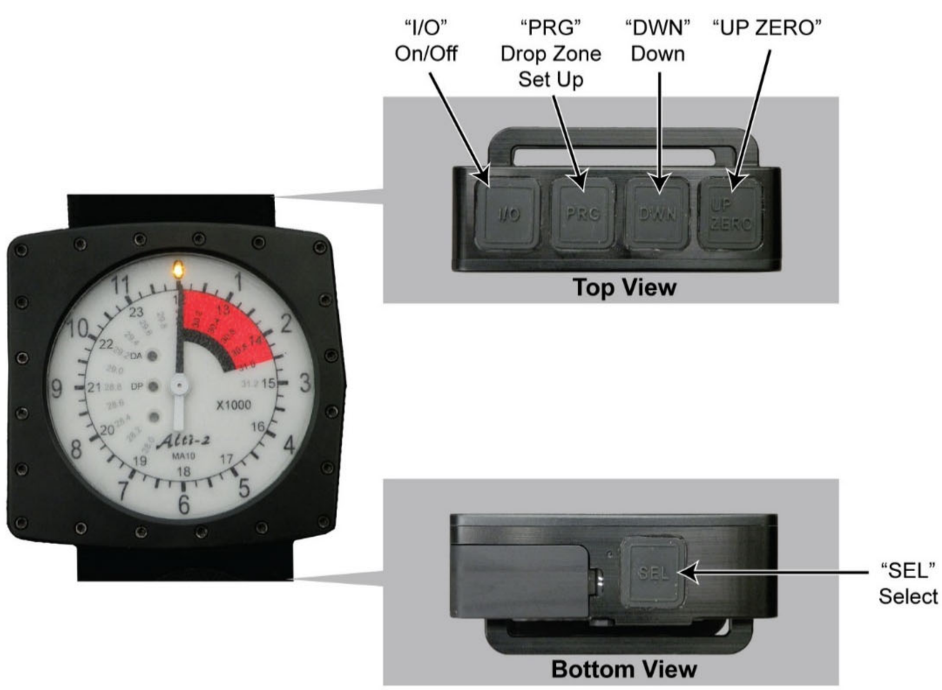


Figure 10-2. MA-10 altimeter buttons

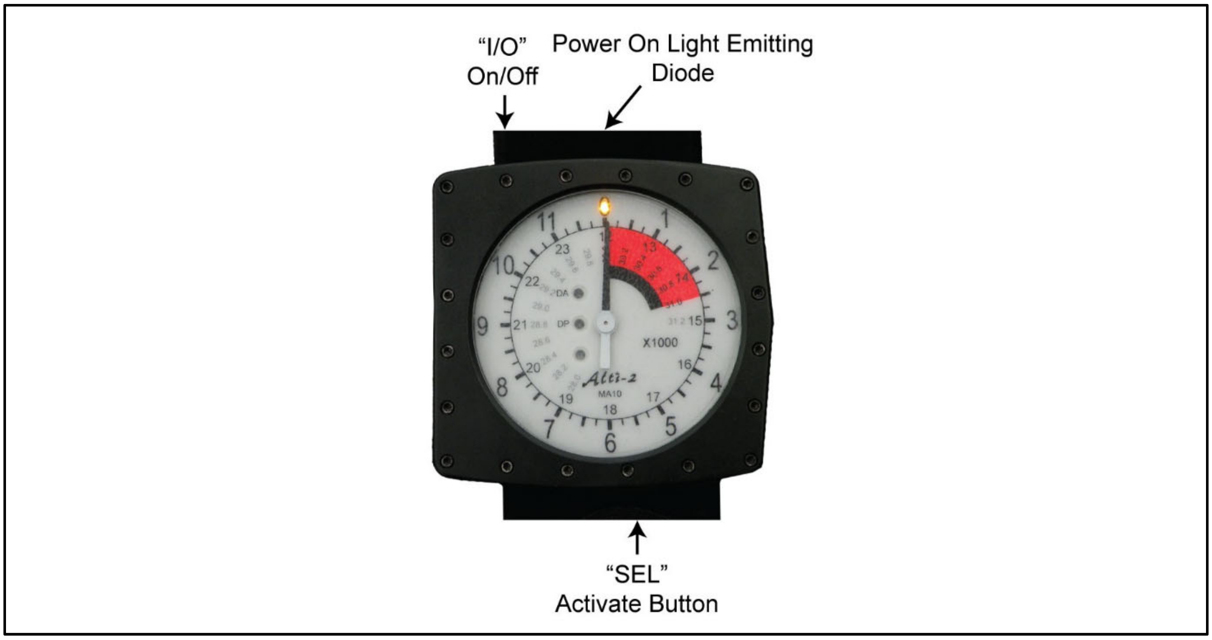


Figure 10-3. MA-10 On/Off buttons

POWER-SAVING MODE

10-7. The system will turn off the motor and backlight if the altitude is below 7,000 feet mean sea level and there is no significant change in altitude for a period of 30 minutes. The Power On LED at the 12 o'clock position will flash to indicate power saving mode (figure 10-4). If altitude activity is sensed, the unit will automatically sweep the pointer one revolution and revert to full function.

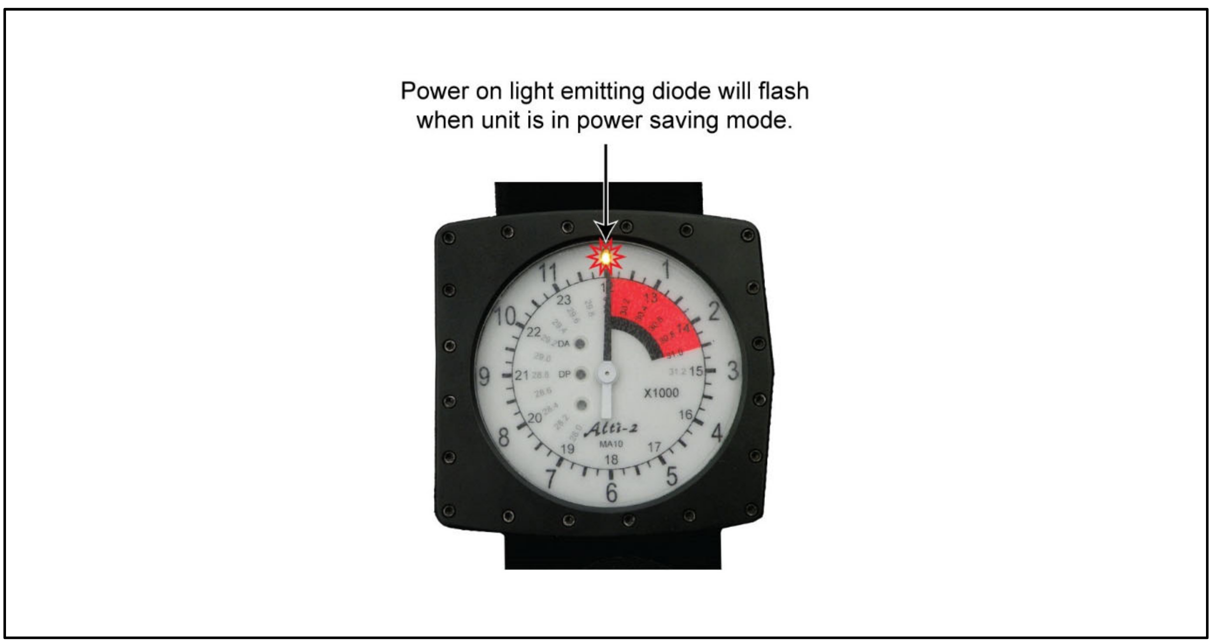


Figure 10-4. MA-10 power-saving mode

BATTERY COMPARTMENT

10-8. The MA-10 is powered by two 1.5-volt AA lithium batteries; standard 1.5-volt AA batteries may be used with reduced battery life. The battery compartment is not waterproof. Figure 10-5 shows the instructions for replacing the batteries.

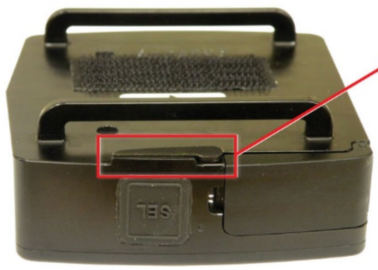
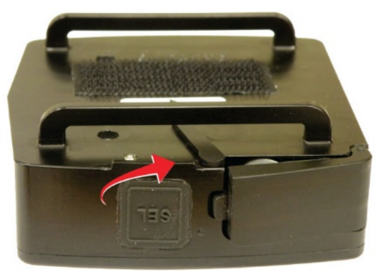
A 	**Step A.** Remove the wrist strap. Locate the battery door lever.
B 	**Step B.** Press firmly on the battery door to release pressure on the latch, and rotate latch 90 degrees past the lever lock to unlocked position. Replace batteries with two type AA lithium batteries. ***Note:*** Alkaline batteries may be used; however, battery life will be shorter and the unit may not function if exposed to temperatures below -20 degrees Celsius.
C 	**Step C.** Press firmly on the battery door and rotate the latch 90 degrees past the lever lock into locked position. Replace the wrist strap. ***Note:*** Battery door must be taped to ensure door does not open inadvertently.

Figure 10-5. Replacing batteries in the MA-10 altimeter

MA-10 ALTIMETER SETTING METHODS

10-9. When powered on, the MA-10 conducts a power-on self-test, checking the pressure sensor, blockage of the filter, stepper motor, battery voltage, and other critical functions. Using the external buttons, the MA-10 can be set in three ways:

- Zeroing to the current location.
- Manually entering the DZ offset.
- Calculating the DZ offset and entering the DZ altitude and a form of barometric pressure called "altimeter setting" for the DZ.

CURRENT LOCATION METHOD

10-10. For training jumps, when the departure airfield and the target DZ are the same location, zero the altimeter when standing on the DZ. To zero the altimeter, momentarily press the "UP ZERO" button and the "SEL" activate button (figure 10-6). Do NOT hold the "UP ZERO" button; this will cause the set altitude to increase or clear any preset DZ altitude and pressure settings.

Note: The manual zero altitude will be retained when the unit is turned off. The MA-10 acts like a mechanical altimeter; it will react to barometric changes and will need to be rezeroed when powered back on.

Figure 10-6. Zeroing the MA-10 altimeter

DROP ZONE OFFSET METHOD

10-11. When the departure airfield and the target DZ are at different altitudes, the DZ offset may be set manually. To manually offset the altitude reading, press and hold the "SEL" Activate Button and then use the "UP ZERO" or "DWN" buttons to set the desired altitude (figure 10-7, page 10-6). This action will clear any preset DZ altitude and pressure settings. The rate of pointer movement will speed up (this helps with larger offsets). If you release the "UP ZERO" or "DWN" button and continue to hold the bottom button, the rate will start slowly again when you press up or down.

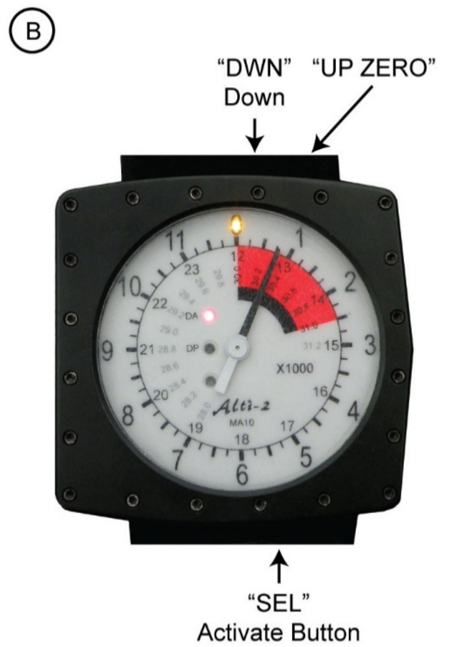
Figure 10-7. MA-10 manual offset

ALTIMETER SETTING METHOD

10-12. When the departure airfield and target DZ are at different altitudes, the DZ offset may be entered using the DZ altitude and form of barometric pressure called "altimeter setting." Steps A through E in figure 10-8, below, and figures 10-9 through 10-12, pages 10-7 and 10-8, depict the instructions for setting the DZ altitude.

Step A.
Press the two buttons shown ("PRG" and "SEL"). The drop zone altitude set light (DA) will be illuminated.

Figure 10-8. Setting the drop zone on the MA-10 (Step A)



Step B.
Use the "UP ZERO" or "DWN" buttons to set the altitude (feet mean sea level) of the target drop zone.

Note: This action will clear any preset manual drop zone offset.

Figure 10-9. Setting the drop zone on the MA-10 (Step B)

Step C.
Press the two buttons shown, ("PRG" and "SEL"). The drop zone barometric pressure set light (DP) will be illuminated.

Figure 10-10. Setting the drop zone on the MA-10 (Step C)

D

Step D.
Use the "UP ZERO" or "DWN" buttons to set the barometric pressure (in inches of mercury) of the target drop zone.

Barometric pressure is marked in gray numerals inside the scale.

> **WARNING**
>
> **When obtaining the barometric pressure always request the "altimeter setting" for the drop zone. Do not use the actual barometric pressure (station pressure) or sea level corrected pressure from the drop zone.**
>
> **The current "altimeter setting" for the drop zone in inches of mercury within 100 miles of the intended drop zone must be determined by using the most accurate methods available.**
>
> **If there are no available means to calculate the current "altimeter setting," the combat setting of 29.92 inches of mercury will be used.**

Figure 10-11. Setting the drop zone on the MA-10 (Step D)

E

Step E.
Press the two buttons shown ("PRG" and "SEL").

This completes the drop zone setup and the altimeter is in RUN mode. The altimeter displays the drop zone offset between your current altitude and the target drop zone.

Note: Since your altitude is below 8,000 feet above ground level from the drop zone, the scale is LINEAR; ignore the compressed scale.

Note: The drop zone altitude and pressure settings will be retained when the unit is turned off.

Figure 10-12. Setting the drop zone on the MA-10 (Step E)

JUMPMASTER'S ALTIMETER CALCULATIONS

10-13. The jumpmaster should obtain data from a current DZ survey, map sheet, or airfield tower. The jumpmaster will verify that elevations are in feet. If elevations are in meters, the jumpmaster will convert to feet (1 meter = 3.28 feet). The jumpmaster's calculations are the differences between the departure airfield and the DZ. All of the jumpmaster's calculations will be referenced from departure airfield and not the DZ. The jumpmaster's calculations are not rounded and settings are placed as closely as possible (within 100 feet).

CAUTION

Special consideration will be given to any obstacles (for example, ridgelines, mountains, towers, and other such items and their elevations) that may be located within 3 nautical miles or 5.5 kilometers of the parachutist's release point or desired impact point.

DEPARTURE AIRFIELD LOWER THAN DROP ZONE

10-14. Figure 10-13, page 10-10, provides an example computation for the altimeter setting when the departure airfield elevation is lower than the DZ elevation. The following steps are performed by the jumpmaster:

- **Step 1.** Determine the departure airfield elevation (above MSL). In this example, departure airfield elevation is 1,500 feet above MSL.
- **Step 2.** Determine the DZ field elevation (above MSL). In this example, the DZ elevation is 3,000 feet above MSL.
- **Step 3.** Find the difference between the departure airfield and the DZ elevation. If—
  - Both are positive, subtract (Key Word: VALUES THE SAME, SUBTRACT).
  - Both are negative, subtract (Key Word: VALUES THE SAME, SUBTRACT).
  - One is positive and one is negative, add (Key Word: VALUES DIFFERENT, ADD).

DEPARTURE AIRFIELD HIGHER THAN DROP ZONE

10-15. Figure 10-14, page 10-10, provides an example computation for the altimeter setting when the departure airfield elevation is higher than the DZ elevation. The following steps are performed by the jumpmaster:

- **Step 1.** Determine the departure airfield elevation (in feet above MSL) (in this example, the departure airfield elevation is 1,300 feet above MSL).
- **Step 2.** Determine the DZ elevation (in feet above MSL). In this example, the DZ elevation is 200 feet below MSL (-200 feet).
- **Step 3.** Find the difference between the departure airfield and the DZ elevation. If—
  - Both are positive, subtract. (Key Word: VALUES THE SAME, SUBTRACT).
  - Both are negative, subtract (KEY WORD: VALUES THE SAME, SUBTRACT).
  - Only one is positive, add (KEY WORD: VALUES DIFFERENT, ADD).

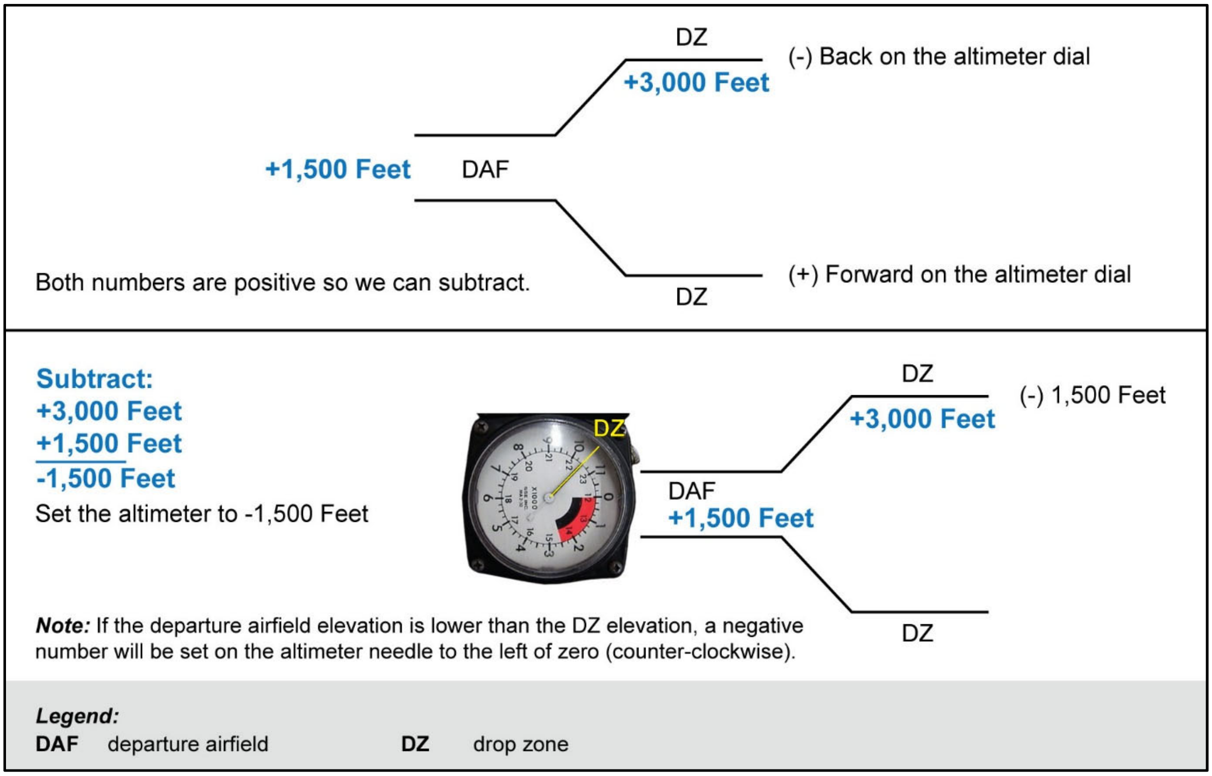


Figure 10-13. Departure airfield lower than drop zone

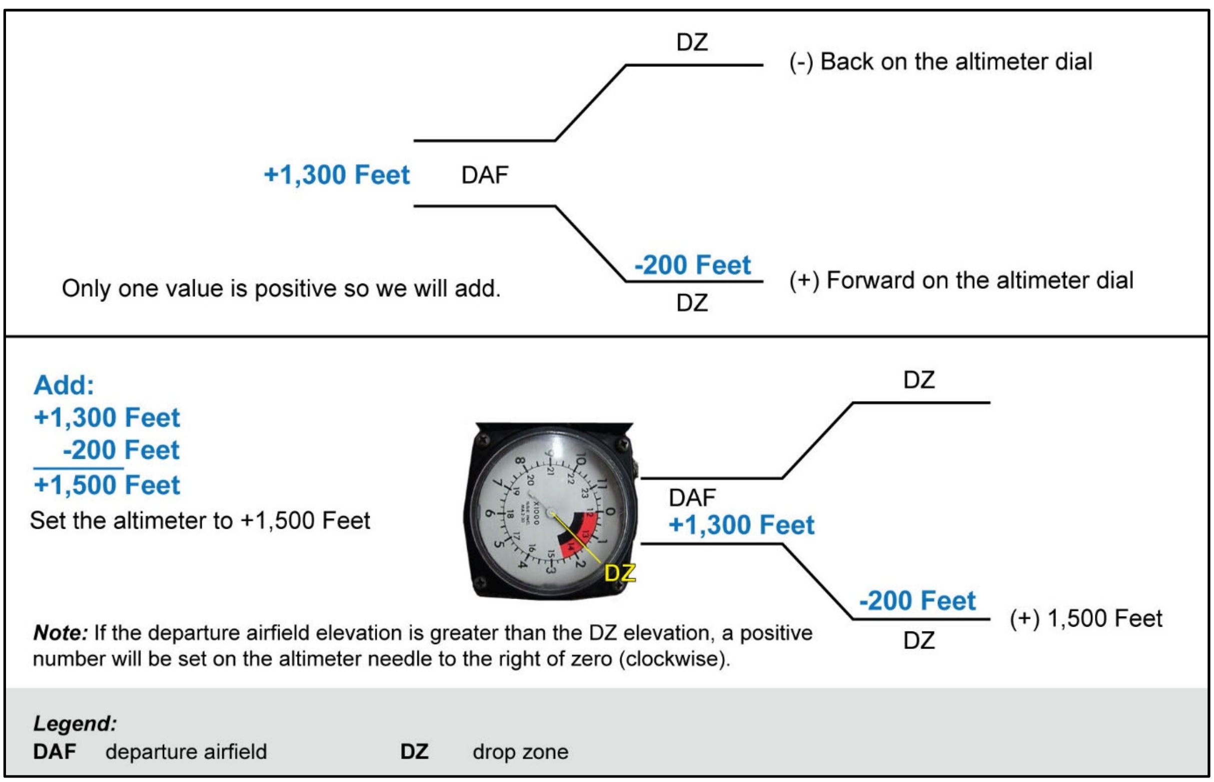


Figure 10-14. Departure airfield higher than drop zone

Chapter 11

Cybernetic Parachute Release System

This chapter provides information on an electronic device that meets the needs and requirements for MFF operations for HALO and HAHO operations.

OVERVIEW

11-1. The CYPRES senses the rate of fall and altitude by using the pressure relation of the set default altitude above a DZ (for training mode) or a programmed virtual DZ (VDZ) (for operational mode) by means of setting a calculated pressure setting in millibars into the CYPRES unit. When the CYPRES falls through the altitude window set above the DZ—either actual or virtual—at a rate of fall at or beyond the default speed of the CYPRES, the CYPRES will activate. The explosive-powered cutter assembly activates electronically and severs the reserve parachute's special-made closing loop to allow positive opening of the reserve pack assembly. If the rate of fall is slower than the set default speed, the CYPRES will not activate.

WARNING

Jumpers assigned to or jumping with USASOC will not use any CYPRES in the default (training) mode. For more information, refer to USASOC Regulation 350-2.

11-2. The CYPRES is water-resistant for 15 minutes at a depth of 15 feet, and it is encased in a robust case with rounded corners and edges. The Military CYPRES control unit is located on top of the container above the reserve, and it has a clear plastic-covered window so the jumper can set the unit or check its status.

Note: If using a CYPRES 1500/35 A model for a two-pin reserve, the extra release unit explosive-powered cutter assembly cable must be S-folded inside the CYPRES pocket when attached to the RA-1.

GENERAL INFORMATION ON MILITARY CYPRES 2 MODELS

11-3. Three Military CYPRES 2 models and one Expert CYPRES 2 model are currently being used by the U.S. Army as safety devices. They are designed to activate and enable the reserve parachute to deploy in the absence of the parachutist deploying his main parachute or having a malfunction of his main parachute. The Military CYPRES 2 is designed specifically for tactical application use.

11-4. The three Military CYPRES 2 models are: 1000/35 A, 1500/35 A, and the 2500/29 A. All models have two modes of operation—training mode and operational mode. Default (training) mode WILL NOT be used for nontactical or tactical MFF jumps. Absolute (operational) mode can be used for both tactical and nontactical MFF jumps in any scenario.

11-5. The Expert CYPRES 2 is designed for use in authorized nonstandard parachutes, and it has two modes of operation—training mode and offset mode. Offset mode MUST be used with a setting of an offset of 300 arrow up or reserve activation of 1,050 feet above the intended DZ. Offset mode can be used when the departure airfield and DZ are at different altitudes or when the departure airfield and DZ are at the same altitude.

WARNING

As stated in USASOC Regulation 350-2, all Army MFF units will only use the Military CYPRES 2 in the absolute (operational) mode. Services supplementing their SOPs with this ATP will follow their Service regulation on using the CYPRES 2 in absolute (operational) mode or default (training) mode.

WARNING

It is essential that all personnel read this entire chapter and are trained in using and setting the Military CYPRES 2. The jumpmaster and jumper must be familiar with all CYPRES model functions, procedures, and limitations.

MILITARY CYPRES 2 PRINCIPLES OF OPERATION

11-6. When the parachutist arms the Military CYPRES 2, the reserve parachute deploys automatically if the parachutist reaches the preset altitude at the preset vertical velocity and meets other critical conditions. The Military CYPRES 2 deploys the reserve parachute by firing the release element and severing the reserve closing loop material. The reserve pilot chute is then free to launch and deploy the reserve parachute. If the parachutist reaches the preset altitude and does not meet the conditions to fire the release element (such as when the main parachute is fully deployed), the Military CYPRES 2 will not send the signal to fire the release element. In case the jump conditions change, the Military CYPRES 2 silently continues to monitor the parachutist's condition during canopy flight until the parachutist reaches 130 feet above the VDZ.

GENERAL OPERATION

11-7. The three Military CYPRES 2 models and the Expert CYPRES 2 model will only activate and fire the release element within the activation window. The Military CYPRES 2 will only fire the release element for parachute malfunctions that fall through the activation window and meet the vertical activation speed. All parachute malfunctions that fall faster than the vertical activation speed (such as pack closure, hard pull, bag lock, and horseshoe malfunctions with the canopy in the bag) and are within the activation window will meet the conditions to fire the release element. For all other parachute malfunctions that cause the parachutist to fall slower than the vertical activation speed (such as single-riser separation, line over, pilot chute over the nose, line twists, closed end cells, broken control lines, and tension knots), the parachutist must activate the reserve manually. It must be understood that the Military CYPRES 2 will leave the activation window at 130 feet above the VDZ and will no longer operate.

ACTIVATION WINDOW—ABSOLUTE (OPERATIONAL) MODE

11-8. Once properly powered ON, the Military CYPRES 2 in absolute (operational) mode arms itself immediately. The activation window will extend from the default activation setting above the VDZ (set by the jumpmaster) down to approximately 130 feet above the VDZ. For example, once powered ON with a 5,000-foot VDZ setting, the Military CYPRES 2 1500/35 A is armed immediately, regardless of the location where it was powered ON. The parachutist exiting the aircraft will need to fall approximately 1,000 feet to reach the vertical activation speed of 35 meters per second (78 miles per hour or 115 feet per second). If the parachutist enters the activation window (1,500 feet above the VDZ to 130 feet above the VDZ) and is falling faster than the vertical activation speed of 35 meters per second, the Military CYPRES 2 will fire the release element.

MILITARY CYPRES 2 MODELS

11-9. The three Military CYPRES 2 models—1000/35 A, 1500/35 A, and 2500/29 A—are the models in present use for all USASOC tactical parachute systems. All models have the same appearance, function, and theory of operation. The Military CYPRES 2 uses millibars absolute as the unit of measurement. The differences among the three models are their preset information, including the default activation altitude above the VDZ, the vertical activation speed, and the release unit configuration.

11-10. Different settings are required to tailor the Military CYPRES 2 to specific parachute equipment and mission applications. For quick identification and to help ensure proper settings, the three Military CYPRES 2 models have their presets displayed on the green ON/OFF button located on the control unit. The presets identify the model of a Military CYPRES that goes with a specific parachute system as described below:

- The Military CYPRES 2 model **1000/35 A** is used on the Military Tandem Tethered Bundle systems reserve parachute and authorized nonstandard parachute systems.
- The Military CYPRES 2 model **1500/35 A** is used with the RA-1, MC-4, MJN-1, MJA-2, MT-2XX/SL, SOV2-HH, and the Multimission Parachute System.
- The Military CYPRES 2 model **2500/29 A** is used on the Sigma Vector–Military Tandem Vector-3 System and the Tandem Offset Resupply Delivery System.

11-11. The preset information for each model can be found printed on the back of the control unit and on the front cover of the processing unit. Figure 11-1 shows the Military CYPRES 2 1500/35 A.

DANGER

The jumpmaster must accurately identify the CYPRES model being used and understand the correct pressure-setting method. Failure to identify the correct model for the parachute system and to properly set the CYPRES may result in the CYPRES not firing at the intended altitude, resulting in injury or death to the parachutist.

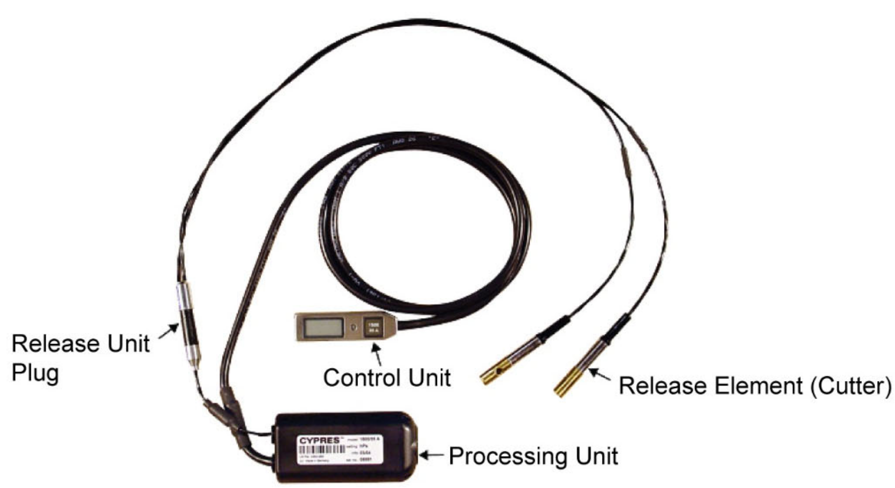


Figure 11-1. Military CYPRES 2 1500/35 A

EXPERT CYPRES 2 MODEL

11-12. The Expert CYPRES 2 has the same look, function, maintenance, and theory of operation as the Military CYPRES 2 in training mode, but it is limited in use because it does not have an operational mode setting. Whereas the Military CYPRES 2 uses millibars absolute as the unit for the setting, the Expert CYPRES 2 uses feet relative to the departure airfield. The Expert CYPRES 2 has its own preset activation altitude above the VDZ, activation speed, and release unit configuration. The Expert CYPRES 2 model is identified by the red ON/OFF button located on the control unit. The preset information is not printed anywhere on the outside of the Expert CYPRES 2. Figure 11-2 shows the Expert CYPRES 2.

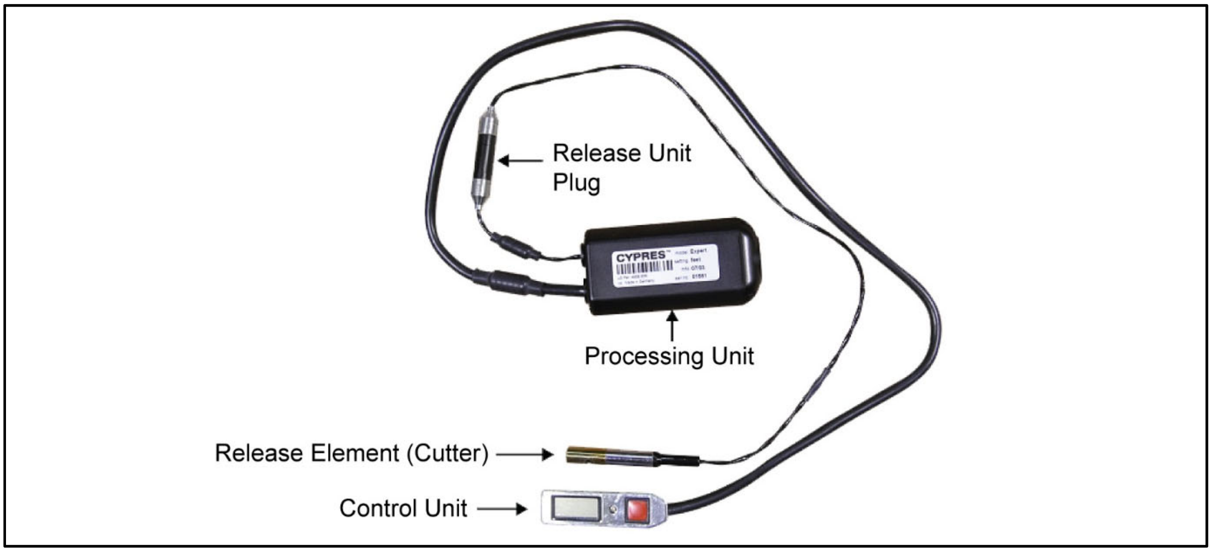


Figure 11-2. Expert CYPRES 2

11-13. The Expert CYPRES 2 model is used with authorized nonstandard parachute systems. The Expert CYPRES 2 model is set in feet and the display is graduated in feet. This setting is different from the three Military CYPRES 2 models which are set and displayed in millibars.

CYPRES MODEL IDENTIFICATION

11-14. The specific models of the CYPRES 2 are only authorized for use on the specified parachute systems listed in table 11-1, page 11-5.

DANGER

Failure to identify the correct Military CYPRES 2 model and setting method may result in configuring an improper setting, thus preventing the Military CYPRES 2 from firing when needed. This may result in injury or death to the parachutist.

Failure to only use the Expert CYPRES 2 in authorized nonstandard parachute systems may result in the Expert CYPRES 2 not firing at the intended altitude. This may result in injury or death to the parachutist.

Table 11-1. CYPRES 2 model identification

Button Identification	Default Activation Altitude (Feet)	Vertical Activation Speed			Pressure Setting Display Value	Authorized Parachute System
		Meters per Second	Miles per Hour	Feet per Second		
Military CYPRES 2 Green Button 1000/35 A	1,000	35	78	115	Millibars Absolute	Military Tandem Tethered Bundle and Authorized Nonstandard Parachute Systems
Military CYPRES 2 Green Button 1500/35 A	1,500	35	78	115	Millibars Absolute	RA-1, MC-4, MJN-1, MJA-2, SOV2-HH, MT-2XX/SL, and the Multimission Parachute System
Military CYPRES 2 Green Button 2500/29 A	2,500	29	65	95	Millibars Absolute	MTV-3 and Tandem Offset Resupply Delivery System
Expert CYPRES 2 Red Button (No Letters)	1050	35	78	115	+/- Feet Relative	Authorized Nonstandard Parachute Systems (Javelin)

Legend:
CYPRES Cybernetic Parachute Release System

11-15. The three Military CYPRES 2 models and the Expert CYPRES 2 model can be identified by the ON/OFF button on the control unit as described in the following paragraphs.

MILITARY CYPRES 2 MODEL 1000/35 A

11-16. On the Military CYPRES 2 Model 1000/35 A (figure 11-3), the control unit button is green and the markings indicate that the Military CYPRES 2 is set to activate approximately **1,000 feet** above the VDZ if the vertical speed is faster than approximately 35 meters per second (78 miles per hour or 115 feet per second). The A indicates that the pressure setting is in millibars absolute; the information in the control unit window display also reads in millibars. When the Military CYPRES 2 Model 1000/35 A is removed from the parachute system, the setting information can be read on the back of the control unit and on the front cover of the processing unit.

Figure 11-3. Military CYPRES 2 Model 1000/35 A control unit

MILITARY CYPRES 2 MODEL 1500/35 A

11-17. On the Military CYPRES 2 Model 1500/35 A (figure 11-4), the control unit button is green and the markings indicate that the Military CYPRES 2 is set to activate approximately **1,500 feet** above the VDZ if the vertical speed is faster than approximately 35 meters per second (78 miles per hour or 115 feet per second). The A indicates that the pressure setting is in millibars absolute; the control unit window display also reads in millibars. When the Military CYPRES 2 Model 1500/35 A is removed from the parachute system, the setting information can be read on the back of the control unit and on the front cover of the processing unit.

Figure 11-4. Military CYPRES 2 Model 1500/35 A control unit

MILITARY CYPRES 2 MODEL 2500/29 A

11-18. On the Military CYPRES 2 Model 2500/29 A (figure 11-5), the control unit button is green and the markings indicate that the Military CYPRES 2 is set to activate approximately **2,500 feet** above the VDZ if the vertical speed is faster than approximately 29 meters per second (65 miles per hour or 95 feet per second). The A indicates the pressure setting is in millibars absolute; the control unit window display also reads in millibars. When the Military CYPRES 2 Model 2500/29 A is removed from the parachute system, the setting information can be read on the back of the control unit and on the front cover of the processing unit.

Figure 11-5. Military CYPRES 2 Model 2500/29 A control unit

EXPERT CYPRES 2 MODEL

11-19. On the Expert CYPRES 2 Model (figure 11-6, page 11-7), the control unit button is red with no markings. If the vertical speed is faster than 35 meters per second (78 miles per hour or 115 feet per second), the Expert CYPRES 2 model is set to activate at approximately 750 feet above the DZ. The setting is graduated in feet and the control unit display is graduated in 30-foot increments. All USASOC MFF units will set the Expert CYPRES 2 to 300 feet arrow up to allow an offset to be 1,050 feet above the intended DZ.

Figure 11-6. Expert CYPRES 2 control unit

COMPONENTS

11-20. The Military CYPRES 2 has only three components:

- Control unit.
- Processing unit with internal battery.
- Release unit with one or two release elements.

CONTROL UNIT

11-21. The control unit houses a liquid crystal display and a green ON/OFF button. It is attached to the processing unit by an electrical cable. The control unit provides the interface between the user and the processing unit. This allows the user to control functions such as powering ON and OFF and setting the Military CYPRES 2 with the proper millibar setting for the absolute (operational) mode. During the power ON sequence, the liquid crystal display shows the power ON self-test information, the error codes, and the pressure setting. The user can see the Military CYPRES 2 is ON or OFF by observing the zero down arrow (0▼) setting for use in the default (training) mode, or by the proper millibar setting for use in the absolute (operational) mode. Once the power ON sequence and pressure setting is complete, the control unit is disengaged from the processing unit and its only function is to power OFF the Military CYPRES 2. The pressure setting will remain displayed on the liquid crystal display. The control unit does not conduct any of the pressure readings or calculations performed by the Military CYPRES 2.

11-22. The numerical information written on the control unit's single operating button lets the jumpmaster know which CYPRES 2 model is installed in the parachute system. Table 11-1, page 11-5, explains the numerical information. Figure 11-7, shows the control unit for the Military CYPRES 2. The Military CYPRES 2 has a default setting of 1,500 feet, a fall-rate setting of 35 meters per second (115 feet per second or 78 miles per hour), and a pressure setting of absolute. When the Military CYPRES 2 is removed from the parachute system, the setting information can be read on the back of the control unit (figure 11-8, page 11-8) and on the front cover of the processing unit (figure 11-9, page 11-8).

Figure 11-7. Military CYPRES 2 control unit

Figure 11-8. Back of Military CYPRES 2 control unit

Figure 11-9. Military CYPRES 2 processing unit

PROCESSING UNIT

11-23. The processing unit houses the microprocessor and the battery (figure 11-9, above). The microprocessor conducts a self-test every time it is powered ON. The processing unit will stay ON and remain active for 14 hours from power ON, and then it will automatically power itself OFF. The microprocessor software and sensors monitor the parachutist's altitude, vertical velocity, and other critical data points during free-fall. It handles all critical calculations and functions to determine when a parachutist is in trouble so that the release elements can be fired. If the parachutist reaches the preset altitude at the preset vertical velocity and meets other critical conditions, the processing unit fires. This sends an electrical charge to the release unit, fires the release elements, and severs the reserve closing loop material.

Note: The processing unit is protected from electromagnetic interference and static electricity, making it highly unlikely that radios and static electric shock might cause accidental discharge of the release elements.

RELEASE UNIT

11-24. Release units are available for one-pin or two-pin reserve parachutes. The release unit contains a propellant-actuated cutter called the release element (figure 11-10, page 11-9). The number of release elements used depends on the parachute configuration. The RA-1 uses a single release element. The release unit is attached to the processing unit by the release unit plug. A used release element can be replaced during the reserve repack by unplugging the old release unit from the processing unit and plugging in the new release unit. In the event the parachutist meets all conditions to fire the release element, the processing unit sends an electrical input to the release element. A propellant inside the release element is electrically activated and, in turn, moves the release element cutter approximately 5 millimeters to sever the reserve parachute closing loop(s) in order to open the reserve container. A CYPRES closing loop must be used to ensure proper operation. Once the release elements have fired, they must be replaced by the parachute rigger prior to repacking the reserve parachute. Fired release elements that have been fired are self-contained and remain pressurized—no attempt should be made to cut them open.

Note: The release element (cutter) is transportable on all military aircraft and does not require any special load planning or transportation considerations.

Figure 11-10. Military CYPRES 2 release unit

MAINTENANCE

11-25. Inspection, installation, maintenance, and storage of the Military CYPRES 2 shall be performed by an RA-1 pack-qualified parachute rigger.

BATTERY

11-26. The Military CYPRES 2 battery is replaced at 4 and 8 years from date of manufacture (plus or minus 6 months) during the periodic technical service performed by the manufacturer (SSK Industries). The Military CYPRES 2 has a lifetime of 12.5 years from date of manufacture.

WATER LANDINGS

11-27. The Military CYPRES 2 is water resistant for 15 minutes at 5 meters. If a Military CYPRES 2 gets wet from a water landing, the parachute rigger at the unit level is responsible for changing the filter.

SCHEDULED MAINTENANCE

11-28. The Military CYPRES 2 will be sent to the manufacturer for a periodic technical service at 4- and 8-year intervals (plus or minus 6 months each) from the date of manufacture. The Military CYPRES 2 alerts the user when the scheduled maintenance is approaching. The serial number (figure 11-11) and the maintenance due date (figure 11-12, page 11-10) are both easily retrievable.

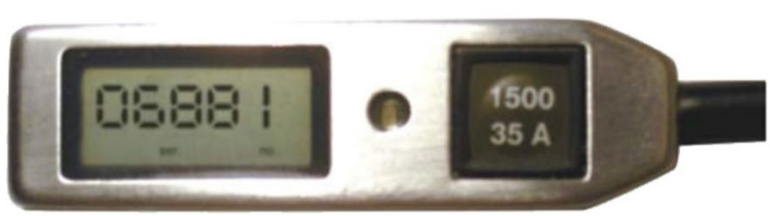


Figure 11-11. Example of Military CYPRES 2 serial number

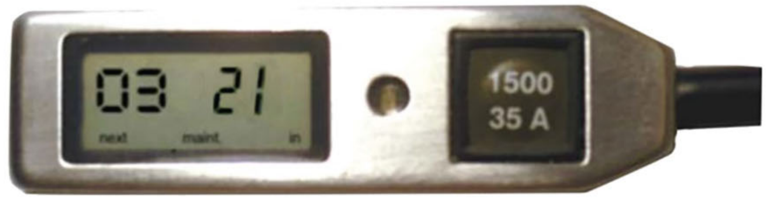


Figure 11-12. Example of next required maintenance date for Military CYPRES 2

11-29. To access the serial number or the next maintenance due date without removing the unit from the parachute, the following steps are performed:

- Set the Military CYPRES 2 for use in the absolute (operational) mode.
- Enter a value outside of its operational range by selecting 0 for the first value and the numeral 1 (or 0) for the next three values.

11-30. The screen will momentarily go blank and then the serial number will appear in the display screen for approximately 5 seconds. The screen will go blank again and the next required maintenance date will appear on the screen.

Note: The maintenance date for the Military CYPRES 2 will be indicated with the month first, followed by the year. In figure 11-12, above, 03 is the month and 21 is the year.

GENERAL TERMS

11-31. The jumpmaster and parachutist should be familiar with the following terms as to how the Military CYPRES 2 performs its setting calculations:

- **Virtual Drop Zone.** The VDZ is defined as the virtual zero reference point established by the jumpmaster from which the Military CYPRES 2 makes its calculations. This reference point becomes the zero starting point, or the VDZ, for all Military CYPRES 2 calculations. There are two reasons for use of a VDZ in lieu of the actual DZ:
  - When a highest release point obstacle exists. This VDZ (highest elevation) must be used to provide the jumper with a safe distance above the obstacle for reserve deployment via the Military CYPRES 2.
  - To adjust the reserve parachute to a higher actuation altitude for a tactical HAHO option. This is SOP-based only.
- **Highest Release Point Obstacle.** For the Military CYPRES 2 setting calculations, a terrain feature near the release point is considered an obstacle if it is over 200 feet higher than the DZ (for HALO and HAHO jump operations). The obstacle is taken into consideration if it falls within the parameters below, and the highest release point obstacle will become the VDZ on which all setting calculations are based:
  - 500-meter radius of the release point for operations up to 13,000 feet AGL.
  - 1,000-meter radius of the release point for operations above 13,000 feet AGL.

Note: Both highest release point obstacle radiuses are minimum distances and can be increased by the jumpmaster as needed.

- **Altimeter Setting.** This setting is in inches of mercury (depicted as QNH). The barometric pressure is corrected to feet MSL by taking the current station pressure and temperature and adjusting it to feet MSL from the difference in elevation from where the reading was taken. The pressure value of an aircraft altimeter scale is set so that it will indicate the altitude above MSL of an aircraft on the ground at the location for which the value was determined.
- **Unknown (Combat) Setting (29.92).** If the aircraft altimeter setting (inches of mercury) is unknown, a value of 29.92 (inches of mercury) is used to calculate the millibar setting of the Military CYPRES 2. The value of 29.92 (inches of mercury) is the average pressure at 0 feet MSL and 59 degrees Fahrenheit, which is the around-the-world average.

MODES OF OPERATION

11-32. The three Military CYPRES 2 models consist of two modes: default (training) mode and absolute (operational) mode. U.S. Army units WILL ONLY USE the absolute (operational) mode. The Expert CYPRES 2 consists of one mode: default (training) mode, but it can be set with an offset that will allow for a ±3,000-foot difference between the departure airfield and the DZ.

11-33. The primary jumpmaster for each jump is responsible for determining the proper mode and setting. The jumpmaster must properly identify the Military CYPRES 2 model to be used and fully understand its mode of operation to make the proper mode selection. The following paragraphs describe the Military CYPRES 2 modes of operation.

ABSOLUTE (OPERATIONAL) MODE (MILITARY CYPRES 2)

11-34. In absolute (operational) mode, the DZ or VDZ is calculated by the jumpmaster depending on operational requirements. By entering the desired millibar setting into the Military CYPRES 2, the jumpmaster tells the Military CYPRES 2 the absolute pressure of the location of the DZ or VDZ. The elevation corresponding to the pressure entered into the CYPRES calculator is now the zero reference point for the Military CYPRES 2. All calculations for the activation window and the activation altitude made by the Military CYPRES 2 are based off of this point. A VDZ may be programmed to any altitude within the device’s operational range of -1,600 feet to +36,000 feet MSL, which equates to 1,075 to 200 millibars.

11-35. Once set, the DZ or VDZ is locked into the millibar setting that corresponds to that altitude to start the Military CYPRES 2 calculations. The Military CYPRES 2 in absolute (operational) mode does not make adjustments for barometric pressure changes in weather. For example, if all conditions are met, the Military CYPRES 2 Model 1500/35 A in absolute (operational) mode with a VDZ set at 5,000 feet above MSL (a mountain is at the release point) will fire at 6,500 feet above MSL (VDZ MSL plus default activation equals Military CYPRES activation MSL). If all conditions are not met to fire the release element, the Military CYPRES 2 remains active until the parachutist reaches 130 feet above the VDZ (5,130 feet above MSL), at which time it will deactivate automatically for the remainder of the canopy flight.

OFFSET MODE (EXPERT CYPRES 2)

11-36. The Expert CYPRES 2 does not have an absolute (operational) mode. However, the Expert CYPRES 2 can be set with an offset that will allow for a ±3,000-foot difference between the departure airfield and the DZ. This setting is derived by the jumpmaster using the same method employed to set the jumper’s altimeter (altitude difference between the departure airfield MSL and DZ MSL equals offset). Rounded to the nearest 30-foot increment, the offset is entered into the Expert CYPRES 2. Once powered ON in offset mode, the VDZ (zero reference point) automatically becomes the departure airfield plus the amount of offset. For example, if all conditions are met, the Expert CYPRES 2 that is powered ON at the departure airfield with a default activation altitude of 750 feet and a +300-foot offset will fire the release element at 1,050 feet above the departure airfield elevation. If all conditions are not met to fire the release element, the Expert CYPRES 2 will remain active until it reaches 130 feet above the VDZ elevation, at which time it will deactivate automatically. Once set in the offset mode, the Expert CYPRES 2 must be powered OFF and powered back ON just prior to every lift at the departure airfield; this is a required safety measure for military use.

OPERATIONAL MODE

11-37. The absolute (operational) mode may be used under all conditions for MFF HALO and HAHO jumps as long as the required absolute (operational) mode-setting parameters are followed. The absolute (operational) mode may be used for short or long flights. If the parameters change, the Military CYPRES 2 may need to be reset. The Military CYPRES 2 will power itself OFF after 14 hours under any condition.

Operating Conditions for Absolute (Operational) Mode

11-38. The three Military CYPRES 2 models must be used in absolute (operational) mode for the following operating conditions:

- The Military CYPRES 2 is powered ON in flight.
- Low-level flights en route to the DZ are flying below the departure airfield MSL elevation.
- There is a highest release point obstacle of 200 feet or greater above the DZ.
- The Military CYPRES 2 activation altitude is different than the default activation altitude.
- The departure airfield and DZ are at separate locations.
- The aircraft must be pressurized.

Rules for Using the Absolute (Operational) Mode

11-39. When the Military CYPRES 2 is used in absolute (operational) mode, all of the following apply to all operations and must be strictly adhered to:

- During in-flight power ON, the aircraft climb rate or descent rate must not exceed 1,000 feet per minute until all Military CYPRES 2 models on board are powered ON. The preferred method is to have the aircraft level off while the Military CYPRES 2 is being set.
- All parachutists on the same stick will have the same DZ/ VDZ setting.
- The minimum VDZ setting for jump operations at 13,000 feet AGL and below is the height of the highest obstacle if 200 feet or higher than the DZ and within 500 meters of the release point.
- The minimum VDZ setting for a jump operation at greater than 13,000 feet AGL is the height of the highest obstacle if 200 feet or higher than the DZ and within 1,000 meters of the release point.
- The minimum vertical separation between reserve activation altitude and main deployment altitude is 2,000 feet for the 1000/35 A and the 1500/35 A models and 2,500 feet for the 2500/29 A model. When the 1000 model is used on the tandem bundle, the vertical separation is not applicable.
- While in absolute (operational) mode, the altimeter setting for the DZ should be checked every hour during the operation using the most accurate means available. If the Military CYPRES 2 setting changes more than ±3 millibars or if the operational parameters change, the jumpmaster must recalculate and reset the Military CYPRES 2.

WARNING

The actual absolute pressure (QFE) at the VDZ must be entered into the Military CYPRES 2 in operational mode. This pressure can be determined by direct measurement with an instrument such as the Military CYPRES Portable Calibration Station. An actual Military CYPRES 2 can be calculated from the aircraft altimeter setting (QNH) and the MSL elevation of the VDZ using the approved CYPRES calculators (for example, Excel, circular calculator, or digital calculator).

It is important to realize that flight services and weather stations normally report pressure as if it were seal level (QNH, not QFE); therefore, it is necessary to convert the QNH to QFE for use with the Military CYPRES 2.

Calculations for the Drop Zone in Absolute (Operational) Mode

11-40. When using the Military CYPRES 2 in operational mode, the jumpmaster will calculate the millibar setting by obtaining the following information:

- Actual absolute air pressure at the DZ.
- Both the current aircraft altimeter setting (QNH) (in inches of mercury) and DZ elevation (in feet MSL).

Calculations for the Virtual Drop Zone in Absolute (Operational) Mode

11-41. In some scenarios, the jumpmaster must use a VDZ —described as a virtual line in the sky—which is a higher elevation in feet MSL than that of the actual DZ. These scenarios include the following:

- MFF HALO jumps or HAHO jumps with a low reserve activation altitude that have a highest release point obstacle of 200 feet or greater than the DZ elevation and—
  - Within a 500-meter radius of the release point for operations up to 13,000 feet AGL.
  - Within a 1,000-meter radius of the release point for operations above 13,000 feet AGL.
- MFF HAHO operations with a high reserve activation altitude setting for a tactical operation based on SOPs.

WARNING

Pressure readings should be as current as possible—preferably they will be updated every hour by the DZ safety officer and recorded from the nearest source to the drop zone.

Jumpmasters must use their best judgment when obtaining the aircraft altimeter setting offsite from the DZ (within ± 20 miles is a good reference). Depending on the geographic location of the DZ or the HARP, atmospheric conditions and pressure values could be significantly different between two neighboring valleys that are only separated by a single ridgeline.

Jumpmasters should make note of pressure differences and weather conditions in relation to the location they obtained the aircraft altimeter setting from and to the location of the DZ. The distances away from the DZ or VDZ for obtaining the pressure can greatly increase if meteorological conditions are favorable.

The DZ elevation used for calculating the millibar setting is the highest point of elevation (MSL) given on the Air Force Information Management Tool Form 3823, *Drop Zone Survey.*

11-42. The jumpmaster will calculate the millibar setting for a VDZ by obtaining the—

- Current aircraft altimeter setting (QNH) (in inches of mercury).
- Higher VDZ elevation (MSL).

Note: The jumpmaster will take into account the cutaway decision altitude (in feet AGL) when adjusting for VDZ elevation.

WARNING

When using a VDZ or higher elevation than the DZ, the jumpmaster must also change the pull altitude of his jumpers. Jumpers must maintain 2,000 feet (1000/35 A and 1500/35 A models CYPRES) of vertical separation between pull altitude and reserve activation altitude (2,500 feet of vertical separation for the 2500/29 A model CYPRES). When used with nonstandard parachutes, 1,500 feet of vertical separation is required for the 1000/35 A model CYPRES.

Calculations for Unknown Setting in Absolute (Operational) Mode

11-43. When using the Military CYPRES 2 in operational mode, if the jumpmaster cannot obtain a current aircraft altimeter setting for a precise measurement of station pressure, he must use 29.92 inches of mercury for his millibar calculation.

11-44. Because the pressure may not actually be 29.92 inches of mercury, the jumpmaster must plan for the reserve activation altitude being possibly higher or lower than planned for as follows:

- If the actual pressure is higher, the Military CYPRES 2 will activate on the high side.
- If the actual pressure is lower, the Military CYPRES 2 will activate on the low side.

11-45. The jumpmaster must add a safety factor into his calculations in order for the reserve to have enough altitude to fully inflate and save jumpers' lives. To prevent activation on the low side, the jumpmaster will add 500 feet to the DZ or highest release point obstacle VDZ for a safety factor. This new elevation is the elevation the jumpmaster will use to calculate the millibar.

11-46. The jumpmaster will calculate the millibar setting by using and obtaining the following information:

- Unknown aircraft altimeter setting (QNH) = 29.92 inches of mercury.
- DZ or VDZ elevation MSL + 500 feet for safety factor = VDZ elevation MSL.
- As a safety factor, the jumpmaster must add 1,000 feet to the jumpers' pull altitude.

DANGER

When the QNH is unknown, use the default setting of 29.92 inches of mercury. The jumpmaster adds 500 feet to the DZ or VDZ to allow the reserve to properly deploy. The jumpmaster also adds 1,000 feet to the pull altitude to mitigate the possibility of a dual canopy deployment.

Jumpmaster and Pilot Considerations for Using the Absolute (Operational) Mode

11-47. When using the absolute (operational) mode, the jumpmaster and pilot must consider the following:

- While operating in absolute (operational) mode, the three Military CYPRES 2 models arm as soon as they are powered ON.
- When in the absolute (operational) mode, the Military CYPRES 2 can be set in both a pressurized and a depressurized aircraft while in flight. During an in-flight power ON for an unpressurized cabin, the aircraft climb rate or descent rate must not exceed 1,000 feet per minute or a steady pressurized rate within 1,000 feet per minute for a pressurized cabin until all Military CYPRES 2 models are powered ON. Aircraft leveling off is preferred.
- While descending, the aircraft should never exceed the vertical activation speed for the Military CYPRES 2 while in the activation window. Exceeding the vertical activation speed may cause the

Military CYPRES 2 to fire the release element and deploy the reserve parachute. The aircraft may exceed the vertical activation speed of 6,900 feet per minute for the 1000/35 A and 1500/35 A models or 5,700 feet per minute for the 2500/29 A model during descent, while executing a tactical landing that will cause the Military CYPRES 2 to activate in the aircraft. The jumpmaster must brief the pilots not to exceed 5,000 feet per minute as this descent rate is easy to remember and covers all three Military CYPRES 2 models.

- Descent to an altitude below the elevation of the departure airfield will not affect the Military CYPRES 2 in the absolute (operational) mode.
- Once the aircraft descends through the VDZ altitude, the Military CYPRES 2 will deactivate itself and will not fire the release element. Therefore, if the jump altitude is lowered below the VDZ, all Military CYPRES 2 models on the aircraft must be reset.

OPERATING PROCEDURES

11-48. There are two modes for the three Military CYPRES 2 models: default (training) mode and absolute (operational) mode. There is only one mode (to be used by U.S. Army MFF units) for the Expert CYPRES 2 model: default (training) mode. However, the Expert CYPRES 2 can be set with an offset that will allow for a ±3,000-foot difference between the departure airfield and the DZ. U.S. Army units will only use the CYPRES 2 in the absolute (operational) mode or the Expert CYPRES set with the offset.

11-49. The three Military CYPRES 2 models and the Expert CYPRES 2 model operate and power ON in the same way. The only difference among the models is the activation speed and altitude. The button on the control unit is the only means the user has to control the CYPRES 2. The parachutist performs two actions: powering ON and powering OFF the CYPRES 2.

POWER ON PROCEDURES FOR MILITARY CYPRES 2 IN ABSOLUTE (OPERATIONAL) MODE

11-50. During the power ON sequence, the Military CYPRES 2 conducts a self-test. The jumper must watch the display during the entire power ON self-test. Table 11-2 defines the error codes.

Table 11-2. CYPRES 2 power ON self-test error codes in absolute (operational) mode

Error Code	Meaning
1111 2222	One or both of the attached release units are not correctly electrically connected to the unit. The reason may be a cable break, the cutter plug could be disconnected, or the release unit(s) may have activated.
3333	Excessive variations in ambient air pressure have been measured during the self-test period. The unit is unable to obtain consistent values for the ambient air pressure at ground level. Possible reasons could be an attempt to switch on the Military CYPRES 2 in the training mode in an airborne aircraft while exceeding a climb rate or descent rate of more than 1,500 feet per minute.
7777	Low battery. The battery capacity is large enough to cover most of the usage profile, but in extreme situations a low-battery indication may show up. In this case, Airtec or SSK should be contacted before the next use.

CAUTION

The jumper should press the control unit button with the tip of a finger. He should not use a fingernail or a sharp object. Prolonged use of a fingernail or a sharp object will wear the letters off the button and possibly wear a hole in the button material, thus rendering the Military CYPRES 2 unserviceable.

Note: If a button click is missed or a button is pressed too soon before the light comes on, the Military CYPRES 2 will not power ON. If the Military CYPRES 2 fails to power ON, the sequence should be started over again in absolute (operational) mode.

Note: The four-click initiation cycle is designed to avoid accidental activation.

11-51. The jumper starts the power ON process for the Military CYPRES 2 in the absolute (operational) mode by pressing and releasing the button on the control unit four times as follows:

- Press and release the button on the control unit with the tip of a finger.
- When the LED illuminates, press and release the button again while the light is on.
- Repeat above step two more times for a total of four times.
- Hold the button down on the fourth press.

11-52. When the power ON steps are successful, the display will come on and the self-test will start to count down, which should last for 10 seconds (figure 11-13).

Figure 11.13 Power ON sequence for Military CYPRES 2 in absolute (operational) mode

11-53. The jumper must watch the display during the self-test period. The display will start with 10 (figure 11-14) and then show a rapid countdown to 0▼.

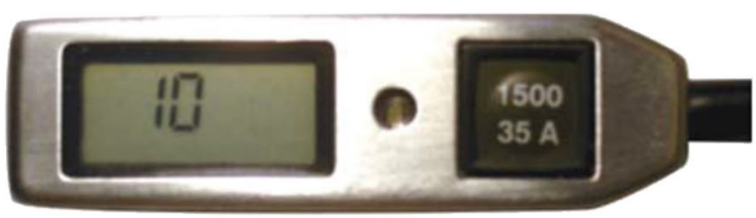


Figure 11-14. Beginning of Military CYPRES 2 self-test countdown in absolute (operational) mode

11-54. The self-test cycle takes 10 seconds to complete. There is a brief pause between 1 and 0 where the current barometric pressure is displayed in millibars (figure 11-15, page 11-17).

Figure 11-15. Military CYPRES 2 displaying current barometric pressure in millibars

11-55. Once the 0▼ reading is displayed (figure 11-16), the Military CYPRES 2 has passed the self-test.

Figure 11-16. Military CYPRES 2 set in absolute (operational) mode

11-56. If a functional deficiency in the Military CYPRES 2 is detected during the power ON self-test, the Military CYPRES 2 will display an error code and power OFF. Prior to the Military CYPRES 2 powering off, the jumper should note the error code in the display (figure 11-17).

Figure 11-17. Example of Military CYPRES 2 error code

11-57. Upon completion of the self-test, the Military CYPRES 2 will display the millibar setting of "1000." To set the appropriate millibar setting, the jumper performs the following steps:

- The 1 will alternate with 0. Release the button to choose 0 or 1. The chosen value remains on the display (figure 11-18, page 11-18).

Figure 11-18. First value of 1 chosen for millibar setting

- Press and hold the button again. The second digit counts from 0 through 9. To select the second value, release the button when the desired value appears. This value remains on the display (figure 11-19).

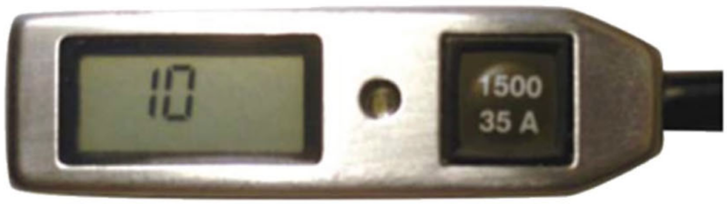


Figure 11-19. Second value of 0 chosen for millibar setting

- Press and hold the button again. The third digit counts from 0 through 9. To select the third value, release the button when the desired value appears. This value remains on the display (figure 11-20).

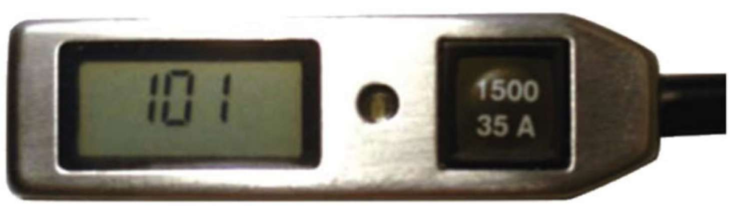


Figure 11-20. Third value of 1 chosen for millibar setting

- Press and hold the button again. The fourth digit counts from 0 through 9. To select the final value, release the button when the desired value appears. This value remains on the display (figure 11-21, page 11-19).

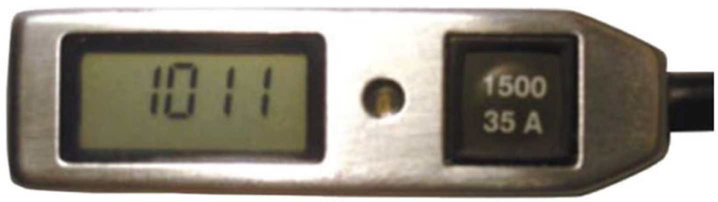


Figure 11-21. Final value chosen and Military CYPRES 2 set

11-58. To change an incorrect entered number, the jumper presses the button until the value shows up again. (After 9, the display restarts automatically with 0.) In order to start over completely because of an incorrect input in a previous value, without powering off, the jumper—

- Inputs a number into all four values.
- Before the light goes out after the fourth value input, presses and holds the button again. The display will start over at the first value again.

Note: If the jumper tries to enter a pressure of less than 200 millibars (approximately 39,000 feet above sea level) or more than 1,075 millibars (approximately 1,600 feet below sea level), the Military CYPRES 2 switches itself off. The blank display indicates that the desired adjustment is outside the specified parameters.

11-59. The pressure adjustment and the display indication remain until the unit is switched OFF. To change the setting, the jumper switches the Military CYPRES 2 to OFF and then ON again. The Military CYPRES 2 automatically turns off after 14 hours. During the 14 hours, the Military CYPRES 2 settings will not adjust for barometric pressure changes.

POWER ON PROCEDURES FOR EXPERT CYPRES 2 IN OFFSET MODE

11-60. The Expert CYPRES 2 can be set in an offset mode that allows the default altitude to be changed by ±1,500 feet (±3,000 feet on units produced after 2006) from the departure airfield. This allows the default setting to be adjusted if the DZ elevation is higher or lower than the departure airfield or if the default activation level needs to be raised. In the offset mode, the Expert CYPRES 2 powers ON the same way as the Military CYPRES 2 in the absolute (operational) mode except that the button cannot be released while making the setting. As soon as the button is released, the setting is locked into the Expert CYPRES 2. If the desired offset is missed, the Expert CYPRES 2 must be powered OFF and powered back ON in offset mode to adjust the setting. During the power ON sequence, the Expert CYPRES 2 conducts a self-test. The jumper must watch the display during the entire power ON self-test. Table 11-3 defines the error codes.

Table 11-3. Expert CYPRES 2 power ON self-test error codes in offset mode

Error Code	Meaning
1111 2222	One or both of the attached release units are not correctly electrically connected to the unit. The reason may be a cable break, the cutter plug could be disconnected, or the release unit(s) may have activated.
3333	Excessive variations in ambient air pressure have been measured during the self-test period. The unit is unable to obtain consistent values for the ambient air pressure at ground level. Possible reasons could be an attempt to switch on the CYPRES 2 in the training mode in a car, driving uphill or downhill, or in an airborne aircraft.
7777	Low battery. The battery capacity is large enough to cover most of the usage profile, but in extreme situations a low-battery indication may show up. In this case, Airtec or SSK should be contacted before the next use.

CAUTION

The jumper should press the control unit button with the tip of a finger. He should not use a fingernail or a sharp object. Prolonged use of a fingernail or a sharp object will wear the letters off the button and possibly wear a hole in the button material, thus rendering the Expert CYPRES 2 unserviceable.

Note: If a button click is missed or a button is pressed too soon before the light comes on, the Expert CYPRES 2 will not power ON. If the Expert CYPRES 2 fails to power ON, the sequence should be started over again in offset mode.

Note: The four-click initiation cycle is designed to avoid accidental activation.

11-61. The jumper starts the power ON process for the Expert CYPRES 2 in the offset mode by pressing and releasing the button on the control unit four times as follows:

- Press and release the button on the control unit with the tip of a finger.
- When the LED illuminates, press and release the button again while the light is on.
- Repeat above step two more times.
- Hold the button down on the fourth press. Do not let up finger pressure on the button.

11-62. When the power ON steps are successful, the display will come on and the self-test will start to count down, which should last for 10 seconds (figure 11-22).

Figure 11-22. Power ON sequence for Expert CYPRES 2 in offset mode

11-63. The jumper must watch the display during the self-test period. The display will start with 10 and then show a rapid countdown to zero with the arrow pointing down (0▼), referred to as zero down. The self-test cycle takes 10 seconds to complete (figure 11-23).

Figure 11-23. Expert CYPRES 2 displaying countdown

11-64. If a functional deficiency in the Expert CYPRES 2 is detected during the power ON self-test, the Expert CYPRES 2 will display an error code and power OFF. Prior to the Expert CYPRES 2 powering off, the jumper should note the error code in the display (figure 11-24).

Figure 11-24. Example of Expert CYPRES 2 error code

11-65. Once the 0▼ reading is displayed (figure 11-25), the Expert CYPRES 2 has passed the self-test in offset mode.

Figure 11-25. Expert CYPRES 2 control unit displaying countdown at zero down in offset mode

DANGER

In the offset mode, an arrow up means the offset is higher than the default altitude of 750 feet; an arrow down means the offset is lower than the default altitude of 750 feet. Failure to ensure that the arrow is pointing in the correct direction could result in the Expert CYPRES 2 not firing at the intended altitude, resulting in injury or death to the parachutist.

11-66. After reaching 0, the numbers on the display screen will advance in 30-foot increments up to 1,500 feet with the arrow changing from up to down at each increment. The direction of the arrow indicates whether the designated landing area is higher or lower than the departure airfield (the jumper's current position). Once the desired offset is reached, the jumper releases the button when the arrow is pointing in the desired direction. The desired setting will stay on the display screen. If the desired setting is missed, the jumper powers OFF the Expert CYPRES 2 and repeats the whole process. Figure 11-26, page 11-22, shows the Expert CYPRES 2 set at 120 feet above the default altitude of 750 feet. The Expert CYPRES 2 is now set to activate at 870 feet above the departure airfield (the jumper's current position).

Figure 11-26. Expert CYPRES 2 set at 120-foot offset

11-67. The Expert CYPRES 2 automatically powers off after 14 hours. During the 14 hours, the Expert CYPRES 2 settings will adjust for barometric pressure changes.

POWER OFF PROCEDURES FOR THE MILITARY AND EXPERT CYPRES 2

11-68. The power OFF procedures are the same for all Military and Expert CYPRES 2 models and in every mode. It is the reverse of the power ON process.

CAUTION

The jumper should press the control unit button with the tip of a finger. He should not use a fingernail or a sharp object. Prolonged use of a fingernail or a sharp object will wear the letters off the button and possibly wear a hole in the button material, thus rendering the Military and Expert CYPRES 2 unserviceable.

11-69. The jumper starts the power OFF process (figure 11-27) by pressing and releasing the button on the control unit four times as follows:

- Press and release the button on the control unit with the tip of a finger.
- When the LED illuminates, press and release the button again while the light is on.
- Repeat above step two more times.

Figure 11-27. Power OFF sequence for Military and Expert CYPRES 2

11-70. When the power OFF steps are successful, the display will shut off. If the Military and Expert CYPRES 2 does not power OFF, the jumper should repeat the four steps.

MILITARY CYPRES 2 CALCULATORS

11-71. In situations in which the Military CYPRES 2 absolute (operational) mode must be used, two sets of information are required to calculate the millibar setting: the altimeter setting for the intended DZ and the MSL elevation of the DZ or VDZ. The jumpmaster obtains the DZ altimeter setting from the pilot or from a weather station within as close a range as possible to the DZ. The jumpmaster does not use the actual barometric pressure of the DZ; he instead uses the altimeter setting for the DZ. If the current DZ altimeter setting information is unavailable from the pilot or weather station, the unknown altimeter setting of 29.92 inches of mercury, which is 1013 millibars at 0 foot MSL, should be used. Once the jumpmaster obtains the current aircraft altimeter setting and DZ or VDZ MSL elevation, he will calculate the millibar setting using an approved Military CYPRES 2 calculator.

WARNING

Use of any other device to get the altimeter setting is unauthorized (for example, Suunto, Kestrel, or other personal device).

11-72. When on a mission with limited weather information, the aircrew can provide the altimeter setting for the DZ en route to the DZ. The altimeter (pressure) setting is given in inches of mercury to the nearest one-hundredth of an inch. The altimeter setting will always be for the intended DZ. Once the altimeter setting of the intended DZ has been determined, the primary jumpmaster will use an approved CYPRES calculator to determine the setting of each Military CYPRES 2 model on the mission. Once the primary jumpmaster has determined the settings, the assistant jumpmaster will independently determine the settings. If any discrepancy is found in the results, the primary and assistant jumpmasters will work together to determine the correct settings.

11-73. Tools authorized to use for the millibar setting calculation include the following:

- Military CYPRES absolute adjust circular calculator (whiz wheel) (figure 11-28 [A], page 11-24).
- Military CYPRES Calculator application (used with smart phone or tablet) (figure 11-29, page 11-25).
- Digital Military CYPRES calculator developed by Airtec (figure 11-30, page 11-26).
- Online Military CYPRES absolute adjust model calculator available on the SSK Military Industries website (figures 11-32 to 11-36, pages 11-27 to 11-29).

Military CYPRES Absolute Adjust Circular Calculator (Whiz Wheel)

11-74. The jumpmaster obtains the forecasted aircraft altimeter setting for the DZ. If flying a mission with limited weather information, the aircrew can provide the altimeter setting en route to the DZ. The altimeter (pressure) setting will be given in inches of mercury. The jumpmaster obtains the setting to the nearest one-hundredth of an inch. Using the Military CYPRES absolute adjust circular calculator (figure 11-28 [A], page 11-24), the jumpmaster determines the absolute adjust millibar setting by—

- Rotating the discs so the weather correction (QNH) arrow points to the present aircraft altimeter setting at the target (virtual) DZ. A default of 29.92 is used if the altimeter setting is unknown or unavailable.

Note: This setting can cause inaccuracies depending on weather conditions; for example, DZ altimeter setting = 30.15 inches of mercury (figure 11-28 [B], page 11-24).

- Keeping the discs carefully aligned, finding the VDZ field elevation above sea level (feet MSL) on the inner disc, and placing the "clock hand" black indicator line on the ground elevation of the desired (virtual) DZ (in the example in figure 11-28 [C], page 11-24, DZ elevation equals 7,100 feet). The number aligned with this elevation on the outer disc is the setting in millibars for the absolute adjustment for the Military CYPRES (in the example in figure 11-28 [C], page 11-24, it is 787 millibars).

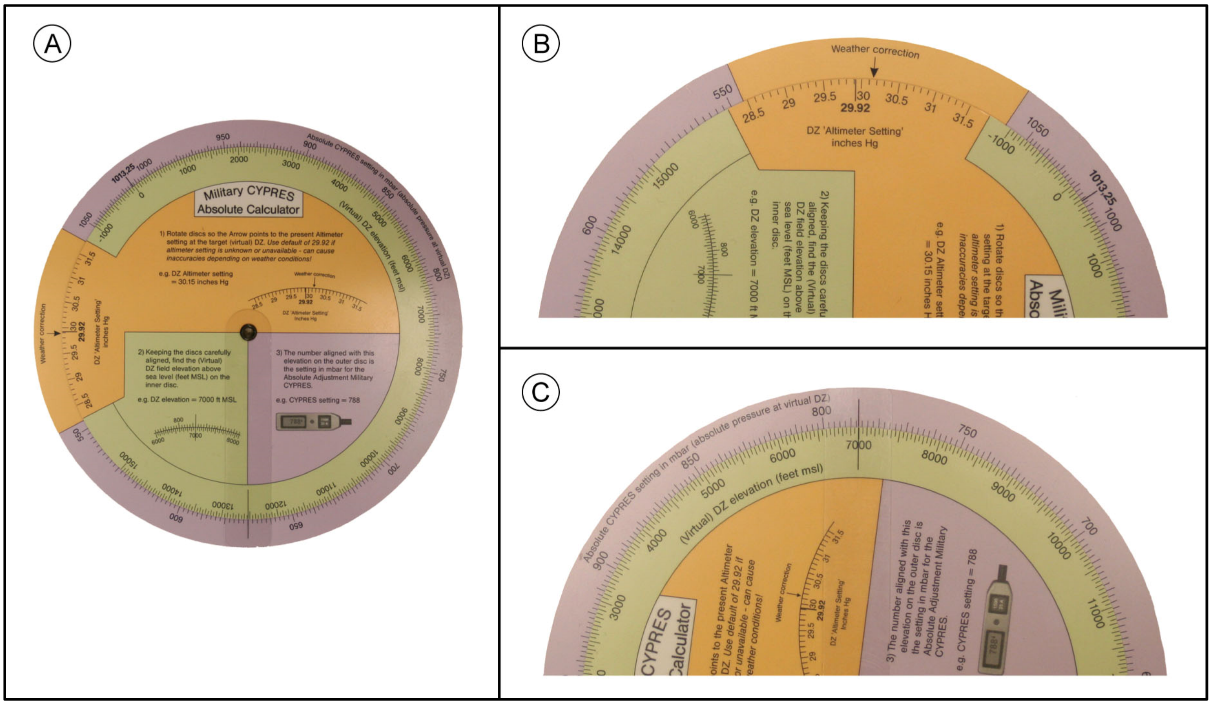


Figure 11-28. Military CYPRES absolute adjust circular calculator (whiz wheel)

MILITARY CYPRES CALCULATOR APPLICATION

11-75. The military CYPRES Calculator application is the electronic equivalent of the Military CYPRES circular calculator (whiz wheel). If the jumper does not have access to the circular calculator, the Military CYPRES Calculator application (figure 11-29, page 11-25) in his smart phone or tablet will perform the task of calculating the pressure at the target DZ or VDZ for use with the Military CYPRES in operational mode.

11-76. The Military CYPRES Calculator application can be downloaded from Google Play or the App Store for free or from the information provided at the SSK Military Industries website. Users should ensure that they keep the latest version of the Military CYPRES calculator application. Jumpmasters may visit the same website to use the online Military CYPRES absolute adjust model calculator. There is no one brand of phone or tablet that must be used for the Military CYPRES calculator application. To utilize the application,—

- Open the application on the smart phone or tablet.
- Enter the altimeter setting (in either Hg or mbar).
- Enter the elevation at the DZ or VDZ.
- Select the elevation units (either feet or meters).
- Click the Calculate button and the value for CYPRES setting will be displayed.

Figure 11-29. Military CYPRES calculator

DIGITAL MILITARY CYPRES CALCULATOR

11-77. If the atmospheric (absolute) air pressure values to perform the altitude adjustment are not known, it is possible to do the altitude adjustment using the Military CYPRES calculator (figure 11-30, page 11-26) developed by Airtec. This calculator can be ordered separately (meter scale also available).

> ***Note:*** If jumpmasters want to set a Military CYPRES 2 in operational mode and no one is able to tell them the air pressure of their target, they should use the Military CYPRES calculator or go the Military CYPRES User's Guide on the SSK Military Insustries website.

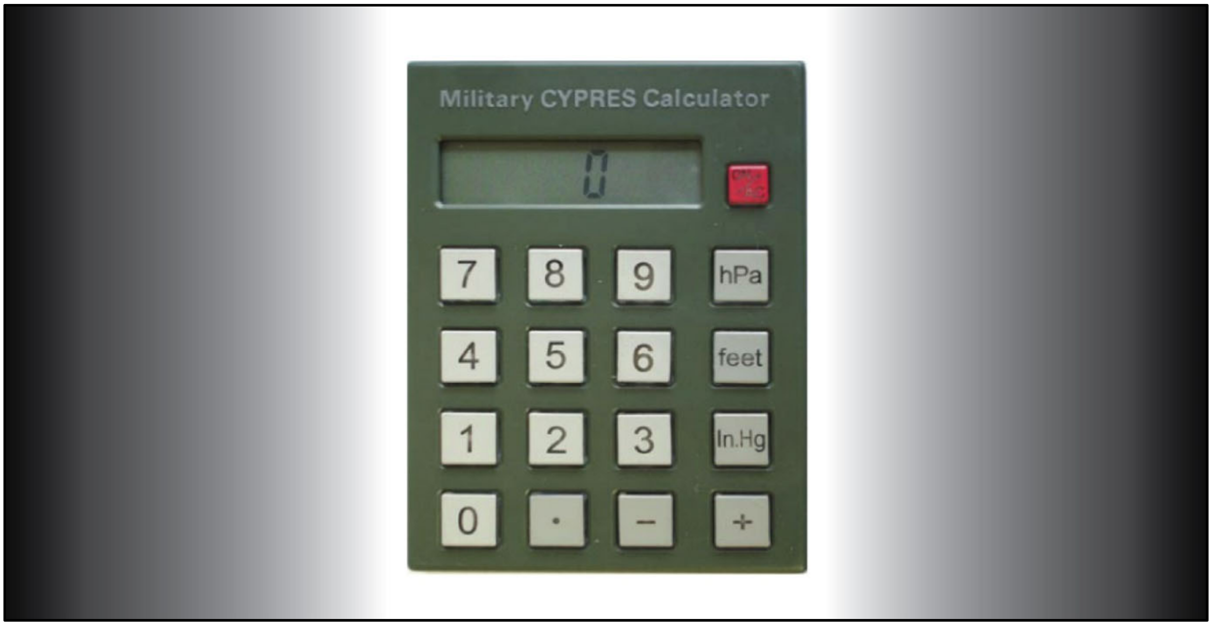


Figure 11-30. Military CYPRES calculator

11-78. Figure 11-31 shows the usage instructions located on the back of the Military CYPRES calculator.

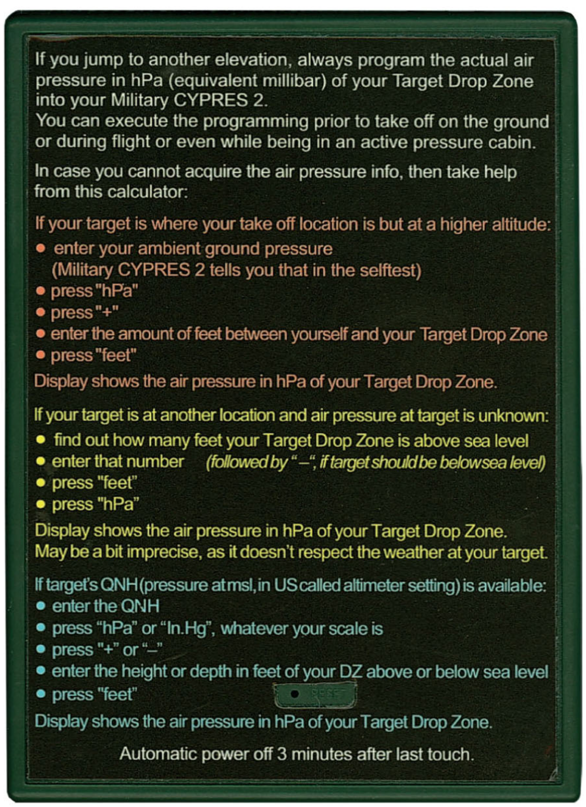
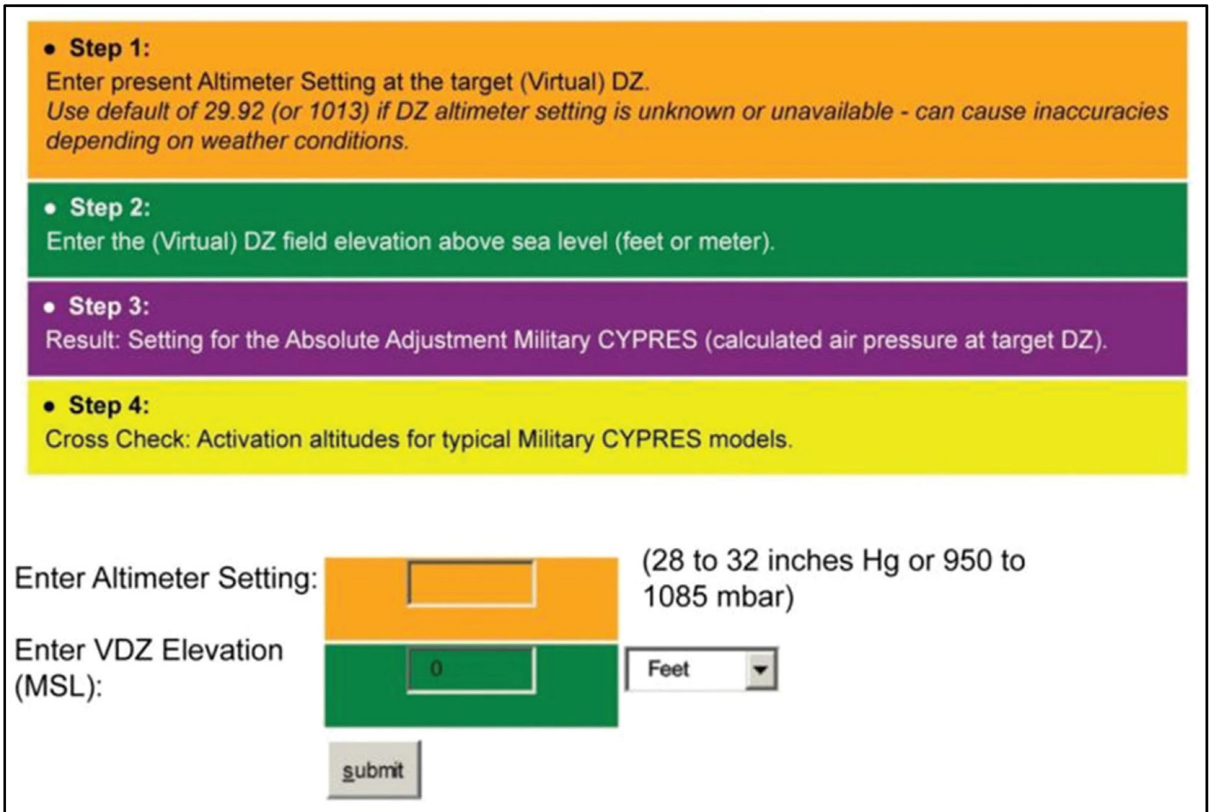


Figure 11-31. Usage instructions for the Military CYPRES calculator

Online Military CYPRES Absolute Adjust Model Calculator

11-79. Parachutists may use the Military CYPRES absolute adjust model calculator available on the SSK Military Industries website. Figures 11-32 through 11-36, pages 11-27 through 11-29, show examples of the online calculator.

Note: Parachutists must use this calculator with "Absolute Adjustment" Military CYPRES units only (with "Abs. Adj." nomenclature on control unit). Detailed procedures are in the Absolute Adjustment Military CYPRES User's Guide, as well as additional information on how to use all of the CYPRES capabilities.



Legend:

CYPRES Cybernetic Parachute Release System
DZ drop zone
Hg inches of mercury
mbar millibar
MSL mean sea level
VDZ virtual drop zone

Figure 11-32. Instructions and first page of the online Military CYPRES absolute adjust model calculator

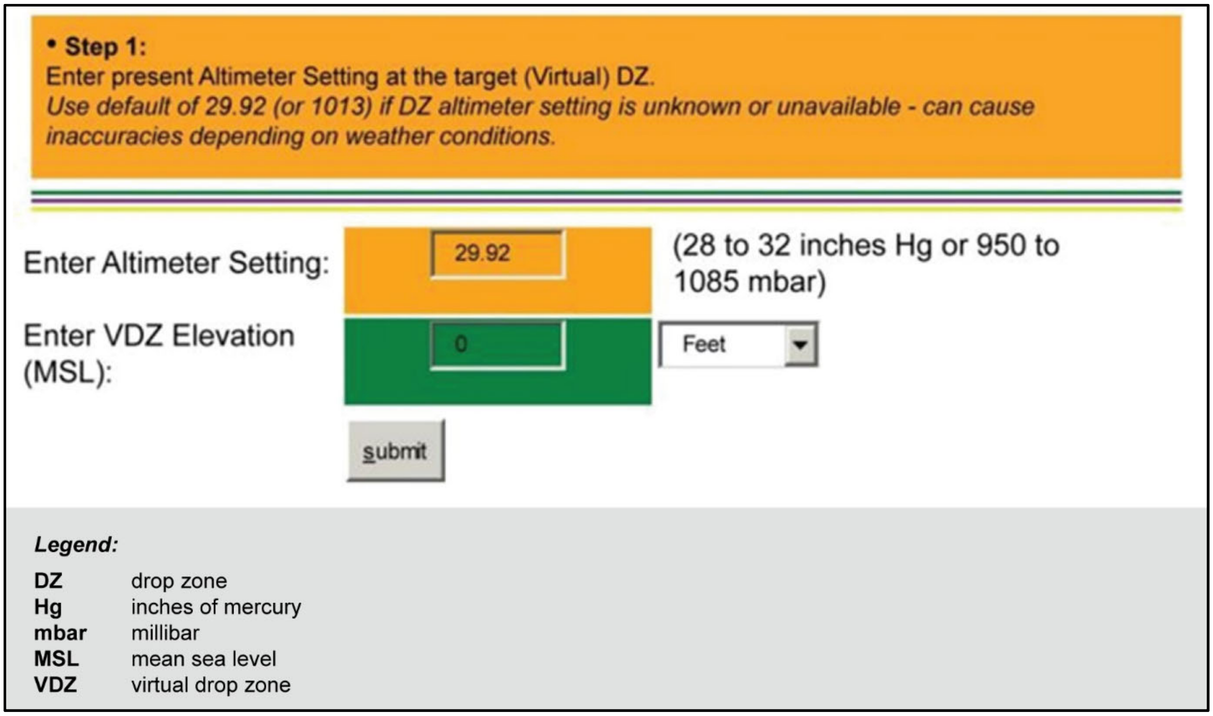


Figure 11-33. Step 1: Military CYPRES absolute adjust model calculator

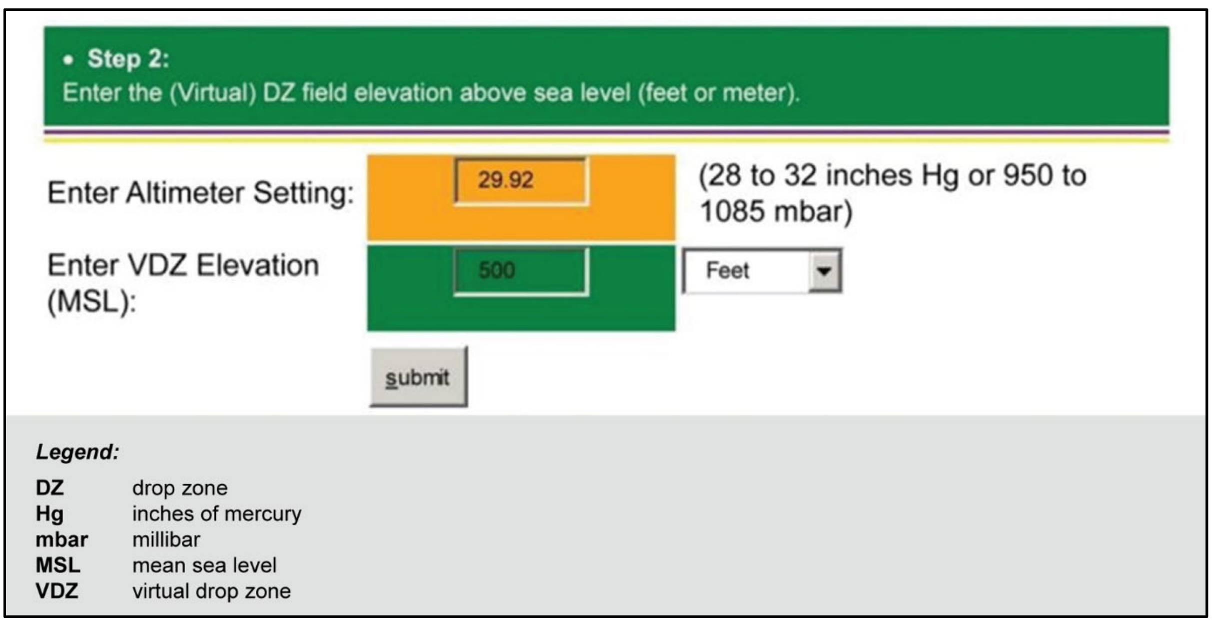


Figure 11-34. Step 2: Military CYPRES absolute adjust model calculator

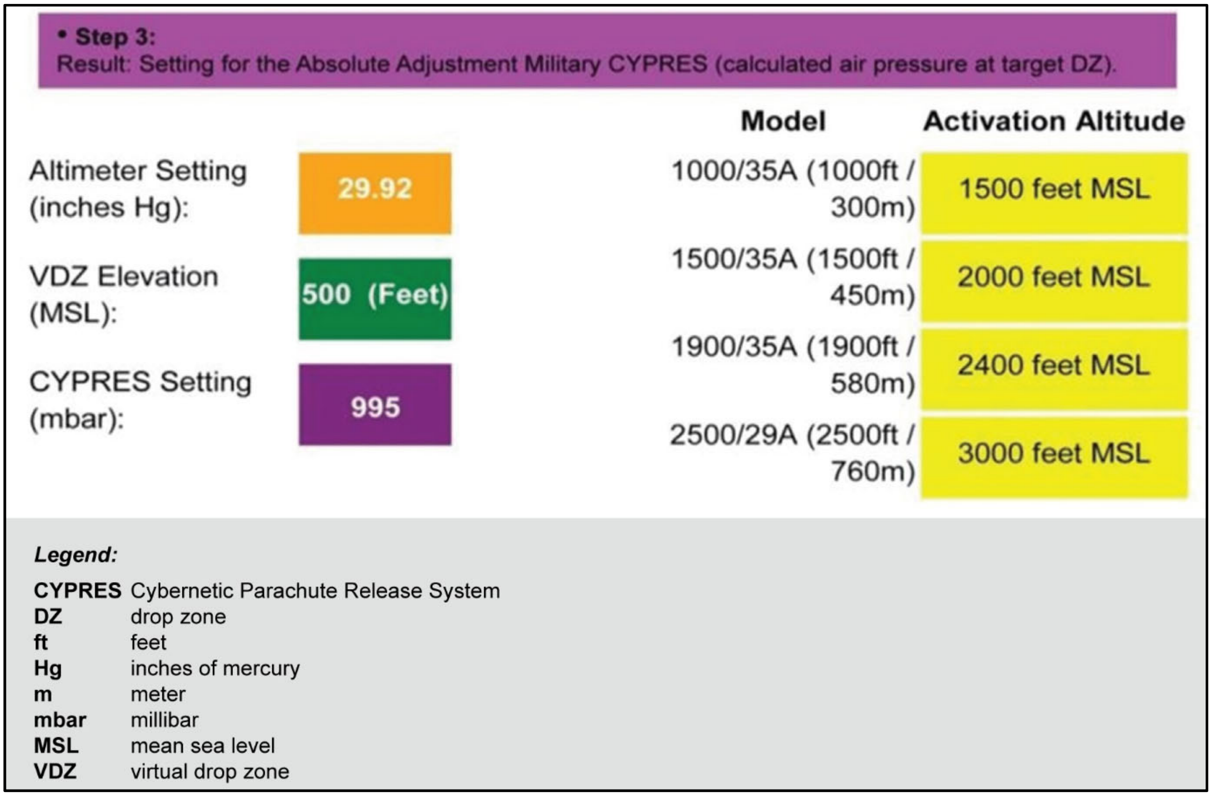


Figure 11-35. Step 3: Military CYPRES absolute adjust model calculator

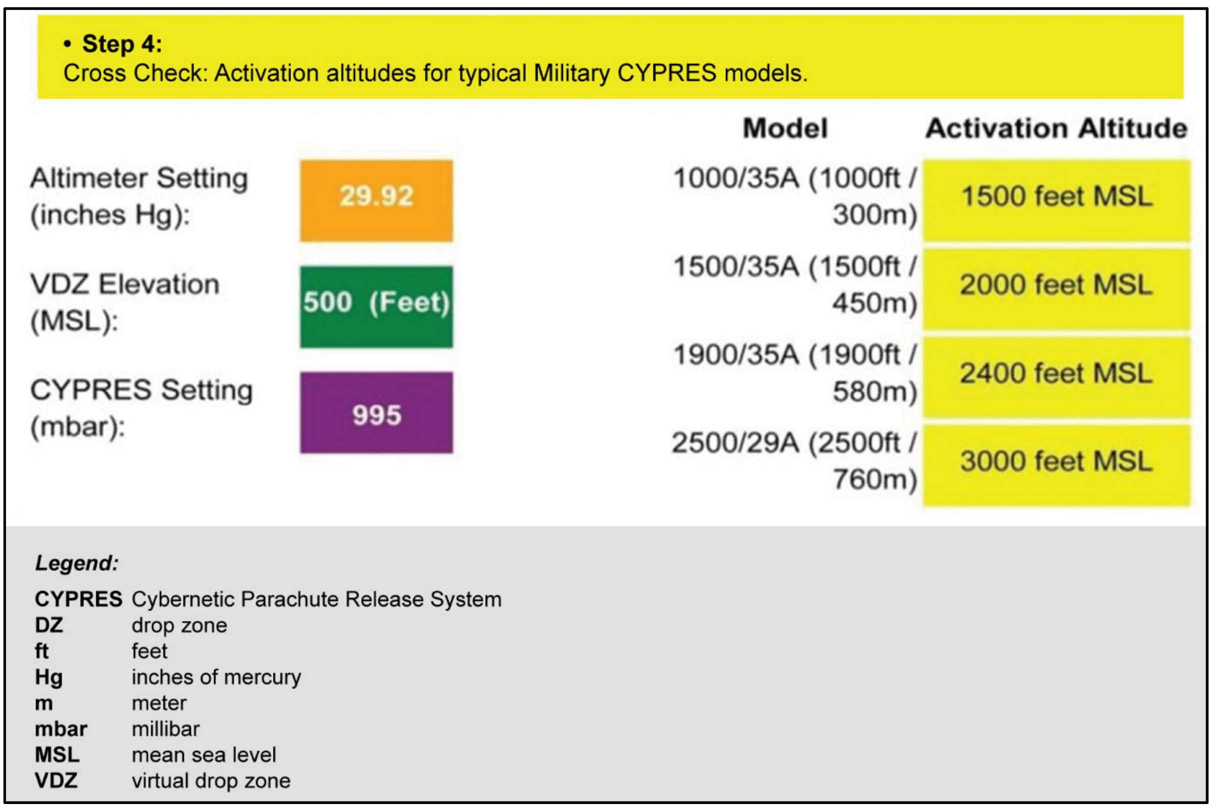
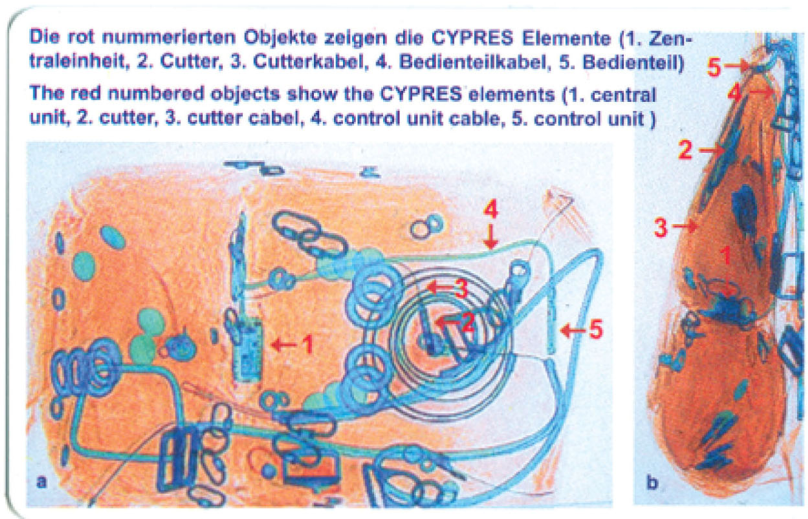


Figure 11-36. Step 4: Military CYPRES absolute adjust model calculator

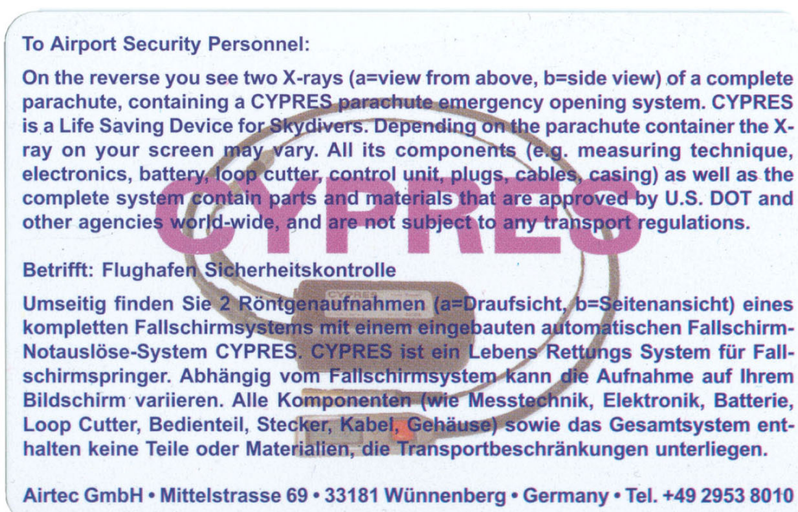
Military CYPRES Commercial Air Travel

11-80. A CYPRES-equipped rig may be transported in freight and passenger airplanes without restrictions. All of its components (for example, electronics, power supply, loop cutter, control unit, plugs, cables, and casing), as well as the complete system contain parts and materials that are approved by the U.S. Department of Transportation and other agencies worldwide, and are not subject to any transport regulations. Because of the size of a rig, it is recommended to check it in as normal luggage and not take it on board as hand luggage. In case of questions or objections from the security personnel, parachutists should use the card in figure 11-37, which shows an x-ray of a complete rig with the Military CYPRES 2. Depending on the type and design of the rig, the x-ray on the security's screen may vary. Presently, the Parachute Industry Association and the U.S. Parachute Association are working with the Transportation Security Agency concerning traveling with parachutes.

Front



Back


To Airport Security Personnel:

On the reverse you see two X-rays (a=view from above, b=side view) of a complete parachute, containing a CYPRES parachute emergency opening system. CYPRES is a Life Saving Device for Skydivers. Depending on the parachute container the X-ray on your screen may vary. All its components (e.g. measuring technique, electronics, battery, loop cutter, control unit, plugs, cables, casing) as well as the complete system contain parts and materials that are approved by U.S. DOT and other agencies world-wide, and are not subject to any transport regulations.

Betrifft: Flughafen Sicherheitskontrolle

Umseitig finden Sie 2 Röntgenaufnahmen (a=Draufsicht, b=Seitenansicht) eines kompletten Fallschirmsystems mit einem eingebauten automatischen Fallschirm-Notauslöse-System CYPRES. CYPRES ist ein Lebens Rettungs System für Fallschirmspringer. Abhängig vom Fallschirmsystem kann die Aufnahme auf Ihrem Bildschirm variieren. Alle Komponenten (wie Messtechnik, Elektronik, Batterie, Loop Cutter, Bedienteil, Stecker, Kabel, Gehäuse) sowie das Gesamtsystem enthalten keine Teile oder Materialien, die Transportbeschränkungen unterliegen.

Airtec GmbH • Mittelstrasse 69 • 33181 Wünnenberg • Germany • Tel. +49 2953 8010

Note: If the card is lost, a new one may be obtained from Airtec or SSK.

Figure 11-37. Military CYPRES 2 air travel card

Chapter 12

Equipment and Weapon Rigging Procedures

Parachutists will normally operate with individual equipment that includes clothing and equipment in keeping with the climatic conditions. In addition, each parachutist will have a free-fall parachutist's jump helmet, goggles, and altimeter. Free-fall parachutists jump and carry all detachment mission-essential equipment and supplies as individual loads. If selected items must be dropped as accompanying supplies, jumpers pack these supplies in appropriate aerial delivery containers. This chapter provides rigging procedures for individual equipment and weapons used during MFF operations.

OVERVIEW

12-1. All parachute systems and combat equipment will be stored and secured on the aircraft in a manner in which to ensure no malfunctions or damage will be caused to the rigging and lifesaving equipment on the parachute system. Oxygen equipment will be rigged and placed in position where it will be used during the MFF operation (jumper configuration).

Note: **AIRCRAFT WITH LIMITED SPACE:** All jumpers will don their equipment and before takeoff, the primary and assistant jumpmasters will inspect each jumper for any rigging deficiencies. All jumpers will ensure that their equipment is properly connected when the hand and arm signal to standup is given and before standing up.

Note: **AIRCRAFT WITH AMPLE SPACE:** Equipment will be donned after the 10-minute warning. All jumpers will be inspected by the primary jumpmaster and assistant jumpmaster. The primary jumpmaster and assistant jumpmaster will inspect each other. All jumpers will ensure that their equipment is properly connected when the hand and arm signal to standup is given and before standing up.

Note: **AIRCRAFT WITH AN OPEN DOOR OR RAMP:** All attached equipment will be connected and inspected before takeoff. Jumpmasters need to remain vigilant and ensure that their jumpers do not manipulate or adjust their equipment in such a way that they could have an inadvertent deployment of the main or reserve pilot chute.

Note: Any equipment (helmet, PDB, oxygen mask, and so on) that is removed from the jumper after the JMPI will be inspected again before the jumper exits the aircraft.

EQUIPMENT AND WEAPON PACKING CONSIDERATIONS

12-2. The parachutist can attach or wear his individual equipment and weapon in several configurations (for example, weapons can be jumped exposed, in approved weapons containers, or as a mix of the two). Unit SOPs specify ways to pack equipment that are consistent with safety requirements. As a rule, units pack hard, bulky, or irregularly shaped (nonaerodynamic) items in containers. Parachutists can use rucksack or PDB rigging systems for MFF operations that are approved by the U.S. Army.

12-3. The parachutist packs his individual equipment in a PDB or in the medium or large combat pack. He then attaches it to the equipment rings on the parachute's main lift web. He may front- or rear-mount the combat pack using the SOF harness, single-point release; improved equipment attaching sling (Spider Harness); or the H-harness (modified). He may attach either a front- or rear-mounted PDB or rucksack with equipment as long as he is under the RA-1 ARAPS 450-pound all-up total weight (to include parachutist, gear, and weight of canopy suspended below the parachute). The jumper should lower combat packs or any equipment that weighs more than 120 pounds (lbs).

12-4. The parachutist pads fragile items such as weapon sights. He does not place crushable items, such as the protective mask, directly under the attaching harnesses. Exposed weapons or equipment, snap hooks, and projections are potential safety hazards that the parachutist should tape. All equipment worn (excluding oxygen and weapon) will be rigged with the capability to jettison the equipment.

PARACHUTIST AND PARACHUTE LOAD LIMITATIONS

12-5. Commanders must not overload the parachutist with equipment. The variety and weight of equipment and weapons that can be attached to a parachutist may exceed the safe design limits of the RA-1 ARAPS or aircraft door or ramp maximum weight limits. Overloading can result in equipment failure to retrieve a towed jumper, injury to the parachutist, failure in lowering equipment, parachute damage, and unsafe descent rates. Also, the parachutist's actions and the time available to release the tie-down straps and to lower the equipment may interfere with his control of the parachute.

MFF FIELD PACK WEIGHT REQUIREMENT

12-6. All field packs jumped during Military Free-Fall (MFF) operations must have a safety confirmation (SC) that approved the field pack for Military Free-Fall (MFF) operations that includes the minimum and maximum weight determined for the rucksack system employed. Rucksack and harness minimum or maximum weight limits should not exceed the approved recommended safety confirmation weight limit for the system being jumped. When a safety confirmation cannot be verified, the field pack (i.e. rucksack, assault pack, medical bag), should be placed into an approved parachutist drop bag (PDB), or enhanced parachutist drop bag (EPDB), and be within the minimum and maximum weight requirement for the PDB or EPDB referenced in the USASOC Regulation 350-2. Jumpmasters and jumpers should reference TB 43-0001-80 to ensure that the field pack jumped is approved for MFF operations. USSOCOM Major Subordinate Commands (MSCs) are authorized to use other Service common approved ancillary equipment provided the items are listed on a Service USSOCOM MSC Personnel Parachute Authorized for Use List (AUL), provided the following requirements are met.

- A Joint service airborne operation has been directed or approved by the appropriate authority.
- All jumpers are properly trained e.g. transitioned or completed refresher training if previously trained.
- Airborne Commander has an approved risk assessment.

***Note*: Parachutist Drop Bag** (PDB), NSN: 1670-01-508-9053 - Minimum weight is **40lbs** and maximum weight is **70lbs**.

***Note*: Enhanced Parachutist Drop Bag** (EPDB), NSN: 1670-01-616-8332 - Minimum weight is **40lbs** and maximum weight is **120lbs**.

***Note*:** Total suspended weight of the jumper and equipment will not exceed the posted limitations of the parachute used. Maximum suspended weight for the RA-1 ARAPS is **450lbs** (jumper plus equipment, to include parachute system).

12-7. MFF jumpmasters and jumpers must ensure that minimum and maximum field pack weights are followed during MFF operations. MFF jumpers jumping any field pack under or over the recommended safety confirmation tested weight can produce several problems with the ability of the jumper to maintain a stable body position during exit, free-fall, and the pull sequence. An underweight field pack may float or shift on the jumper causing the jumper to spin, tumble, or become unable to stay on heading during the pull (deployment) sequence. Exiting with the required weight outlined in the safety confirmation, will enable the field pack to stay against the jumper and increase the jumper's stability and control during military free-fall operations.

12-8. For heavier field pack container systems in the range of 70 to 120 pounds, the jumpmasters should assess each individual jumper to ensure that it does not exceed the capability of the jumper's experience or the parachute system being jumped. For personnel who cannot demonstrate sufficient movement for a proper exit, stability in free-fall or parachute deployment, jumpmasters should pursue one of the following actions:

- Adjust the PDB, EPDB, or rucksack and re-assess the jumper.
- Remove some of the equipment in the PDB, EPDB, or rucksack.
- Remove the entire PDB, EPDB, or rucksack from the jumper.

HOOK-PILE TAPE LOWERING LINE ASSEMBLY

12-9. The current hook-pile tape lowering line assembly consists of an 8- or 15-foot lowering line made of 1-inch wide tubular nylon. The 8-foot lowering line is recommended for most equipment. A 9- by 7-inch nylon duck retainer is sewn to the upper end. The closing flaps have hook-pile tape sewn to the edges with a metal ejector snap on a yellow safety release.

Note: TM 10-1670-300-20&P authorizes the modification of the 15-foot hook-pile tape lowering line to an 8-foot hook-pile tape lowering line. In addition, it provides procedures for altering the hook-pile tape lowering line. Military occupational specialty 92R personnel are the only personnel authorized to alter the hook-pile tape lowering line in accordance with TM 10-1670-300-20&P.

Note: The yellow release lanyard may be removed, or if it remains attached to the hook-pile tape lowering line, it should be taped with two wraps of 1-inch masking tape around the end and approximately 1 inch from the bottom of the lanyard. The yellow release lanyard should be secured to the lowering line, leaving 1 to 2 inches of the lowering line exposed at the top of the lanyard.

Note: To help prevent inadvertent, premature release of the lowering line, the parachutist places a heavyweight double-looped retainer band around the middle of the stowed lowering line retainer pocket before attaching it to the combat pack. Also, the parachutist places a heavyweight double-looped retainer band around the quick-ejector snap. When using a PDB, the doubled-looped retainer band will be centered and inside the hook-pile tape lowering line stow pocket.

Note: When jumping the hand-deployed pilot chute from BOC, the lowering line should be attached to the left side of the jumper's left equipment attachment ring.

12-10. Figure 12-1, page 12-4, shows steps A through F for stowing a hook-pile tape lowering line assembly.

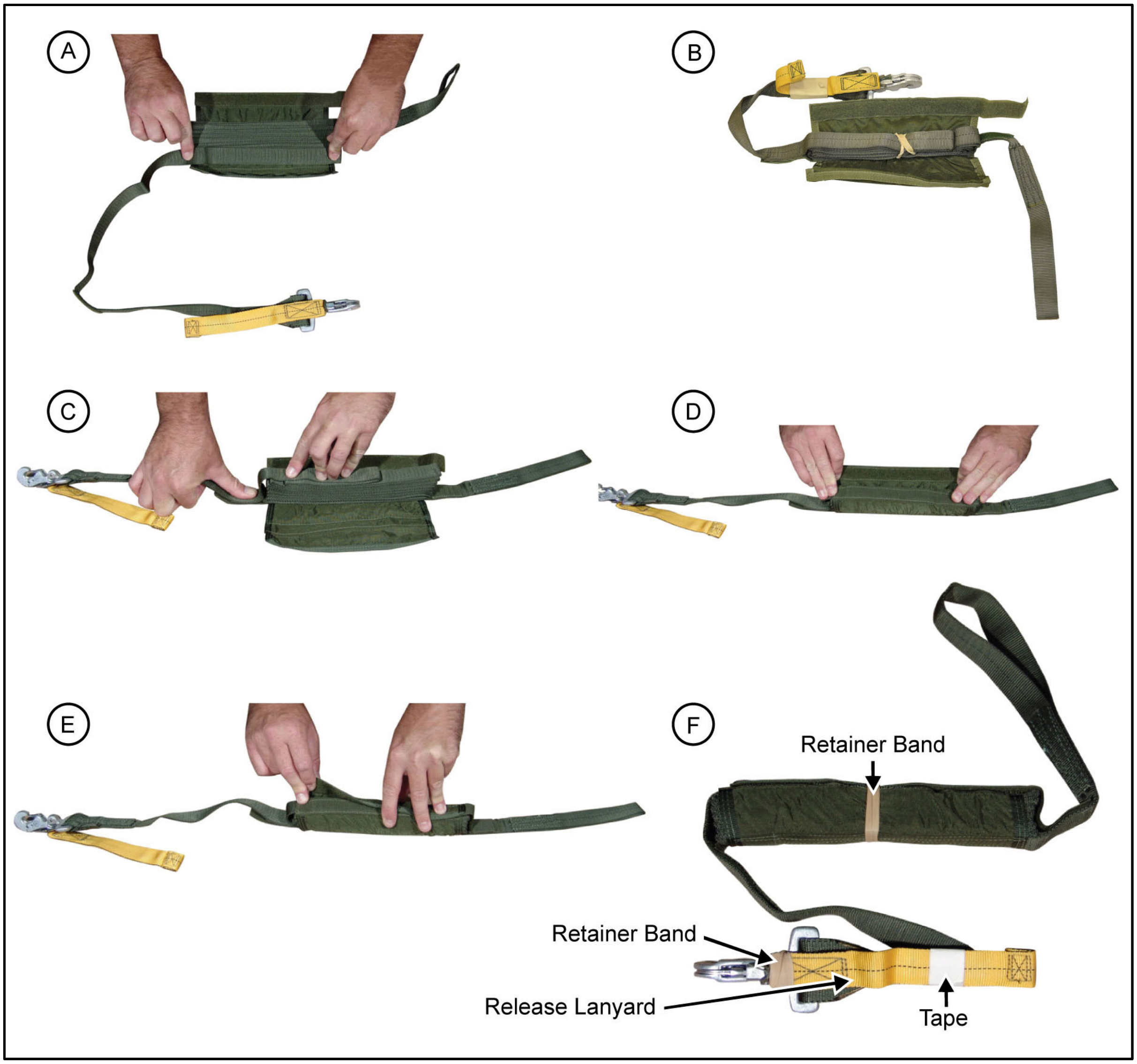


Figure 12-1. Stowing the hook-pile tape lowering line assembly

12-11. The steps for stowing a hook-pile tape lowering line assembly, as shown in figure 12-1, above, are as follows:

- Starting with the looped end to the left, neatly S-fold the tubular nylon until the quick-ejector snap is coming out the right side (figure 12-1 [A], above).
- Place a doubled heavyweight retainer band around the center of the S-folded tubular nylon inside the container (figure 12-1 [B], above).
- Mate the Velcro on the excess tubular nylon to the Velcro on the bottom closing flap (figure 12-1 [C], above).
- Close the top flap, encasing the folded tubular nylon (figure 12-1 [D], above).
- Close off both running ends by realigning the Velcro (figure 12-1 [E], above).
- Remove the yellow release lanyard or tape it with one complete wrap of masking tape. Place a doubled heavyweight retainer band (figure 12-1 [F], above) around the center of the folded lowering line and a tripled heavyweight retainer band around the quick-ejector snap.

MILITARY FREE-FALL OPERATIONS WITHOUT USING THE HOOK-PILE TAPE LOWERING LINE

12-12. If the jumper does not plan to lower his equipment during the MFF operation being conducted, the lowering line is optional and not required to be attached. The jumper must still have the capability to jettison his equipment during any MFF operation; however, there are no emergency procedures requiring a jumper to lower his rucksack or PDB.

Note: The hook-pile tape lowering line is used when jumping with equipment in excess of 120 lbs.

COMBAT PACKS AND OTHER EQUIPMENT CONTAINERS

12-13. The following paragraphs discuss the use of harnesses, equipment attachment slings, and lowering lines in preparing and rigging different packs.

SPECIAL OPERATIONS FORCES HARNESS

12-14. The SOF harness is a lightweight, adjustable, diagonal strap design, pack harness intended for rigging a combat pack/rucksack to a MFF parachute system. The SOF harness (figure 12-2) is made of nylon webbing and uses friction adapters to secure the harness straps around the load (combat pack/rucksack). It has two long diagonal straps and a cross strap that adjusts up or down to fit different pack designs and sizes. It is used with the dual-point release parachute attaching straps to rig combat packs to the parachute harness via snap shackles.

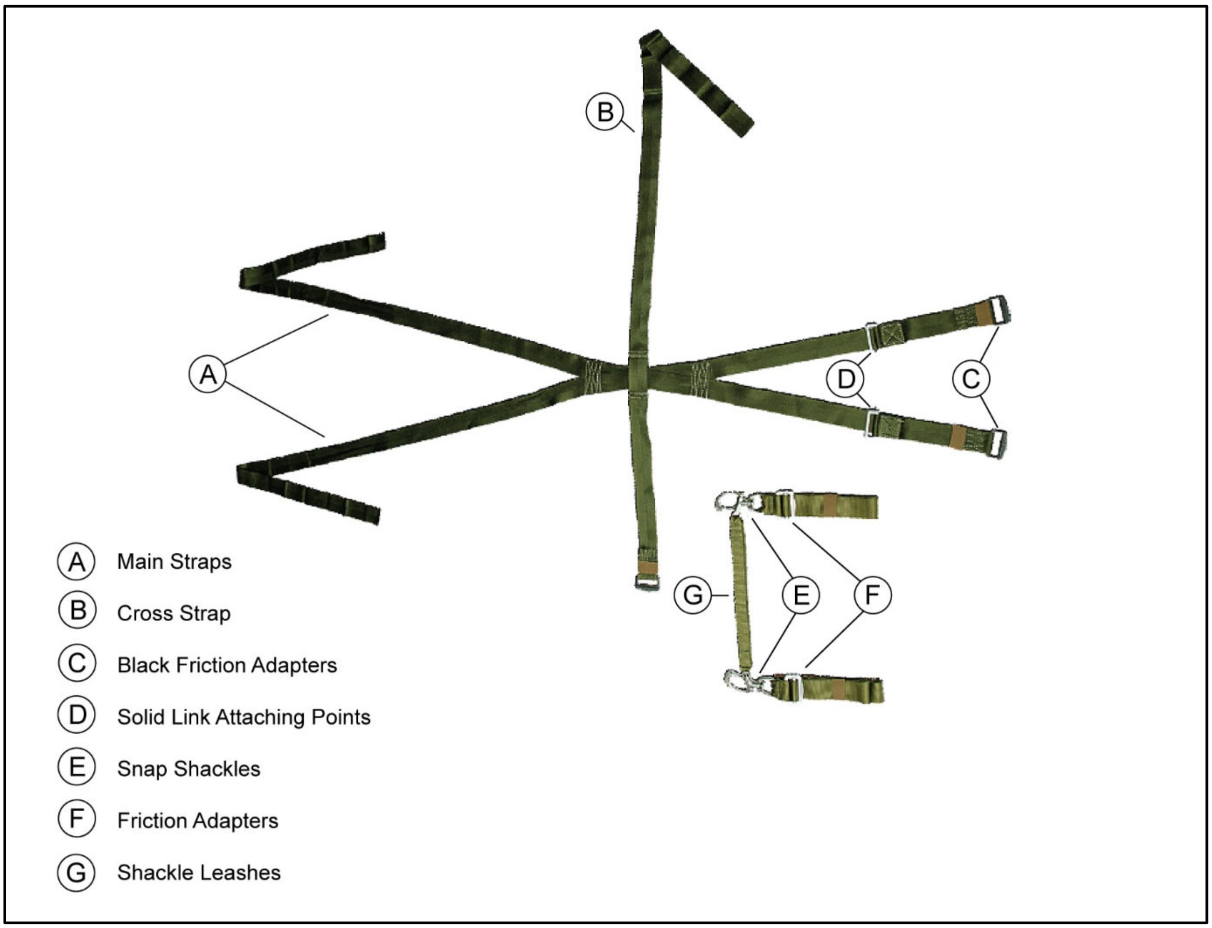


Figure 12-2. Special operations forces harness and parachute attaching straps

12-15. To stabilize the pack to the parachutist during exit, free-fall, and parachute deployment, parachutists step through the pack's shoulder straps. The SOF harness system has a dual-point release assembly that allows parachutists to control the release of the pack to maintain stability before landing.

RIGGING THE COMBAT PACK TO THE SPECIAL OPERATIONS FORCES HARNESS

12-16. Before attaching the SOF harness and the parachute attaching straps to the combat pack, lay the harness out on a clean, flat surface with solid links facing the ground. The jumper will—

- Place the SOF harness solid links facing the ground (figure 12-3 [A], page 12-7).
- Place the pack on the harness (figure 12-3 [A], page 12-7) with pockets facing down, frame up and top of pack facing free ends of main harness webbing. The solid link attaching points should be sticking out approximately 10 inches from under the pack.
- Route the cross strap (figure 12-3 [B], page 12-7) around the pack, and route the mates into their respective friction adapter.
- Route the main, diagonal strap friction adapters (figure 12-3 [C], page 12-7) through the webbing on the bottom of the pack. Solid Link attaching points should be on the inside edge of the waistbelt, facing out from the pack.
- Route the free ends of the main, diagonal straps (figure 12-3 [C/D], page 12-7) over the pack lid (through the webbing on top of the lid, if present), crossing in the center of the pack, over the cross strap and attaching to the friction adapters.
- Turn the pack over (figure 12-4, page 12-7) and adjust the cross strap around the pockets; center the harness.
- Tighten all straps (figure 12-3 [D], page 12-7) then roll the excess webbing and secure it with retainer bands or tape. Fold and secure loose ends with the webbing retainer or masking tape.
- Attach the hook-pile tape lowering line (figure 12-3 [D], page 12-7) in the same way as with the harness, single-point release for a front-mounted combat pack. Route the loop end under crossed diagonal straps and pass the running end through the loop. Secure the hook-pile tape lowering line to the right side of the pack. The 8-foot hook-pile tape lowering line is normally used for MFF operations.
- Attach the parachute attaching straps (figure 12-4, page 12-7) by routing the webbing through the solid link attaching point on the harness and back into the friction adapter on the attaching strap. Repeat for the other side.
- Tighten the webbing of each parachute attaching strap (figure 12-4, page 12-7) to the desired length and secure the running end with the webbing retainer or masking tape.
- Adjust snap shackle leashes to width of chest (allows for arch in flight). Leave the straps connected until it is time to attach the combat pack to the parachutist.

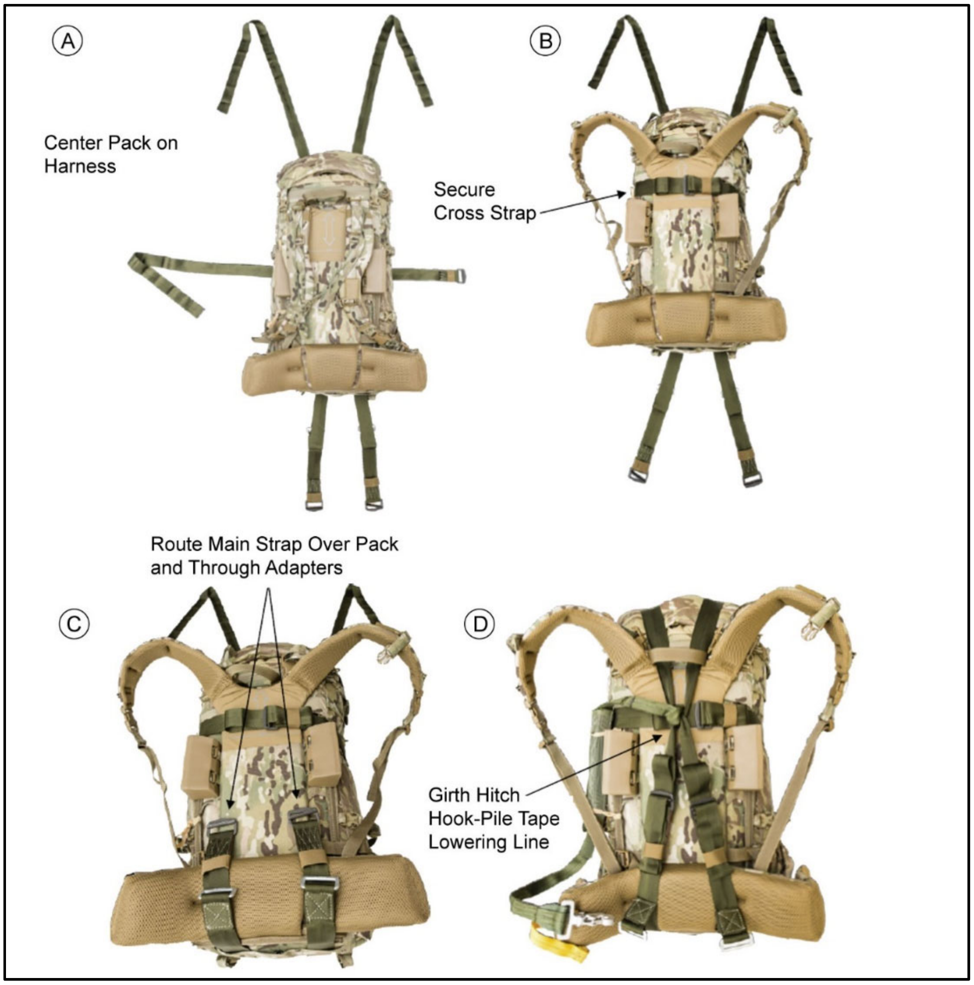


Figure 12-3. Rigging the special operations forces harness

Figure 12-4. Special operations forces harness rigged to the parachutist drop bag

Connecting the Special Operations Forces Harness and Combat Pack to the Jumper's Harness

12-17. The parachutist stands facing the rigged combat pack and steps through the pack shoulder straps. The parachutist opens the snap shackles by pulling on the leashes; he then grasps the harness by the attaching straps and secures the snap shackles to the equipment attachment rings on the main lift webs. The parachutist attaches the ejector snap on the hook-pile tape lowering line to the parachute harness. The jumper will—

- Stand facing the rigged combat pack.
- Step through the pack shoulder straps.
- Secure the snap shackles to the equipment attachment rings.
- Secure the hook-pile tape lowering line ejector snap to the outermost equipment attachment ring.

WARNING

When jumping the hand-deployed pilot chute from the BOC, the hook-pile tape lowering line will be attached to the left side of the jumper's combat container and attached to the left outermost equipment attachment ring.

Improved Equipment Attachment Sling

12-18. The improved equipment attachment sling (figure 12-5) was a component of the MC-3 MFF system and is still being utilized by the MFF community today to rig combat packs to the parachute harness. This system is also known as the spider harness. The jumper modifies this sling by removing the leg straps with hook pile tape (HPT) closures or folds and tapes the leg straps so that they cannot be used. When attached to the jumper the pack shoulder straps are used to secure the pack around the jumper's legs.

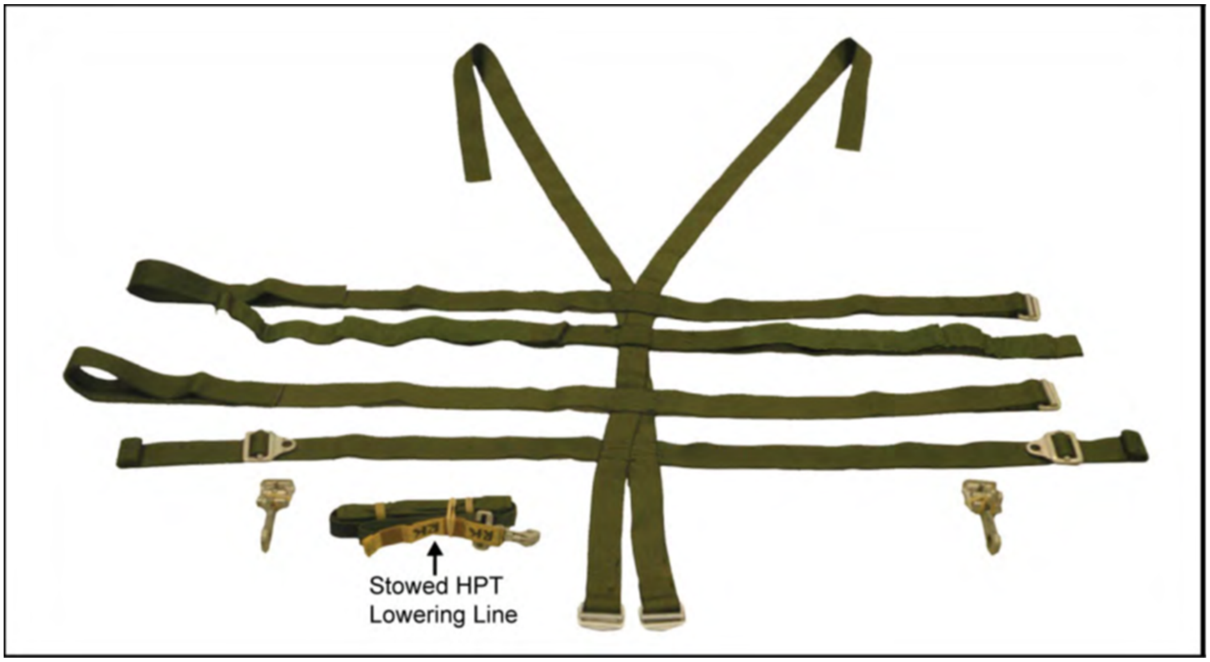


Figure 12-5. Improved equipment attachment sling and lowering line (spider harness)

Rigging the Combat Pack With the Improved Equipment Attachment Sling (Spider Harness) and Lowering Line

12-19. The parachutist—

- Tightens and secures all straps on the pack and positions the pack with the frame up (figure 12-6 [A]).
- Positions the harness on the frame with the friction adapters on the diagonal locking straps at the bottom of the frame and the running ends at the top of the frame.
- Routes the diagonal locking strap friction adapters under the pack frame's base.
- Routes the anchor straps (parachute harness attaching straps with adjustable quick-release lugs) and lateral locking straps under the shoulder straps and over the pack frame.
- Turns the pack over and routes the running ends of the diagonal locking straps around the long axis of the pack, across the straps at the center of the back.
- Secures the diagonal locking straps to the respective friction adapters that protrude beneath the bottom of the pack frame (figure 12-6 [B]).
- Tightens the lateral locking straps and secures them around the pack and to their respective friction adapters (figure 12-6 [C]).
- Folds and secures the running ends of all straps with tape or ties them with 1/4-inch cotton webbing.
- Places the combat pack in an upright position.
- Attaches a quick-release snap hook to each adjustable lug so that the latch handles face away from his body when he attaches the combat pack to the equipment rings (figure 12-6 [D]).

WARNING

The parachutist tapes all combat pack shoulder strap quick-ejector releases to preclude inadvertent release in free fall, causing instability.

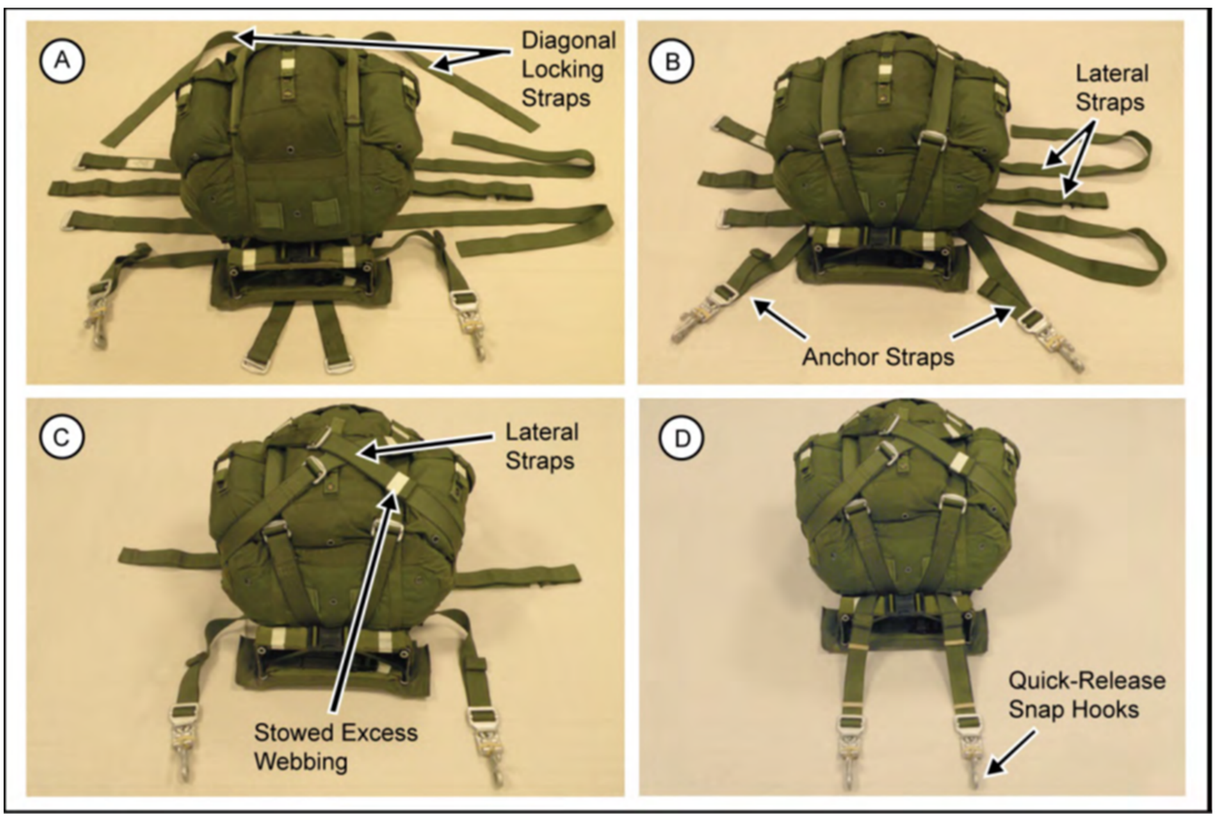


Figure 12-6. Combat pack and frame rigged with the improved equipment attachment sling

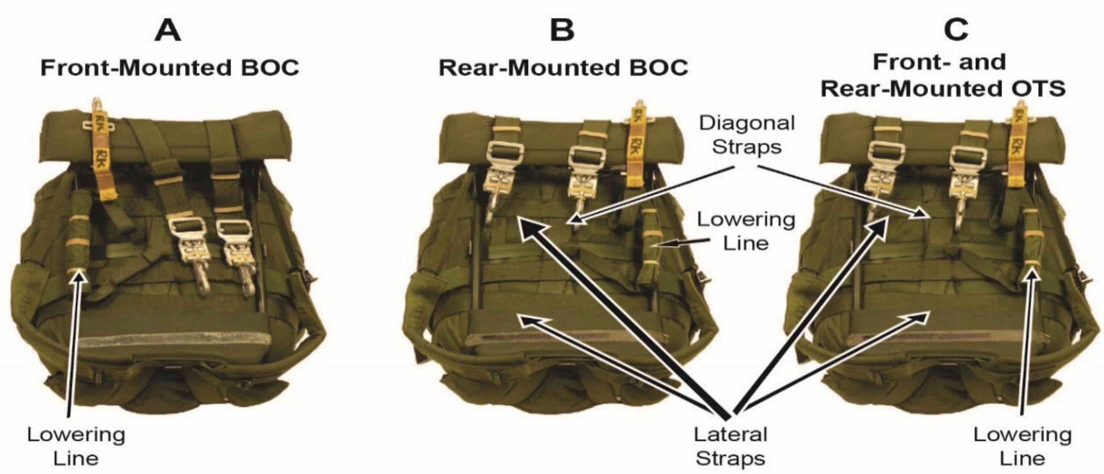
Attaching the Lowering Line

12-20. The parachutist—

- Routes the loop end of the lowering line under the crossed diagonal straps between the diagonal straps and the loop on the backside of the diagonal straps.
- Passes the running end of the lowering line through its own loop and tightens it (figure 12-7).
- Makes S-folds with the remainder of the lowering line and places the S-folds into the retainer pocket.
- Secures the lowering line retainer pocket to the pack frame (jumpers left for BOC), with retainer bands. Uses three retainer bands: two on the frame and one double-wrapped around the center of the lowering line.
- Removes the yellow release lanyard or, if it remains attached to the HPT lowering line, tapes it to the lowering line with one single wrap of masking tape the length of the lanyard, leaving 1 to 2 inches exposed at the top of the lanyard.
- Attaches the lowering line quick-ejector snap to the left-side outermost equipment attachment ring.

WARNING

When jumping the RA-1 in the bottom of container (BOC) configuration with the hand-deployed pilot chute, the hook-pile tape lowering line will be attached to the left side of the jumper's combat container and the lowering line quick-ejector snap attached to the left outermost equipment attachment ring.



A

Jumper secures the lowering line to the left side of the pack for BOC when jumping front mounted.

B

Jumper secures the lowering line to the right side of the pack for BOC when jumping rear mounted.

C

Jumper secures the lowering line to the right side of the pack for OTS when jumping front or rear mounted.

Parachutist routes the loop end of the lowering line under crossed diagonal straps (between diagonal straps and the loop that faces the pack). He passes the running end of the lowering line through the loop and tightens.

Legend:

BOC bottom of container
OTS over the shoulder

Figure 12-7. Attaching the lowering line to the combat pack

Attaching the Front-Mounted Combat Pack

12-21. The parachutist—

- Loosens the shoulder straps.
- Faces the combat pack and steps through the shoulder straps, one leg through each strap.
- Attaches the quick-release snap hooks to the equipment attachment rings on the main lift webs.
- Tightens equipment attachment straps.
- Ensures the pack is sitting level.
- Folds the excess webbing and secures webbing in the webbing retainer.
- Attaches the hook-pile tape lowering line ejector snap to the left outermost equipment attachment ring.
- Tightens shoulder straps around legs.
- Arches to ensure there is no restriction in movement.

Attaching the Rear-Mounted Combat Pack

12-22. The parachutist—

- Loosens the shoulder straps and steps through the shoulder straps, one leg through each strap.
- Attaches the quick-release snap hooks to the equipment attachment rings on the main lift webs.
- No. 2 lifts up on the pack and the jumper pulls the slack out. In this last step, the parachutist could pull out the slack by himself by squatting and sitting on the pack. Attaches the hook-pile tape lowering line ejector snap to the left outermost equipment attachment ring.
- Tightens pack shoulder straps around legs.
- Arches to ensure there is no restriction in movement.

WARNING

The parachutist should lower all rear-mounted combat packs with frames to avoid injury upon landing.

Releasing the Combat Pack

12-23. After his canopy deploys and when he is clear of other parachutists and has canopy control, the parachutist will verify at 1,000 feet AGL that the HPT lowering line is still attached, cross fit (grip switch) and pull both brakes to the half position, loosen the combat pack's shoulder straps, and pull them clear of the kit bag. He then detaches the combat pack's left-side quick-release snap hook so that the pack falls cleanly when released. When on his final approach and 500 feet above the ground, he ensures that the ejector snap and HPT is still connected, then releases the second quick-release snap hook, catches his combat pack with his feet, and flies to the desired landing point. Between 500 to 200 feet after turning on final approach, the parachutist looks down and around to verify that airspace is clear and then ensures the combat pack is fully lowered and off the feet before he lands. To jettison the combat pack, he releases the lowering line's quick-ejector snap, allowing the pack to fall free.

12-24. The parachutist then pulls on the free running ends of the attaching straps and cinches the pack up to the large equipment attachment rings. After this, the parachutist makes sure the pack is level, then folds the excess webbing and secures it in the webbing retainer. The parachutist arches chest wide to make sure the leashes are adjusted wide enough and the shackles do not prematurely release.

12-25. The jumper—

- Pulls the attaching straps to cinch the pack to the equipment attachment rings.
- Ensures the pack is sitting level.
- Folds the excess webbing and secures it in the webbing retainer.
- Arches to ensure the leashes are properly adjusted.

12-26. Figure 12-8 shows the SOF harness attached to the PDB in BOC configuration.

Figure 12-8. Special operations forces harness attached to the parachutist drop bag in the bottom of the container configuration (jumper's left, front, and right views)

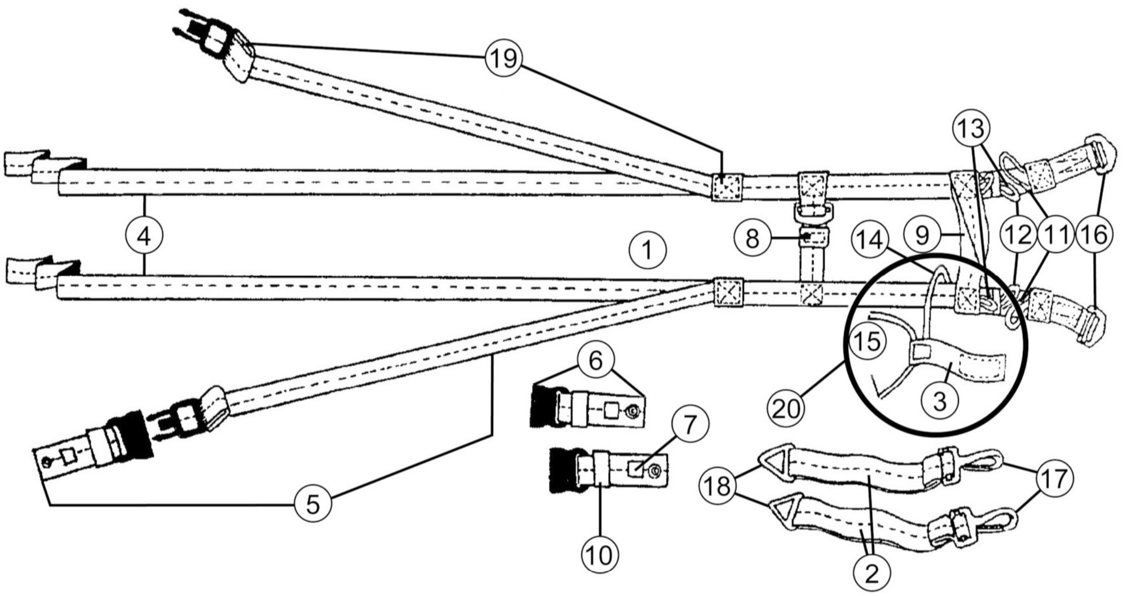
WARNING

The jumper will ensure the leashes are adjusted wide enough that the shackles will not release unintentionally during free-fall flight when arching.

HARNESS, SINGLE-POINT RELEASE

12-27. The harness, single-point release (figure 12-9, page 12-13), is an H-type design. It is made of nylon webbing, has friction adapters to secure it around the load, and has two adjustable D-ring attaching straps.

To stabilize the pack to the parachutist during movement inside the aircraft, exit, free-fall, and parachute deployment, two adjustable leg straps are used to secure the pack to the parachutist's right and left legs. The leg straps are equipped with the male portion of the leg strap release assembly. The harness has a single-point release assembly that simultaneously releases the load and leg straps from the parachutist and parachute harness.



1	Harness, Single-Point Release	11	White Attaching Loop
2	Adjustable D-ring Attaching Strap	12	Green Attaching Loop
3	Release Handle	13	Red Attaching Loop
4	Equipment Retainer Strap	14	Release Handle Lanyard
5	Adjustable Leg Strap	15	Release Handle Cable
6	Female Portion; Leg Strap Release Assembly	16	Friction Adapter
7	Cable Loop Retainer	17	Snap Hook
8	Adjustable Cross Strap	18	Triangle Link
9	Release Handle Cross Strap	19	Male Portion, Leg Strap Release Assembly
10	Webbing Retainer	20	Release Handle Assembly

Figure 12-9. Harness, single-point release (NSN 1670-01-227-7992)

Rigging the All-Purpose, Lightweight, Individual, Carrying Equipment Pack With the Harness, Single-Point Release

12-28. Before attaching the harness, single-point release to the all-purpose lightweight individual carrying equipment (ALICE) pack and Service-authorized combat packs, attach the release handle and adjustable D-ring attaching straps (figure 12-10, page 12-14) to the harness, single-point release.

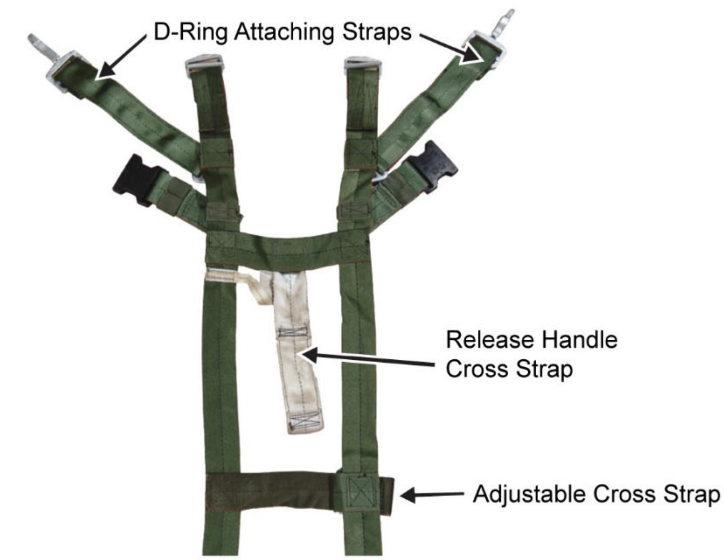


Figure 12-10. Harness, single point release (release handle and D-ring attaching straps)

Packing Procedures

12-29. When packing the combat container, the parachutist follows these procedures:

- Pad and, if required, waterproof any fragile or sensitive gear, such as communications equipment. Place these items toward the rear of the container, locating the gear closest to the lowering line attachment point.
- Continue waterproofing and packing the personnel load in accordance with team SOPs.
- Place equipment in the combat container and padding between the load and the portion of the container that will make contact with the ground first.
- Fill outside pockets with nonfragile items and tape snaps to prevent them from opening during free-fall. If using the harness, single-point release, fill the outer pockets help to keep the harness in position.
- Close the combat container by engaging drawstrings and tie-down straps.
- Roll and secure any excess webbing or drawstrings.
- Route the running end of the combat container waistband behind the frame and secure the waistband running ends by using the webbing retainer or masking tape.
- If conducting a water jump, dip test equipment to assure positive buoyancy and that the equipment remains dry. Conduct a second dip test after the combat container is completely rigged.

Harness, Single-Point Release

12-30. The harness, single-point release is an equipment attachment sling designed to be used as an alternative to the PDB. It is attached directly to the equipment being jumped. The parachutist pulls the single-release handle to lower equipment to the end of an 8- or 15-foot lowering line.

12-31. The harness, single-point release (figure 12-10) is an H-type design for MFF parachutists. The harness is made of nylon webbing, has friction adapters to secure it around the load, and has two adjustable D-ring attaching straps.

12-32. Two adjustable leg straps secure the equipment to the parachutist's right and left legs. This stabilizes the equipment to the parachutist during movement inside the aircraft, exit, free-fall, and parachute deployment. The leg straps are equipped with the male portion of the leg strap release assembly.

12-33. The harness has a single-point release assembly that simultaneously releases the load and leg straps from the parachutist and parachute harness.

Rigging Procedures

12-34. The parachutist performs the steps discussed below to rig the harness, single-point release to the ALICE pack. The parachutist—

- Routes the two release handle cables between the two plies of the release handle cross strap.
- Attaches the pile tape of the release handle to the hook tape attaching tab, located between the plies of the release handle cross strap. He ensures that the release handle lanyard is not misrouted.
- Places the triangle links of the adjustable D-ring attaching straps on top of the white attaching loops.
- Routes the white attaching loop up through the triangle link (figure 12-11 [A]).
- Routes the green attaching loop up through the white attaching loop (figure 12-11 [A]).
- Routes the red attaching loop up through the green attaching loop (figure 12-11 [A]).
- Routes the red attaching loop through the grommet on the female portion of the leg strap release assembly. He ensures that the cable loop retainer on the female portion of the leg strap release assembly is facing up (figure 12-11 [A]).
- Routes the release handle cable through the red attaching loop and then through the cable loop retainer. He repeats the process for the other strap (figure 12-11 [B]).
- Turns the harness over so that the adjustable D-ring attaching straps are on the bottom.

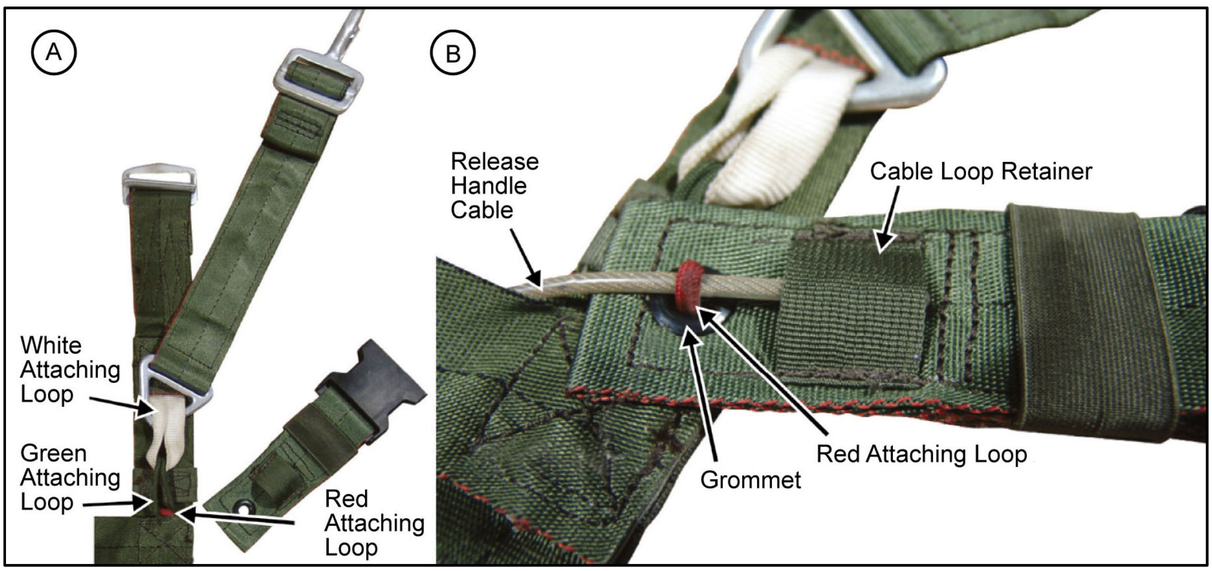


Figure 12-11. Attaching snap hooks and leg strap release assembly

- Places the ALICE pack on top of the harness so that the middle outer cargo pocket is placed between the release handle cross strap and the adjustable cross strap (figure 12-12 [A], page 12-16).
- Ensures the top of the pack is facing the equipment retainer straps (figure 12-12 [A], page 12-16).
- Routes the equipment retainer straps underneath the top of the frame, crosses them on the back of the pack to form an X, and then routes them underneath the frame and the backrest of the pack (figure 12-12 [B], page 12-16).

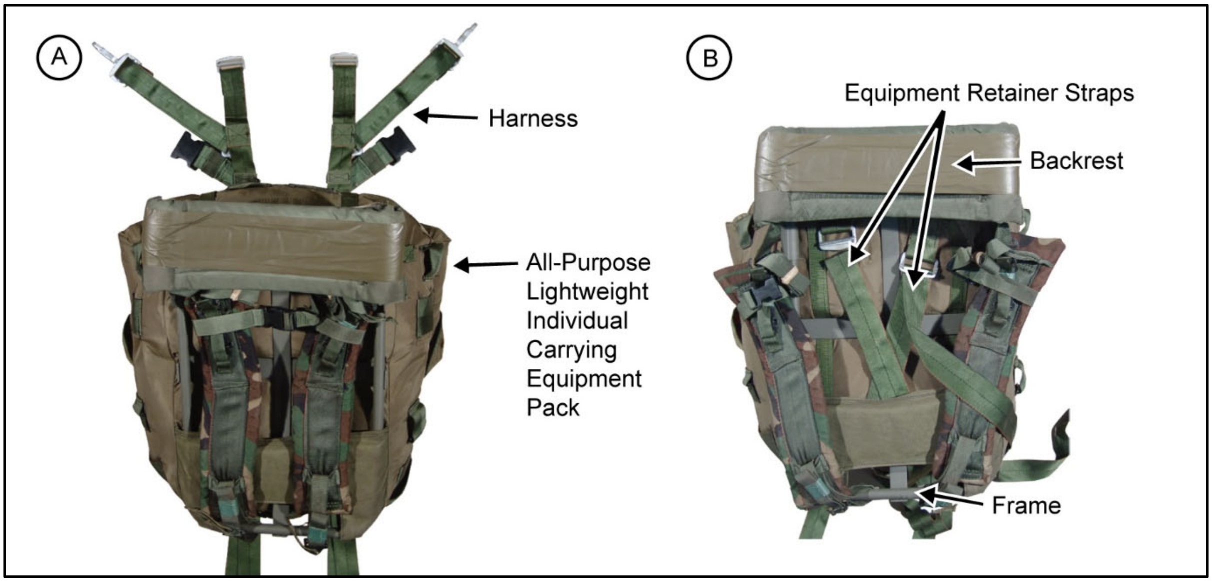


Figure 12-12. Rigging the harness, single-point release

- Routes the equipment retainer straps through their appropriate friction adapters (a two- or three-finger quick release is optional; if used, the quick-release loop is secured to the harness with tape or a retainer band) (figure 12-13 [A]).
- S-rolls the excess webbing and secures it with retainer bands or tape (separates from the quick release loop, if used) (figure 12-13 [A]).
- Tightens the shoulder straps.
- Routes the adjustable leg straps around the pack and attaches the male portion of the leg strap release assembly to the female portion of the leg strap release assembly, leaving it connected until it is time to attach the combat pack to the parachutist (figure 12-13 [B]). The harness, single-point release leg strap release (male portion) may be routed through the pack, between the frame and pack on shorter parachutists to allow tighter attachment of the ALICE pack.

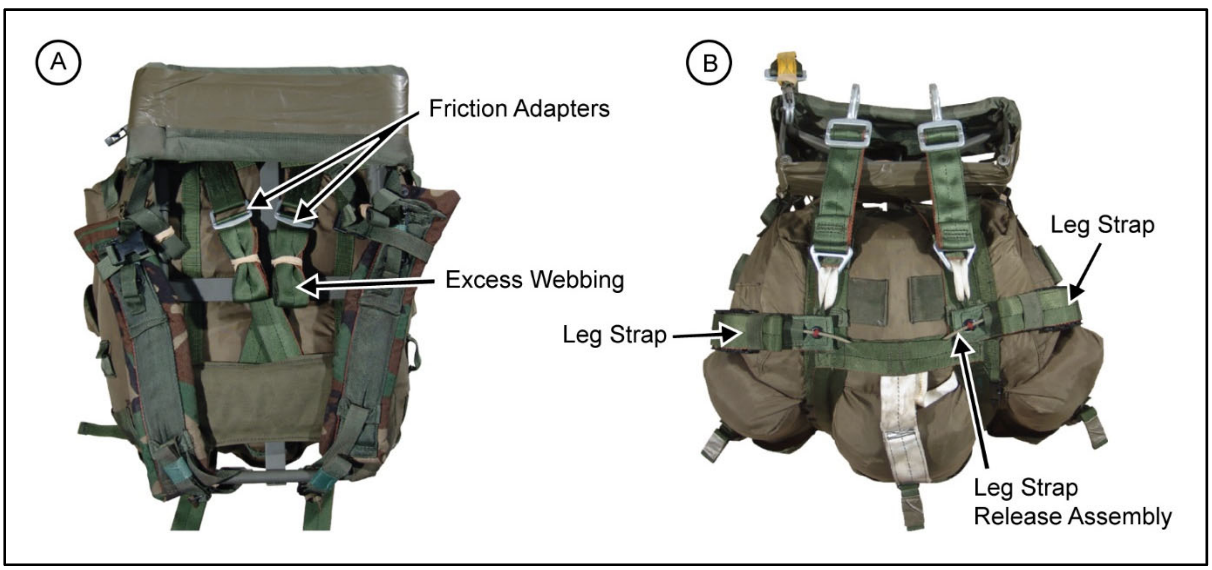


Figure 12-13. Completed rigging of the harness, single-point release

Note: Oscillation under canopy is dramatically increased when using the 15-foot hook-pile tape lowering line.

Hook-Pile Tape Lowering Line Assembly

12-35. The parachutist attaches the hook-pile tape lowering line in the same way as with the modified H-harness for a front-mounted combat pack (figure 12-14). The 8-foot hook-pile tape lowering line is normally used for MFF operations. Terrain considerations may require use of a 15-foot hook-pile tape lowering line.

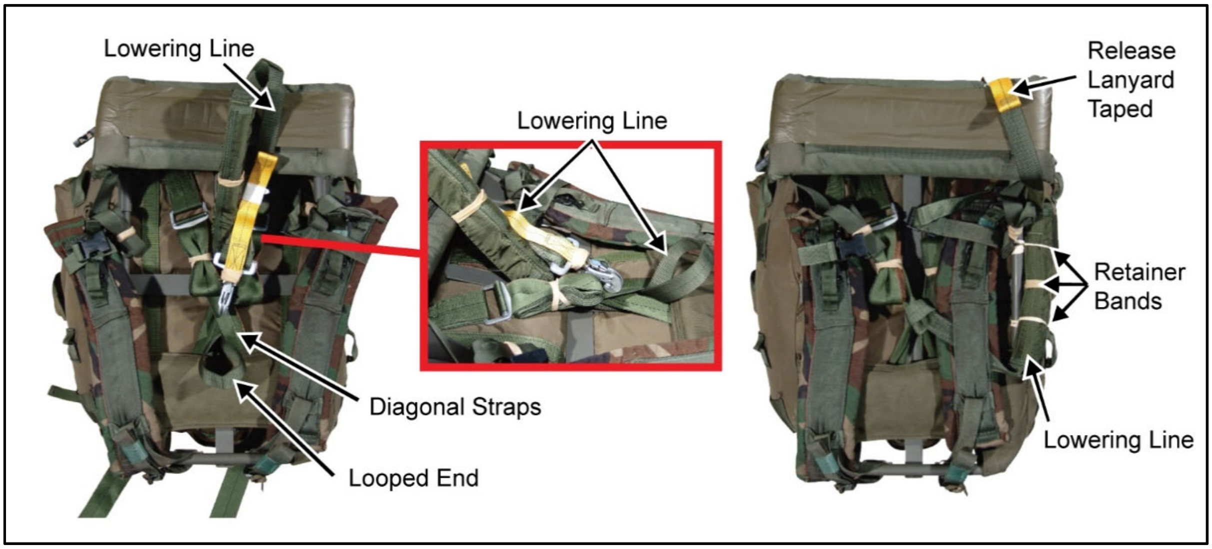


Figure 12-14. Attaching the hook-pile tape lowering line assembly

WARNING

When jumping the hand-deployed pilot chute from the BOC, the lowering line will be attached to the left side of the jumper's combat container and attached to the left equipment attaching ring.

Attaching the Harness, Single-Point Release, for Rigged Combat Equipment to the Parachutist

12-36. The buddy system or the seat of the aircraft should be used to attach the harness, single-point release to the parachutist.

Note: Parachutists can use either the shoulder straps or the leg straps to secure the combat equipment to the legs when using the harness, single-point release. The same sequence is followed for attaching the front-mounted combat pack using the hook-pile tape lowering line.

12-37. The parachutist performs the steps discussed below to attach the harness, single-point release for rigged combat equipment:

- The parachutist loosens the shoulder straps and steps through them, if used in this configuration and not the harness, single-point release leg strap configuration. If not, continue to the next step.
- Parachutist #1 grasps the harness by the two adjustable D-ring attaching straps and secures the snap hooks to the equipment attachment rings directly below the three-ring release assemblies.
- Parachutist #1 attaches the quick-ejector snap on the hook-pile tape lowering line to the right-side lowering line attachment ring (lower equipment ring) on the parachute harness.

Note: When jumping the hand-deployed pilot chute from BOC, attach the lowering line quick-ejector snap on the hook-pile tape lowering line to the left equipment attachment ring on the parachute harness.

- Parachutist #2 (if using the adjustable leg straps) routes the adjustable leg straps around the legs of parachutist #1 and attaches the male portion to the female portion of the leg strap release assembly. If using the shoulder straps, this step is skipped.
- Parachutist #1 pulls on the free-running ends of the adjustable D-ring attaching straps and tightens the pack up to the equipment attachment rings.
- Parachutist #1 folds the excess webbing and secures it in the webbing retainer or uses masking tape.

PARACHUTIST DROP BAG PROCEDURES

12-38. The PDB is a fast, easy, and secure way of carrying the parachutist's rucksack and load-bearing equipment for MFF operations. The bag opens and closes quickly so that the equipment can be secured efficiently on the DZ. There are exterior pockets for water and maps so that the parachutist does not have to open his rucksack on the aircraft. There is an integral 8-foot lowering line attached to the bag. The bag is reversible with shoulder straps on both sides. The side with the hardware for dropping is camouflage in color, allowing the parachutist to put his parachute into it on the DZ for a hasty cache. The other side is dark gray, which presents a visually lower profile so that equipment can be carried through an airport. The standard size of the PDB is medium; this size allows most parachutists to put a mission combat pack and load-bearing equipment in the bag. The smallest bag possible should be used so the straps can compress the load to prevent the contents of the PDB from shifting.

***Note*:** The enhanced parachutist drop bag (EPDB) can be rigged in the same manner as the PDB.

LOADING THE PARACHUTIST DROP BAG

12-39. The parachutist opens the bag completely, forming an open clamshell. He places the rucksack and load-bearing equipment on the open bag. The hip pad of the rucksack should be against the top of the side facing the parachutist (as the bag hangs on the harness). The parachutist then zips the bag shut and connects and tightens the compression straps (figure 12-15, page 12-19).

12-40. After loading the bag and securing any excess webbing, the jumper girth hitches the lowering line to the attaching point and stows it in the pouch on the outside of the bag. After stowing is completed, he sets up the quick-release assembly using the same procedures as on the harness, single-point release. The parachutist then does the following:

- Stows and mates the Velcro on the release handle with the cables facing toward the white loops.
- Ensures the release handle lanyard is not misrouted.
- Threads the white attaching loop through the triangle link.
- Threads the green loop through the white loop and the red loop through the green loop.
- Threads the red loop through the grommet on the female portion of the leg strap release assembly with the cable loop retainer facing up.

- Threads the release cable through the red loop and into the cable loop retainer.
- Repeats the same process on the opposite side.

Figure 12-15. Compression straps connected and tightened

ATTACHING THE PARACHUTIST DROP BAG

12-41. The PDB can be attached to the front or rear of the parachutist. The PDB attaches to the parachutist by standard quick-release connectors (figure 12-16, page 12-20). The quick release system will have a retainer band doubled-looped around the center point of the activation arm. The equipment attachment straps are long enough for the parachutist to connect the bag to his parachute harness's upper large equipment rings while the bag rests on the floor. When jumping the bag on the rear of the jumper, the bag should be up against the BOC, allowing approximately 4 inches between the BOC and the top of the PDB, when jumping the bag in the rear, and as close as possible to the equipment attachment rings, when jumping the bag in front (figure 12-17 [A], page 12-20). The excess webbing on the attachment straps should be stowed in the webbing retainers on the strap itself prior to jumping. The integral lowering line is identical to that already used by parachutists. It attaches in the same manner to the upper or lower equipment ring; it is the outer most equipment attachment if using the upper equipment ring (figure 12-17 [B], page 12-20). The integral lowering line may also be girth-hitched to a Stubi-85 (locking carabiner) and the equipment lowering line V-ring to allow for quick derigging on the ground.

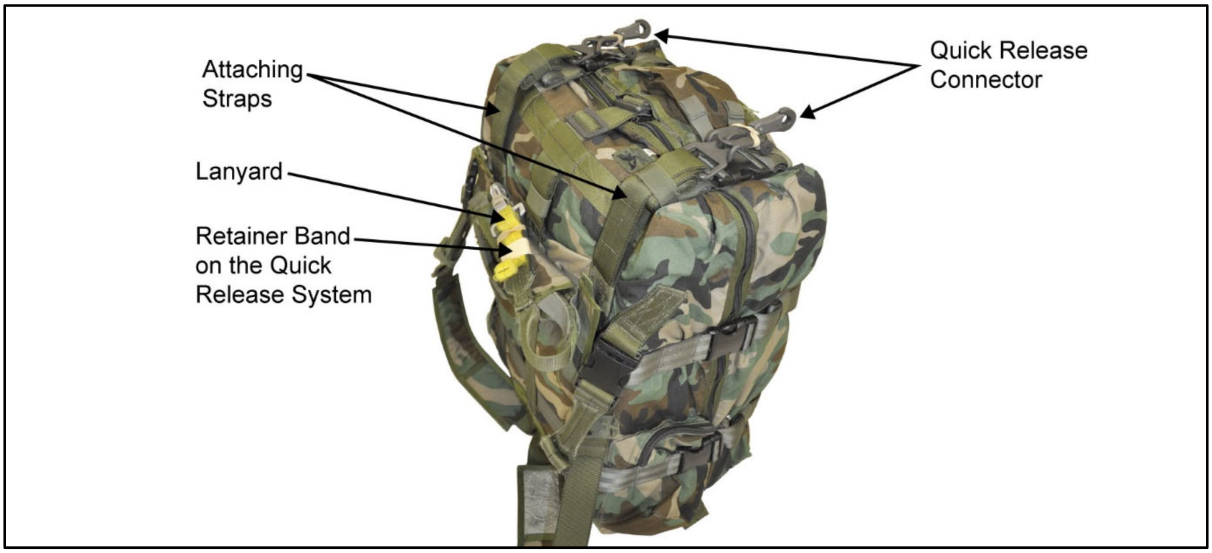


Figure 12-16. Parachutist drop bag quick-release connectors

Figure 12-17. Parachutist drop bag showing the lowering line attachment point

JUMPING THE PARACHUTIST DROP BAG

12-42. The bag is jumped in an identical manner as the standard rucksack (figure 12-18, page 12-21). The shoulder straps (used as leg straps while jumping) should be tightened around the thighs but not so tight as to restrict movement. Once under canopy, the pull-tabs on the shoulder straps (leg straps) can be pulled to loosen the straps from around the legs.

DERIGGING THE PARACHUTIST DROP BAG

12-43. Once on the ground, the parachutist detaches the lowering line from the parachute. He then unbuckles all of the Fastex buckles and secures the compression straps around the bag. The slide fastener closing the bag can be ripped open by pulling apart both sides of the bag, exposing the load. The parachutist removes the load and places the parachute inside the bag for storage or a hasty cache.

Figure 12-18. Parachutist drop bag rigged for front-mounted jump

WEAPON RIGGING PROCEDURES

12-44. An MFF parachutist can jump with his individual weapon exposed, inside an approved weapons container, or packed inside an approved rucksack. When jumping with the weapon exposed, the parachutist attaches the weapon to the left or right side. However, when jumping with oxygen, the parachutist should rig the weapon on the left side or use the CMWH. If jumping with multiple weapons, the larger weapon should be attached to the left side or rigged horizontally with the CMWH. If not using the CMWH, place the smaller weapon to the right side and the larger weapon on the left side of the parachutist. The parachutist can jump with a pistol in a shoulder holster or in an approved equipment container. The parachutist should wear the shoulder holster under the jumpsuit or other protective clothing. The parachutist should secure the pistol in the holster by taping the holster closed, using an airborne strap, or by using a lanyard that will not interfere with the jumper or parachute system.

Center-Mounted Weapon Harness

12-45. The CMWH (figure 12-19) is in response to USASOC's need for a weapon harness that allows the parachutist ease of donning and doffing during MFF operations.

WARNING

The CMWH will not be used when conducting MFF door exits from any fixed-wing or rotary-wing aircraft. The CMWH will only be used when conducting over-the-ramp MFF airborne operations.

Figure 12-19. Center-mounted weapon harness

12-46. During user assessments and free-fall training conducted at the MFF School at Yuma, Arizona, USASOC Soldiers have conducted thousands of MFF operations using the CMWH. The CMWH is manufactured using the following components:

- **Weapon Harness.** Use 1-3/4-inch nylon tape backing with pile sewn the length of two non-nylon-based male end adapters. The additional straps on the weapon harness use 1-3/4-inch nylon tape with either pile or hook sewn to the center of the weapon harness. This forms a triple fold of hook and pile to secure weapons when worn in the vertical configuration. The length of the weapon harness is 24 inches.

- **Main Lift Web Attaching Points.** Use three sections of hook and pile sewn in a triple-fold configuration with 1-3/4-inch nylon tape as a backing with two female non-nylon-based adapters. The length of the main lift web adapters, including female adapters, is 10 inches.
- **Horizontal Attaching Straps.** Use three sections of hook and pile sewn in a triple-fold configuration with 1-3/4-inch nylon tape as a backing. The length of horizontal attaching straps is approximately 20 inches.

12-47. To use the CMWH, the parachutist—

- Attaches the main lift web attaching points to the main lift web of the RA-1 ARAPS harness below the lowering line attachment point with the attachment buckle outboard (figure 12-20).

Figure 12-20. Main lift web attaching points

- For the horizontal configuration, attaches horizontal straps to the pile portion of the weapon harness as close as possible to the male portion of the Fastex buckles (figure 12-21).

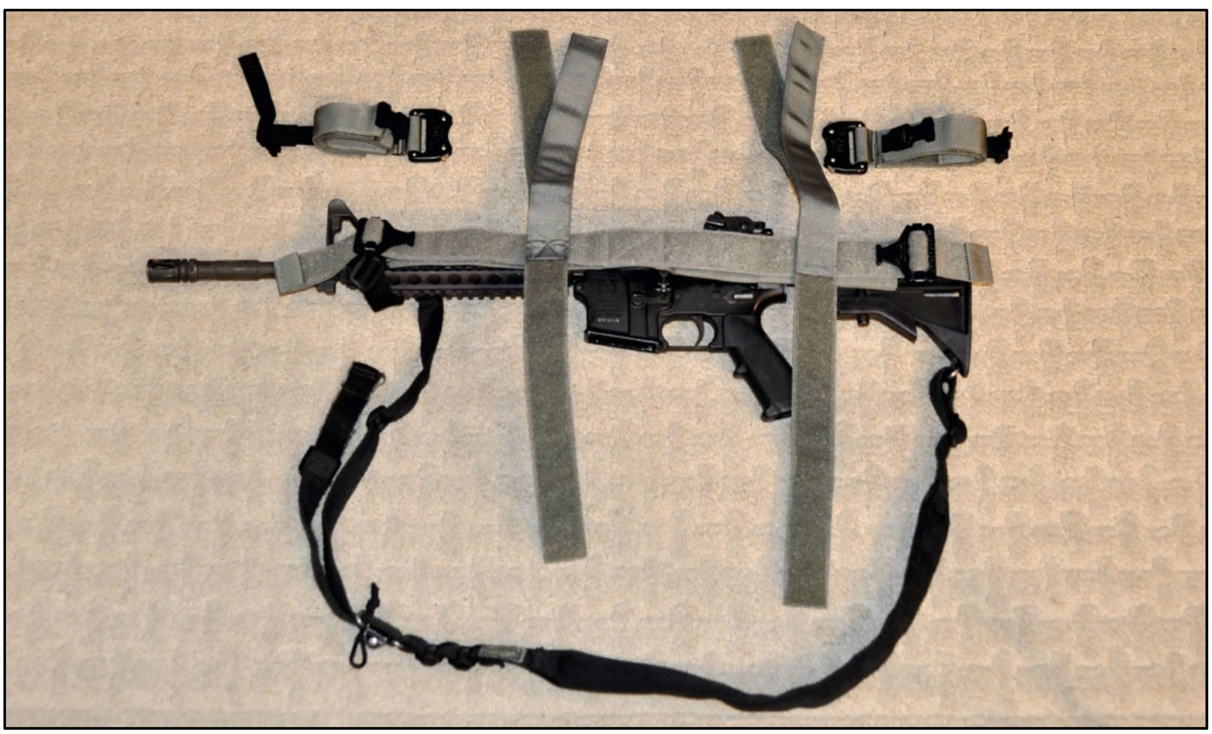


Figure 12-21. Attaching horizontal straps to the pile portion of the weapon harness

- Uses triple-fold hook and pile to secure the weapon harness to the weapon (figures 12-22 and 12-23).

Figure 12-22. Triple-fold hook and pile

Figure 12-23. Securing weapon harness to weapon

12-48. When the parachutist jumps the PDB or ALICE pack, the attaching straps are routed over the weapon (figure 12-24) for additional security.

Figure 12-24. Chest strap routed through the sling and secured with excess chest strap and retainer

EXPOSED WEAPONS CONSIDERATIONS

12-49. If the commander decides that parachutists are to jump with weapons exposed, he must consider the increased risk of injury to the parachutists. To minimize the risks of jumping with exposed weapons, the commander should—

- Consider the proficiency and experience level of the parachutists.
- Conduct a thorough risk assessment that addresses the following risks associated with jumping exposed weapons:
  - Interference with the oxygen system or automatic opening device.
  - Interference with the parachutist's exit from the aircraft.
  - Stability of the parachutist while in free-fall.
  - Ability of the parachutist to perform pull procedures.
  - Ability of the parachutist to perform emergency procedures.
  - Deployment of the parachute.
  - Entanglement of the weapon with another jumper's parachute should a midair entanglement occur.
  - Ability of the parachutist to perform a parachute landing fall.
  - Injury to the parachutist during landing.
  - Damage to the weapon upon landing or when dragged on the ground.

M-4 Carbine-Series Rifle

12-50. To prepare the M-4 carbine-series rifle for jumping (figure 12-25), the parachutist should—

- Adjust the sling to fit just over the shoulder and tape the sling keeper in place.
- Pad and tape the side-mounted bolt assist and the operating handle.
- Pad and tape the muzzle and the sights to avoid possible entanglement with the parachute suspension lines or to avoid debris entering the weapon upon landing.
- Insert the magazine and tape it to the receiver, including the ejector port cover, to prevent loss of the magazine and to keep debris from entering the bolt area.
- Tape the handguards to prevent loss during free-fall or upon landing.
- Tape any accessories on the weapon, such as aim points, to ensure they do not come off during movement.

Note: Neither leather nor padded slings are authorized for MFF operations and should not be used as these items may interfere with emergency procedures when rigged on the parachutist.

Note: The M-16 series rifle is rigged in the same manner as the M-4 carbine-series rifle.

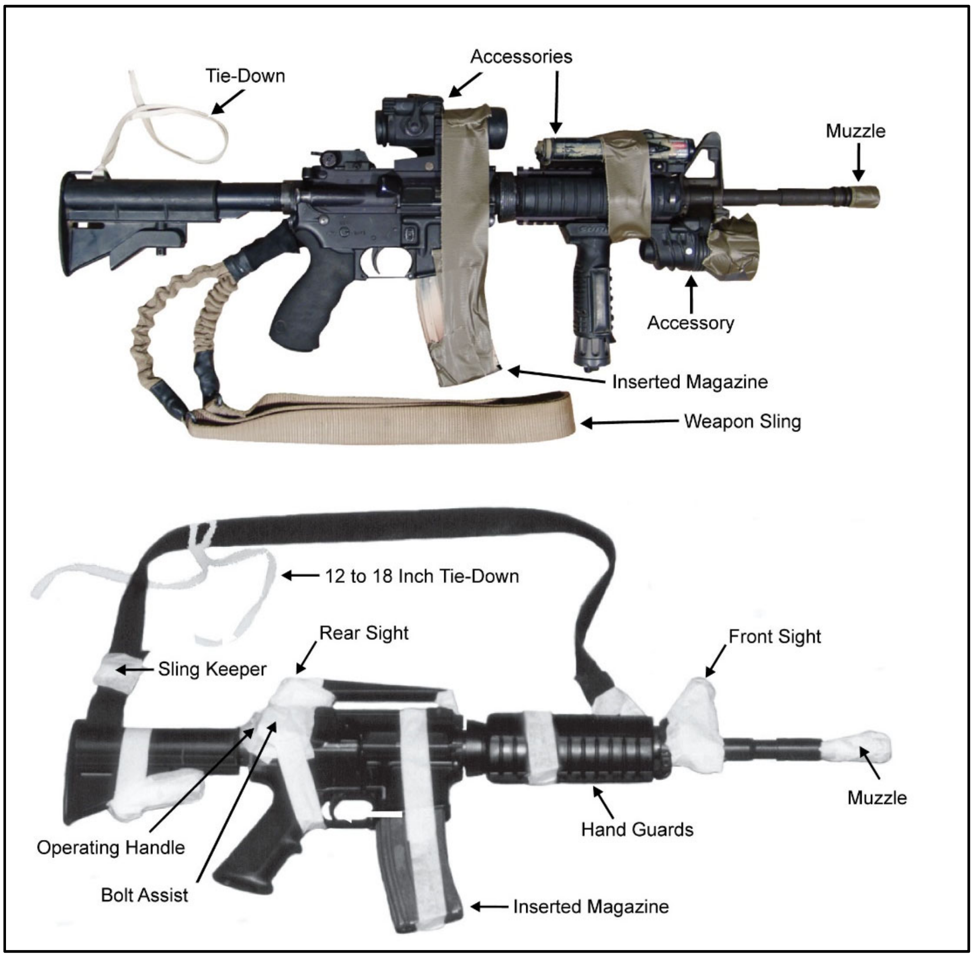


Figure 12-25. M-4 carbine-series rifles rigged for jumping

CAUTION

Any tape should have quick-release tabs and should not interfere with the weapon's operation in case the weapon is needed immediately upon landing.

Tie-Downs

12-51. The parachutist should use a 12- to 18-inch tie-down of 1/4-inch cotton webbing to secure the weapon. He should attach the tie-down to the weapon sling or to a hard point on the weapon with a girth-hitched knot.

Positioning

12-52. With the help of a buddy, the jumper will place the RA-1 ARAPS on his back without securing the chest strap. The parachutist slings his weapon over his left shoulder with the muzzle down and rotates the pistol grip 180 degrees, facing the magazine to his rear (figure 12-26). The jumper and his buddy should then—

- Place the sling from the lower keeper (buttstock) on the outside of the weapon butt stock and over the parachutist's shoulder.

Figure 12-26. Positioning the weapon on the jumper

- Route the sling under the main lift web harness and route the chest strap through the sling. Secure the chest strap. The buddy ties off the running ends of the 1/4-inch cotton webbing to a weapon tie-down loop on the RA-1 ARAPS harness with a soft knot (bowknot).
- Place the weapon between the waistband and the parachutist with the waistband routed over or through the weapon-carrying handle. (This last step through the carrying handle is optional as some weapons do not have a carrying handle.)
- Tighten the waistband securely so that the weapon fits snugly against the parachutist's side. The parachutist then assumes the basic free-fall position to test the fit of the weapon.

Note: If optics are mounted on the weapon, they must be free and clear of the waistband.

Note: Ensure the radio pouch is attached to the container when jumping any weapon on the left side.

M-203 Grenade Launcher Or Enhanced Grenade Launcher Module

12-53. The parachutist should prepare the M-203 grenade launcher (figure 12-27) in the same manner as he prepares the M-16 series, M-4, or SCAR carbine-series rifles. In addition, he should—

- Tape the handguards and the grenade launcher barrel together with the barrel latch covered.
- Remove the quadrant sight.
- Tape down the leaf sight.

Figure 12-27. M-203 rigged for jumping

Tie-Downs

12-54. The parachutist should follow the same procedures used for the M-16 series and carbine-series rifles.

Positioning

12-55. The parachutist and his buddy should follow the same procedures used for the M-16 series and carbine-series rifles.

DUAL WEAPON RIGGING PROCEDURES

12-56. When rigging weapons on both sides of the harness, the jumper should—

- Ensure the radio pouch is attached to the container when jumping any weapon on the left side.
- If jumping oxygen, ensure the oxygen system pouch is attached to the container before rigging the weapon on the right side. If not jumping oxygen, the oxygen system pouch is not needed.
- Ensure weapons are padded to prevent injury to the jumper or damage to the weapon system.

Note: This setup minimizes interference with the oxygen system by placing the shorter weapon on the right side and allowing the jumper to conduct a right side parachute landing fall if needed.

- Use standard weapon-rigging techniques to secure the weapons to the parachutist.

- Place the larger weapon on the parachutist's left side and the smaller one on his right side.
- Ensure that the weapon's slings are routed under the main lift of the harness on both right and left sides of the jumper, route the chest strap through the slings, and secure the chest strap.
- Ensure the sling does not interfere with the main ripcord, main canopy release handle (red cutaway pillow), or the reserve ripcord handle (yellow pillow).
- Ensure weapons are tied off to the weapons tie-down loops on both sides of the RA-1 ARAPS harness.
- Ensure the right weapon is behind the oxygen bottles.
- Ensure the left side of the waistband is routed over or through the weapon-carrying handle. (Some weapons will not have a carrying handle.)

Note: When an oxygen system is used, the buddy should place the short weapon behind the oxygen bottles and against the parachutist's body. The buddy should carefully route the medium-pressure delivery hose over or behind the weapon in a manner that does not restrict the flow of oxygen to the parachutist.

Note: When jumping a PDB or rucksack, the lowering line will be connected to the left side equipment attachment rings when jumping dual weapons.

WARNING

It is not recommended to jump a weapon on the right side when jumping the RA-1 ARAPS in the BOC configuration. The barrel of the weapon could increase the chance of a horseshoe malfunction.

M-249 and M-249 Para Squad Automatic Weapons

12-57. The parachutist can jump with the M-249 squad automatic weapon exposed or in an approved weapons container. To prepare the weapon, he should—

- Pad the optics as necessary.
- Tape the muzzle to avoid debris entering the weapon upon landing.

Note: Parachutists must not insert the magazine and must not chamber rounds.

- Wrap one piece of tape around the foregrip of the weapon and secure the carrying handle, handguard, and bipod.

Note: The M-249 Para squad automatic weapon requires an additional piece of tape forward of the vertical grip on the handguard. The parachutist should consider padding the charging handle if the possibility of discomfort or injury exists. When jumping with larger weapons on the left side, the parachutist should position the hook-pile tape lowering line to the left side to facilitate a right-side parachute landing fall.

Tie-Downs

12-58. The parachutist should use a 12- to 18-inch tie-down of 1/4-inch cotton webbing to secure the M-249 squad automatic weapon. The parachutist should attach the tie-down to the weapon sling or to a hard point on the weapon with a girth hitch. On the M-249 Para squad automatic weapon, he should attach the tie-down to a hard point on the rear of the weapon.

Positioning

12-59. With the help of a buddy, the parachutist should sling the weapon over his left shoulder, with the muzzle down, and rotate the pistol grip to his rear.

> ***Note:*** The M-249 Para squad automatic weapon may be rigged with the weapon pistol grip to the parachutist's front or rear.

12-60. The parachutist and assistant will then run the weapon sling under the main lift web and route the chest strap through the weapon sling. The buddy parachutist ties off the running ends of the 1/4-inch cotton webbing to a weapon tie-down loop on the harness with a soft knot (bowknot). He places the weapon between the waistband and the parachutist, with the waistband routed over or through the weapon-carrying handle. He tightens the waistband securely so that the weapon fits snugly against the parachutist's side. The parachutist then assumes the basic free-fall position to test the fit of the weapon.

> ***Note:*** If optics are mounted on the weapon, they must be positioned free and clear of the waistband.

M-60 and M-240 Machine Guns, Other Light Machine Guns, and .50-Caliber Sniper Systems

12-61. Because of injury to the jumper or damage to their equipment on landing, the parachutist should not jump these fully assembled and exposed weapons while they are attached to the parachute harness during MFF operations. The parachutist may break the weapons down and pack them inside the combat pack, the PDB/enhanced PDB, or a horizontally mounted kit bag with an H-harness. The parachutist should pad all optics before securing the weapon and optics in the PDB or other Service-approved combat packs.

Other Weapons

12-62. The parachutist can rig other weapons using the methods previously described. User unit's SOPs should specify ways to pack or rig similar types of weapons consistent with safety requirements. Units requiring technical help should contact USAJFKSWCS, B Company, 2d Battalion, 1st Special Warfare Training Group, Yuma, Arizona; Defense Switched Network (DSN) 899-3626/3639.

Chapter 13

Military Free-Fall and Oxygen Equipment Procedures

MFF parachuting is physically demanding. It exposes the parachutist to temperature extremes, rapid pressure changes, and long exposures at altitudes requiring supplemental oxygen. To prepare for this environment, the MFF parachutist must be thoroughly familiar with the physiological effects of oxygen, oxygen use, and the operation of oxygen equipment. This chapter provides the procedures to use when conducting MFF operations with oxygen.

OVERVIEW

13-1. All U.S. Army personnel participating in MFF operations must meet the physiological training requirements outlined in USASOC Regulation 350-2 regardless of altitude and type of aircraft used. Air Force instruction (AFI) 11-403 provides instructions on physiological stresses and human factor implications of modern aviation.

DANGER

Note: **Only qualified parachute riggers or oxygen safety technicians may perform maintenance on oxygen equipment.**

Oil and grease must be kept away from oxygen. Oxygen equipment must not be handled with greasy hands or clothing.

No substance may be in the mouth of any jumper while on life-support equipment (oxygen) at any time, to include smokeless tobacco (dip), chewing gum, or food.

Equipment must be kept clean and free from petroleum-based products, lubricants, hydraulic fluid, and dirt. A drop of oil or lubricant coming in contact with pure oxygen under certain circumstances can cause an explosion.

Oxygen must be kept away from any source of ignition, fire, or flame. Small fires rapidly become large fires in the presence of oxygen supplies. Soldiers must never permit smoking near oxygen equipment, while handling oxygen supplies, or when using oxygen life-support equipment.

Cylinders and valves must be handled with extreme caution. Before opening cylinder valves, Soldiers must ensure the cylinder is firmly supported. Oxygen cylinders must not be dropped or tipped over. Dropping a cylinder can damage or break the valve, allowing gas to escape under pressure with the potential for propelling the cylinder a great distance and with great force. Soldiers must only open and close oxygen valves by hand and never strike the valve with any tool or object to loosen it. If the parachutist or technician cannot open and close the oxygen valve by hand, the cylinder must be returned to the depot for repair.

Note: Only essential personnel who have completed High-Altitude Parachutist Initial Training are permitted on unpressurized aircraft flying above 10,000 feet MSL. (Exception: Tandem passengers do not require High-Altitude Parachutist Initial Training and are permitted on unpressurized flights up to 13,000 feet MSL provided that the time above 10,000 feet MSL does not exceed 30 minutes.)

OXYGEN HANDLING AND SAFETY

13-2. Because of the limited contact with oxygen and its handling, personnel may not fully realize the danger involved. Improper use and handling can result in property damage, serious injury, and death. Personnel handling oxygen should always adhere to the warnings provided in this chapter. Personnel handling oxygen must—

- **Keep Oil and Grease Away From Oxygen.** Do not handle oxygen equipment with greasy hands or clothing. Do not let fittings, hoses, or any other oxygen equipment get smeared with petroleum-based products, lubricants, hydraulic fluid, or dirt. A drop of oil or lubricant in the wrong place can cause an explosion.
- **Keep Oxygen Away From Fires.** Small fires rapidly become large fires in the presence of oxygen supplies. Never permit smoking near oxygen equipment, while handling oxygen supplies, or when using oxygen life-support equipment.
- **Handle Cylinders and Valves Carefully.** Before opening cylinder valves, make sure the cylinder is firmly supported. Never let a cylinder drop or tip over. Dropping a cylinder can damage or break the valve, allowing the gas to escape and to propel the cylinder a great distance, which is an obvious hazard. Open and close the valves only by hand. If the valve cannot be opened and closed by hand, personnel must return the cylinder to the depot for repair.

PHYSIOLOGICAL EFFECTS OF HIGH-ALTITUDE MILITARY FREE-FALL OPERATIONS

13-3. Most physiological effects of high-altitude MFF operations fall into the category of pressure-change hazards. These hazards usually include various physiological symptoms. Based on Class C physiological mishaps occurring since 1984, the most common types of physiological effects have been sinus and ear blocks, hypoxia, decompression sickness, and hyperventilation. These conditions are discussed in the following paragraphs. Procedures for physiological and oxygen equipment-related emergencies are also discussed.

SINUS AND EAR BLOCKS

13-4. Sinus and ear blocks normally occur when an MFF parachutist with a head cold or some other type of upper respiratory illness conducts an MFF jump. Sinus and ear blocks usually occur during free-fall descent or during aircraft pressurization. Performing a Valsalva maneuver as the parachutist feels his ears getting full can clear most ear blocks. A Valsalva maneuver may clear a sinus block; however, this condition may require additional medical attention. Use of nasal sprays may alleviate the symptoms associated with sinus and ear blocks.

WARNING

Do not chew gum in an attempt to clear blocked ears when wearing the POM.

HYPOXIA

13-5. Hypoxia is a condition caused by lack of oxygen. A reduction in the partial pressure of oxygen in the atmosphere occurs as the parachutist ascends. When the parachutist inhales, he receives fewer oxygen molecules. The reduction of the partial pressure inhibits the body's ability to transfer oxygen to the tissues. The most common symptoms of hypoxia are blurred or tunnel vision, color blindness, dizziness, headache, nausea, numbness, tingling, euphoria, belligerence, loss of coordination, and lack of good judgment. Corrective action for a parachutist who becomes hypoxic is to place him on 100-percent oxygen and inform the jumpmaster and/or physiological technician. In extreme cases, it may be necessary to descend the aircraft and evacuate the parachutist to the nearest medical facility.

DANGER

If hypoxia goes unrecognized and uncorrected, it can result in seizures, unconsciousness, or even death.

DECOMPRESSION SICKNESS

13-6. Decompression sickness is a condition caused by the release of nitrogen from body tissues. Decompression sickness usually occurs during unpressurized flights above 18,000 feet MSL; however, it also can occur at lower altitudes. Many factors contribute to decompression sickness. Facial hair can cause an insufficient seal of the oxygen mask to the parachutist's face and render prebreathing ineffective. Poor physical conditioning and fatigue may leave the individual more susceptible to decompression sickness. Alcohol use dehydrates the body, constricting the capillaries and decreasing the efficiency of the cardiovascular system. Nicotine from tobacco use hardens arteries and restricts blood flow to the capillaries, reducing the efficiency of the cardiovascular system. Smoking also reduces the efficiency of the lungs. Parachutists should be aware of the symptoms of decompression sickness and constantly monitor themselves in the aircraft and after returning to the ground. Some parachutists may have symptoms of decompression sickness during the flight that are not readily noticeable. Minor symptoms may be confused with discomfort from the parachute and equipment. Other individuals may choose not to report what they consider to be minor problems. Although these symptoms usually resolve themselves upon the jumper's return to the ground, some personnel may continue to have symptoms. These individuals require prompt medical evaluation because their illness is more severe.

WARNING

If untreated, decompression sickness may result in debilitating or permanent medical disorders.

13-7. There are four types of decompression sickness: the bends, chokes, neurological (central nervous system) hits, and skin manifestations. Each of these is discussed in the following paragraphs.

The Bends

13-8. The bends are the most common type of decompression sickness. The most frequent symptom is a deep, dull, and penetrating pain in major movable joints that can increase to agonizing intensity. This pain may be significant enough to make the parachutist feel as if he cannot move the joint. The affected parachutist may also go into shock.

13-9. Corrective action for a parachutist who experiences the bends is to—

- Place the parachutist on 100-percent oxygen.
- Inform the jumpmaster and/or physiological technician.
- Descend the aircraft and pressurize the cabin to as close to sea level as possible.
- Evacuate the parachutist to the nearest medical facility with a decompression chamber. A flight surgeon or aeromedical examiner will determine if compression therapy is required.

The Chokes

13-10. The chokes are a rare but potentially life-threatening form of decompression sickness. The chokes are similar to the bends; however, the chokes occur in the smaller blood vessels of the lungs and result in poor gas exchange and oxygenation of the blood. The most common symptoms of the chokes are a deep, sharp pain near the breastbone; a dry, nonproductive cough; the inability to take a normal breath; a feeling of suffocation and apprehension; and possible shock symptoms, such as sweating, fainting, and cyanosis. Corrective action for a parachutist who experiences the chokes is the same as that stated for the bends.

Neurological Hits

13-11. Neurological hits occur in extreme cases of decompression sickness when the central nervous system becomes affected. The affected parachutist may experience vision disturbances, headaches, partial paralysis, loss of orientation, delirium, and vertigo. Corrective action for a parachutist who experiences neurological hits is the same as that stated for the bends.

Skin Manifestations or Paresthesia

13-12. Skin manifestations or paresthesia is caused by nitrogen bubbles forming at the subcutaneous layer of the skin. The most common symptoms are itching, hot and cold flashes, a creepy feeling or gritty sensation, mottled reddish or purplish rash, and a tingling feeling of the affected area. Corrective action for a parachutist who experiences any of these symptoms is to—

- Place him on 100-percent oxygen.
- Keep him from scratching or exercising the affected area.
- Inform the jumpmaster and/or physiological technician.

13-13. Normally, the condition will dissipate upon descent. However, if the parachutist is incapacitated due to the condition, further corrective action is to—

- Descend the aircraft and pressurize the cabin to as close to sea level as possible.
- Evacuate the parachutist to a medical facility with a recompression chamber. A flight surgeon or aeromedical examiner will determine if compression therapy is required.

HYPERVENTILATION

13-14. Hyperventilation is a condition characterized by abnormal, shallow, and rapid breathing. Fear, anxiety, stress, intense concentration, or pain normally causes hyperventilation. Symptoms are similar to hypoxia and include lightheadedness, visual impairment, dizziness, numbness and tingling of the extremities, and loss of coordination and judgment. Corrective action for a parachutist who experiences any of these symptoms is to—

- Calm the parachutist and have him talk, which will make him reduce his rate and depth of breathing. The goal is to achieve a breathing rate of 12 to 16 breaths per minute.
- Because of the similarity to hypoxia, place the parachutist on 100-percent oxygen.
- Inform the jumpmaster and/or physiological technician.
- Reevaluate the parachutist's conscious state. If he is not responsive, treat the situation as an in-flight emergency and evacuate the parachutist to the nearest medical facility.

PHYSIOLOGICAL AND OXYGEN EQUIPMENT-RELATED EMERGENCIES

13-15. Procedures for physiological and oxygen equipment-related emergencies are discussed below. Personnel should—

- Make sure the jumpmaster, oxygen safety technician, and aircraft commander (also U.S. Air Force physiological technician if flight is above 20,000 feet MSL) are made aware of the problem.
- Ensure that the parachutist is receiving 100-percent oxygen from the console, the walk-around bottle, or an onboard aircraft regulator.
- Attempt to establish communication with the parachutist. Identify the problem and take corrective actions, to include immobilizing the affected areas, if possible.
- If the problem becomes progressive or severe, inform the aircraft commander about the nature of the problem and declare an in-flight emergency.
- Descend the aircraft and pressurize the cabin to as close to sea level as possible.
- Evacuate to a medical facility with a decompression chamber. A flight surgeon or aeromedical examiner will determine if compression therapy is required.

13-16. Parachutists should be aware of the symptoms of decompression sickness and monitor themselves on return to the ground. Some parachutists may have symptoms of decompression sickness during flight that they do not notice due to discomfort from the parachute and equipment worn or that they do not report. Although these symptoms usually resolve themselves upon returning to the ground, some personnel may continue to have symptoms. These personnel require prompt medical evaluation since their illness is more severe.

FORMS OF OXYGEN

13-17. Oxygen is an odorless, colorless, tasteless gas that makes up 21 percent of the atmosphere. The remaining atmosphere consists of 78-percent nitrogen and 1 percent of other trace gases. There are four types of oxygen in use today—aviation, medical, welding, and research. Aviation oxygen is the only one suitable for MFF operations. The following paragraphs discuss the various forms of aviation oxygen and its associated containers.

GASEOUS OXYGEN

13-18. Gaseous aviator's breathing oxygen is designated Grade A, Type I, Military Specification MIL-0-27210E. No other manufactured oxygen is acceptable. The difference between aviator's and medical or technical (welder's) oxygen is the absence of water vapor. The purity requirement for aviator's oxygen is 99.5 percent by volume. It may not contain more than 0.005 milligram of water vapor per liter at 760 millimeters of mercury at 68 degrees Fahrenheit. It must be odorless and free from contaminants, including drying agents. The other types of oxygen may be adequate for breathing, but they usually contain excessive water vapor that, with the temperature drop encountered at altitude, could freeze and restrict the flow of oxygen through the oxygen system the parachutist uses. The two types of gaseous aviator's breathing oxygen are described below.

Gaseous—Low-Pressure

13-19. Low-pressure aviator's breathing oxygen is stored in yellow, lightweight, shatterproof cylinders. These cylinders are filled to a maximum pressure of 450 psi; however, they are normally filled in the range of 400 to 450 psi. They are considered empty when they reach 100 psi. If a cylinder is stored at a pressure less than 50 psi for more than 2 hours, it must be purged because of the water condensation that forms.

Gaseous—High-Pressure

13-20. High-pressure aviator's breathing oxygen is stored in lime green, heavyweight, shatterproof bottles stenciled with the words AVIATOR'S BREATHING OXYGEN. These bottles can be filled to a maximum pressure of 2,200 psi; however, they are normally filled in the range of 1,800 to 2,200 psi.

LIQUID OXYGEN

13-21. Liquid aviator's breathing oxygen is designated Grade B, Type II, Military Specification MIL-0-27210E. The most common use of liquid oxygen is in storage facilities and for aircraft oxygen supplies because a large quantity can be carried in a small space.

OXYGEN REQUIREMENTS

13-22. The lower density of oxygen at high altitudes causes many physiological problems. For this reason, MFF parachutists and aircrews need additional oxygen. Table 13-1, page 13-7, contains U.S. Air Force-established requirements for supplemental oxygen. Table 13-2, page 13-7, contains U.S. Army-established requirements for supplemental oxygen for the MFF parachutists during unpressurized flight. AFI 11-409 outlines these requirements for U.S. Air Force aircraft, and AR 95-1 outlines these requirements for U.S. Army aircraft. U.S. Air Force aircraft oxygen requirements are briefly described as the following:

- All personnel will prebreathe 100-percent oxygen at or below 16,000 feet MSL pressure or cabin altitude below 16,000 feet MSL pressure on any mission scheduled for a drop at or above 20,000 feet MSL on all MFF operations in which oxygen is required.
- The required prebreathing time will be completed before the 20-minute warning and before the cabin altitude ascends through 16,000 feet MSL.
- Any break in prebreathing requires restarting the prebreathing period or removing the individuals from the mission whose prebreathing was interrupted.
- Prebreathing requires the presence of sufficient U.S. Air Force physiological technician support onboard the aircraft.
- All personnel onboard during unpressurized operations above 10,000 feet MSL will use oxygen. (Exception: Parachutists may operate without supplemental oxygen during unpressurized flights up to 13,000 feet MSL provided the time above 10,000 feet MSL does not exceed 30 minutes each sortie.)

Note: Oxygen requirements and exposure times are different for Army aircraft. For Army aircraft use AR 95-1 or table 13-2, page 13-7.

Note: Portable oxygen bottles or locally procured oxygen systems may not be used for prebreathing; the quick-don/smoke mask is emergency equipment, and it is not approved for prebreathing or other parachute operations conducted at or above 13,000 feet MSL.

13-23. MFF parachuting is physically demanding. The higher jump altitudes associated with MFF operations expose the body to rapid pressure changes that require the use of supplemental oxygen. As a result, the MFF parachutist must—

- Conduct no more than three prebreather sorties in a 24-hour period.
- Not conduct MFF operations within 24 hours of making a nonoxygen dive.
- Wear a clear face shield or goggles on MFF operations that require prebreathing.

Note: The jumpmaster and the oxygen safety technician must be able to see the eyes of the jumpers to determine if they are having any physiological problems.

Table 13-1. Oxygen requirements and exposure limits for military free-fall operations from United States Air Force aircraft

Altitude (Feet MSL) Per AFI 11-409	Oxygen Requirement	Prebreathe Time[1] (Minutes)	Maximum Exposure Time per Sortie[2] (Minutes)
Below 10,000	--	--	--
10,000 to 12,999	Supplemental	--	Supplemental oxygen required only when time exceeds 30 minutes
13,000 to 19,999	Supplemental	--	Unlimited
20,000 to 24,999	100-Percent	30	110
25,000 to 29,999	100-Percent	30	60
30,000 to 34,999[3]	100-Percent	45	30
35,000 or above	100-Percent	75	30

Legend:

AFI Air Force Instruction

MSL mean sea level

[1] No more than three prebreather sorties in a 24-hour period unless otherwise restricted.

[2] Maximum exposure time per sortie is when cabin altitude reaches maximum planned altitude; extended or delayed ascent times expose everyone onboard to greater decompression sickness risk. Missions that require staggered altitude drops use accumulative times per sortie information for mission planning. (Example: Mission-planned drops at 35,000 feet MSL; 29,999 feet MSL; and 24,999 feet MSL: 30 minutes upon reaching 35,000 feet MSL; descend to 29,999 feet MSL—spend only 30 minutes [60 accumulative]; descend to 24,999 feet MSL—spend only 50 minutes [110 minutes accumulative]).

[3] No personnel may be exposed to unpressurized flight above 30,000 feet MSL more than three times each in 7 days and must have a minimum of 24 hours between exposures.

Table 13-2. Oxygen requirements and exposure limits for military free-fall operations from United States Army aircraft

Altitude (Feet MSL) Per AR 95-1	Oxygen Requirement	Prebreathe Time (Minutes)	Maximum Exposure Time per Sortie (Minutes)
Below 10,000	--	--	--
10,000 to 12,000	Supplemental[1]	--	60
12,000 to 14,000	Supplemental[2]	--	30
14,000 to 18,000	Mask/Regulator	--	Unlimited
Above 18,000	Mask/Regulator	30[3]	Not Stated

Legend:

AR Army regulation

MSL mean sea level

[1] Supplemental oxygen is not required for jumpers as long as the total time above 10,000 feet MSL does not exceed 60 minutes. Sorties that plan an excess of 60 minutes above 10,000 feet will require all jumpers to wear an individual mask and regulator.

[2] Supplemental oxygen is not required for jumpers if the total time above 12,000 feet MSL does not exceed 30 minutes. Sorties that plan an excess of 30 minutes above 12,000 feet MSL will require all jumpers to wear an individual mask and regulator.

[3] Prebreathing may utilize either 100-percent gaseous aviator’s oxygen from a high pressure source or an onboard oxygen generating system that supplies at least 90-percent oxygen. Prebreathing will be not less than 30 minutes at ground level and will continue while en route to altitude.

OXYGEN LIFE-SUPPORT EQUIPMENT

13-24. Life-support equipment consists of the POM with the portable bailout parachute oxygen system, the prebreather (console) portable oxygen system, and the prebreather attachment. This equipment is discussed in greater detail in the following paragraphs.

OXYGEN MASK

13-25. The oxygen mask is designed to be worn with parachutist helmets that have bayonet lug receivers for the mask's harness assembly or by using the accessory rail connector (ARC) that is attached to the helmet to attach the mask harness assembly when wearing the combat helmet. Oxygen enters the face piece through the valve located at the front of the mask. The mask has an integral microphone that adapts to the communications system of the aircraft.

Note: There are several types of oxygen masks currently in use by different Services. The mask used by the U.S. Army is the POM.

WARNING

No type of petroleum, oils, or other lubricating products; commercial sunblock; camouflage paint; lip balm; chewing tobacco; chewing gum; or food may be used by MFF parachutists while using oxygen life-support equipment.

Parachutist Oxygen Mask

13-26. The breath-demand POM is an in-flight oxygen breathing device used with an approved jump helmet. These masks are manufactured by Gentex Corporation and Carleton Technologies. The POM is available in four sizes, indicated by the marking on the outer edge of the softshell. The four sizes are small-narrow, medium-narrow, medium-wide, and large-wide. The POM connects to the portable prebreather assembly and the Twin 53-cubic-inch portable oxygen system through use of the Hydraflow HS-57 oxygen breathing hose (32- and 46-inch hose) to ensure unrestricted oxygen flows to the parachutist.

13-27. The POM provides the parachutist with a high oxygen-flow capacity to improve breathing comfort during long missions. It includes an automatic dilution shut-off feature for when the parachutist is connected to a prebreathing console.

13-28. The POM has a high-flow, noncompensated exhalation valve and an integral antisuffocation valve to protect the parachutist in the event of oxygen supply depletion. A diffuser over the inhalation valve of the regulator provides improved mixing of the oxygen in the mask. The mask allows jumpers to pinch their nostrils and perform a Valsalva maneuver in order to release sinus pressure. The configuration of the screws and nuts used to fix the mask attachment straps are designed in a way to reduce rotational friction and ease maintenance.

Advanced Combat Helmet Accessory Rail Connector

13-29. The advanced combat helmet accessory rail connector (ACH-ARC) provides accessory direct-mounting capability for advanced combat helmet (ACH)-style ballistic helmets (figure 13-1, page 13-9). Rails and accessories are secured during MFF operations, combat movement, or tactical use. The low profile of the lightweight, snag-free ACH-ARC mount does not impede mobility, and it incorporates a dynamic breakaway feature to help prevent head and neck injury when exposed to extreme torque, with no permanent damage to the unit. Tough, fiber-reinforced rails bolt directly to the helmet, holding a slide-and-lock Picatinny adapter for mounting of the POM with the additional plug-in oxygen mask receptacles (figure 13-1, page 13-9).

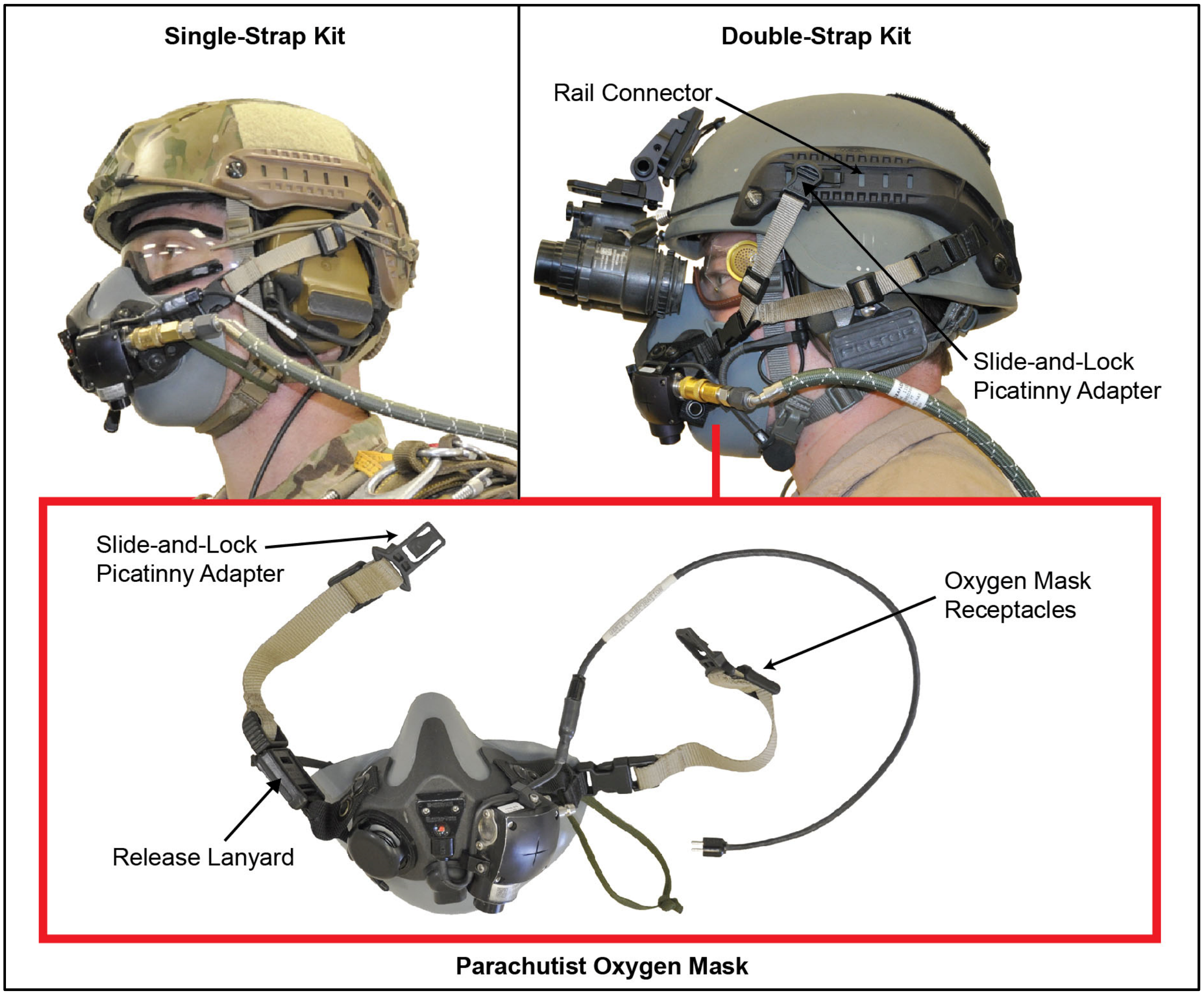


Figure 13-1. ACH-ARC with oxygen single-strap and double-strap kits

13-30. The single and double straps with Fastex buckles are fully adjustable to accommodate a wide range of face and head shapes for proper fit of the POM. The rail connector also contains Picatinny adapter locks and sizing channels that are slot-triggered for ease of tightening, loosening, and fitting the oxygen mask. The ACH-ARC—

- Does not require drilling; it uses existing chinstrap mounting holes.
- Fits the ACH, modular integrated communications headset (tactical communications 2000) and modular integrated communications headset 2002 gunfighter helmets in sizes medium to extra-large.
- Does not fit the modular integrated communication headset 2001 (high ear-cut) helmet or the enhanced combat helmet.
- Includes the oxygen single-strap kit or the oxygen double-strap kit (figure 13-1, above) for mounting the POM.

Parachutist Oxygen Mask Securing Lanyard

13-31. The POM securing lanyard (figure 13-2, page 13-10) was added to keep the oxygen mask from becoming detached during free-fall and floating behind the parachutist's head. The POM securing lanyard should be attached to the mask on the left bottom attaching strap. The chinstrap is routed through the securing lanyard. The securing lanyard should be made from a section of gutted 550 cord and secured by tying a nonslip knot. Appendix A provides JMPI procedures for the POM securing lanyard.

Figure 13-2. Parachutist oxygen mask securing lanyard

WARNING

Not all figures, pictures, or diagrams within this ATP contain the POM securing lanyard. Parachutists should use the securing lanyard to keep the oxygen mask from becoming detached during free-fall and from floating behind the parachutist's head.

13-32. In accordance with Headquarters, United States Army Developmental Test Command, the following precautions should be followed for use of the ARC, the oxygen single-strap kit, and the oxygen double-strap kit with the ACH during MFF operations:

- MFF parachutists should ensure they are fitted with the correct size helmet and follow fit and wear instructions in accordance with TM 10-8470-204-10.
- Preventive maintenance, checks, and services procedures found in the ACH TM should be used for the ACH-ARC. Users must check for loose or missing screws during preventive maintenance, checks, and services. Missing screws should be replaced and loose screws should be tightened. If screws remain loose after tightening, they should be secured with thread-locking compound (NSN 8030-01-104-5392).
- Prior to rigging for an MFF operation, each parachutist and the MFF jumpmaster should inspect the—
  - Strap kit for frayed or cut webbing, cracked or damaged plastic components, and inoperable Head-Loc tabs. All damaged items should be replaced and the strap kit reinspected before use. The strap kit should also be checked to ensure the swivel clips are securely fastened to the webbing, the swivel clip securely locks into the ARC tab, the ARC tab securely locks into the accessory rail, and the rear-strap buckle and/or front-pull release buckle are operable. The parachutist should remount and reinspect all incorrectly or loosely mounted items and replace broken or defective components.
  - Rear-strap buckle and/or front-pull release buckle to ensure they are correctly inserted and that the corresponding strap is not twisted. If the strap is incorrectly inserted or twisted, the parachutist should remove the buckle, rotate it 180 degrees, reinsert, and then reinspect the buckle and strap assembly.

  - ARC for cracked or damaged plastic components, inoperable swivel clips, and inoperable ARC tab adapters. Parachutists should replace all damaged items that fail to lock in place.
- Solvents and steel or metal bristle brushes may damage the ARC and strap kit. Parachutist should only use a medium bristle brush and/or mild detergent to clean soil and debris from the rail system and its components.

Oxygen Supply Hose Assembly

13-33. The oxygen supply hose assembly consists of a four-pin male coupling assembly with an attached end cap, a 98- or 240-inch hose assembly, a flow indicator, and a low-pressure hose assembly. The oxygen supply hose assembly is used primarily by military parachutists for MFF HALO and HAHO MFF missions. The hose interfaces with the portable OXCON to provide a supplemental 100-percent oxygen source prior to jumping from the aircraft. The oxygen supply hose assembly also incorporates a breathing regulator, which reduces the flow from the OXCON to regulate the mask's breathing pressure.

13-34. The POM uses a Hydraflow HS-57 crush-proof oxygen breathing hose to ensure unrestricted oxygen flow to the parachutist, and it is easily attached and detached with the quick-disconnect fitting (figure 13-3). The POM can fully integrate with the existing Parachutist High-Altitude Oxygen System (PHAOS) equipment without modification. When the POM is used with the American Safety Flight System bailout storage and delivery system, only minor modifications to the auxiliary equipment is required:

- The outlet pressure of the prebreathing console must be adjusted.
- An adapter must be incorporated into the outlet of the existing bailout system to permit the connection of the oxygen hose to the console.

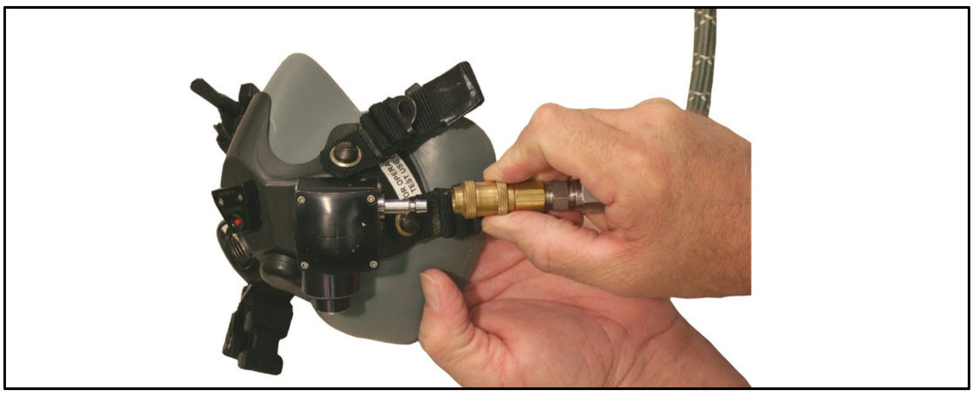


Figure 13-3. Parachutist oxygen mask and the HS-57 quick-disconnect fitting

FITTING THE NEW PARACHUTIST OXYGEN MASK WITH BAYONET CONNECTORS

13-35. A jumpmaster, rigger, or oxygen technician must supervise mask fitting. When the mask fits properly (figure 13-4, page 13-12), it should create a leak-tight seal around the sealing flange throughout the range of pressure-breathing forces administered by regulators. To fit the new POM with the older style bayonet connectors, the parachutist performs the following procedures:

- **Step 1.** Place the mask over the face and insert bayonet connectors into the second locking position in the bayonet receiver. Two clicks will be heard on each side indicating the second locking position. Setting the mask in this position allows adjustments to be made.
- **Step 2.** Ensure the helmet is in a comfortable position on the head. Tighten two top straps equally so the mask stays centered on the face and is tight enough to create a good seal. The POM is equipped with an integral antisuffocation valve to protect the parachutist in the event of oxygen supply depletion or for when fitting the mask without oxygen being attached. If the parachutist cannot exhale, the mask must be considered unserviceable.
- **Step 3.** Tighten the two bottom straps equally, keeping the mask centered.

- **Step 4.** Move the head back and forth two or three times, alternately tightening the straps until a good seal is achieved.
- **Step 5.** Once this procedure is completed, have the mask inspected by a jumpmaster/oxygen technician.
- **Step 6.** After the oxygen technician checks the mask, secure any excess straps by rolling them outboard, securing rolls with medical tape (figure 13-5) and use the securing lanyard (figure 13-2, page 13-10) to keep the oxygen mask from becoming detached during free-fall and from floating behind the parachutist's head.
- **Step 7.** Breathe through the mask to determine if proper fit has been achieved. The parachutist should be able to breathe through the ambient air port on the mask; however, no air should enter around the nose, cheeks, or chin. If the mask is leaking air, it should be readjusted for a proper fit. If a proper fit cannot be established, the parachutist should try a different size mask.

Figure 13-4. Properly fitted mask

Figure 13-5. Parachutist oxygen mask with bayonet connectors and taped straps

FITTING THE NEW PARACHUTIST OXYGEN MASK WITH ADVANCED COMBAT HELMET ACCESSORY RAIL CONNECTOR WITH OXYGEN SINGLE-AND DOUBLE-STRAP KITS

13-36. To fit the new POM with double-strap kits to the ACH-ARC, the parachutist should perform the following procedures:

- **Step 1.** Place the mask over the face and insert the slide-and-lock Picatinny adapter swivel clips into the ARC. Take the slack out of all straps by pulling down on them with equal pressure. Setting the mask in this position allows adjustments to be made.
- **Step 2.** Ensure the helmet is in a comfortable position on the head. Tighten the two top straps equally so the mask stays centered on the face and is tight enough to create a good seal. The POM is equipped with an integral antisuffocation valve to protect the parachutist in the event of oxygen supply depletion or when fitting the mask without oxygen being attached. If the parachutist cannot exhale, the mask is considered unserviceable.
- **Step 3.** Tighten the two bottom straps equally, keeping the mask centered.
- **Step 4.** Move the head back and forth two or three times, alternately tightening the straps by sliding the strap retainers until a good seal is achieved.
- **Step 5.** Once this procedure is completed, have the mask inspected by a jumpmaster/oxygen technician.
- **Step 6.** Breathe through the mask to determine if proper fit has been achieved. The parachutist should be able to breathe through the ambient air port on the mask; however, no air should enter around the nose, cheeks, or chin. If the mask is leaking air, it should be readjusted for a proper fit. If a proper fit cannot be established, the parachutist should try a different size mask.

Note: To fit the new POM with single-strap kit to the ACH-ARC, the parachutist should perform steps 1, 2, 4, 5, and 6 above.

CLEANING THE OXYGEN MASK

13-37. The parachutist must clean the oxygen mask after each use. All surfaces should be wiped carefully with gauze pads or a similar lint-free material and dampened with 70-percent isopropyl alcohol (rubbing alcohol). If isopropyl alcohol is not available, a solution of warm water and a mild liquid dishwashing detergent, such as Ivory, Joy, or Lux, may be used. To rinse, the parachutist wipes the mask with swabs soaked in clean water, taking care not to wet the electronic parts. The mask should be allowed to air dry before storing in a dust-free environment and away from heat and sunlight. If the mask needs more extensive cleaning, the parachutist turns the mask in to the servicing life-support facility.

BAILOUT OXYGEN SYSTEMS

13-38. All oxygen bailout systems provide one function and that is to give the jumper the oxygen needed to safely perform the MFF operation from the time he departs the aircraft to landing on the DZ. Unfortunately, not all of these bailout systems meet the requirement to sustain the jumper on all MFF operations. Selection of the bailout system will need to be matched with the type of MFF operation being performed. Currently, four systems are in use for MFF operations, they include the—

- 120-cubic-inch portable bailout oxygen system (figure 13-6 [A], page 13-14).
- Twin-50-cubic-inch portable bailout oxygen system (figure not shown).
- Twin-53-cubic-inch portable bailout oxygen system (figure 13-6 [B], page 13-14).
- Composite 3000 psi portable bailout oxygen system (figure 13-6 [C], page 13-14).

13-39. As noted above, some systems are single or double bottles. All bailout oxygen systems will have an on/off lever, a pressure gauge, an oxygen delivery hose, and an oxygen supply hose port. The oxygen delivery hose delivers oxygen to the oxygen mask. The port on the assembly is used to connect to the portable OXCON. The rigging procedures for the oxygen system pouch and securing the oxygen bottles within the pouch are also slightly different. All oxygen system pouches are secured to the container using the tub lock adapters on the side of the container and oxygen system pouch. Some bailout bottles are secured by Velcro straps and others are secured by a draw string on the oxygen system pouch. Waistband routing through the keepers on the oxygen system pouch may also differ on the oxygen system pouch being used, but all oxygen system pouches will have the waistband to the outside keepers of the oxygen system pouch. Routing and securing the oxygen supply hose from the oxygen bailout bottle regulator to the jumper's oxygen mask will remain the same for all bailout oxygen systems.

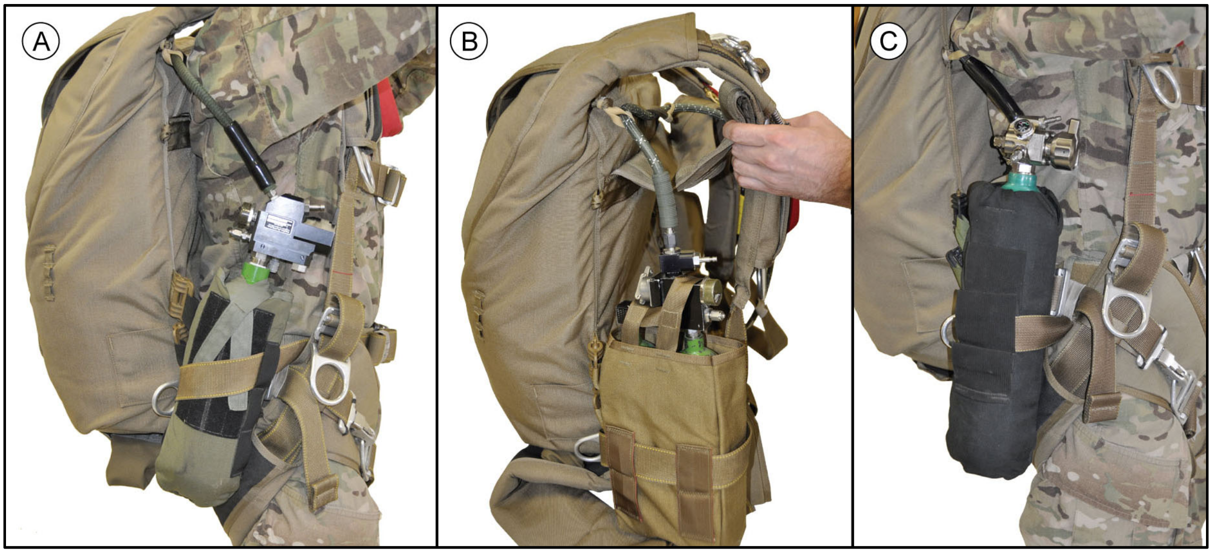


Figure 13-6. Types of portable bailout oxygen systems

WARNING

Jumpmasters must ensure that the proper oxygen bailout system is being used for the altitude of the MFF operation being conducted and that all rigging procedures are properly conducted on the oxygen bailout system being used.

TWIN-50 AND TWIN-53-CUBIC-INCH PORTABLE BAILOUT OXYGEN SYSTEM WITH PARACHUTIST OXYGEN SYSTEM ASSEMBLY

13-40. The Twin-50 (100-cubic-inch) bottle system has two 50-cubic-inch oxygen cylinders rated at 2,100 psi (each), with the same outlet pressure as the Twin-53 system (106-cubic-inch). Since the connection point at the manifold of the Twin-50 oxygen system is identical to that of the Twin-53, the POM is compatible with the Twin-50 bottle system.

13-41. The Twin-53 portable oxygen system is made up of two 53-cubic-inch oxygen cylinders rated at 1,800 psi each. It is connected to a pressure reducer for oxygen delivery at a nominal pressure of 50 psi. At this nominal outlet pressure of 50 psi, the oxygen regulating system is capable of delivering 8.2 to 9.3 liters per minute of oxygen to the parachutist. The Twin-53 system is interconnected via an oxygen hose (figure 13-7, page 13-15), and its oxygen output is controlled by a mask-mounted regulator. A complete breathing system is formed when the Twin-53 system is connected to an oxygen mask. When used with a 100-percent oxygen regulator, this system has a maximum operating altitude equal to that of the aircraft service ceiling.

13-42. The Twin-53-cubic-inch portable bailout oxygen system assembly with the quick-disconnect oxygen hose (figure 13-7, page 13-15) provides the MFF parachutist with a limited stand-off parachuting capability up to 17,499 feet MSL. The regulator extends the duration of two 53-cubic-inch oxygen cylinders and permits the use of any pressure-demand mask and associated oxygen connectors.

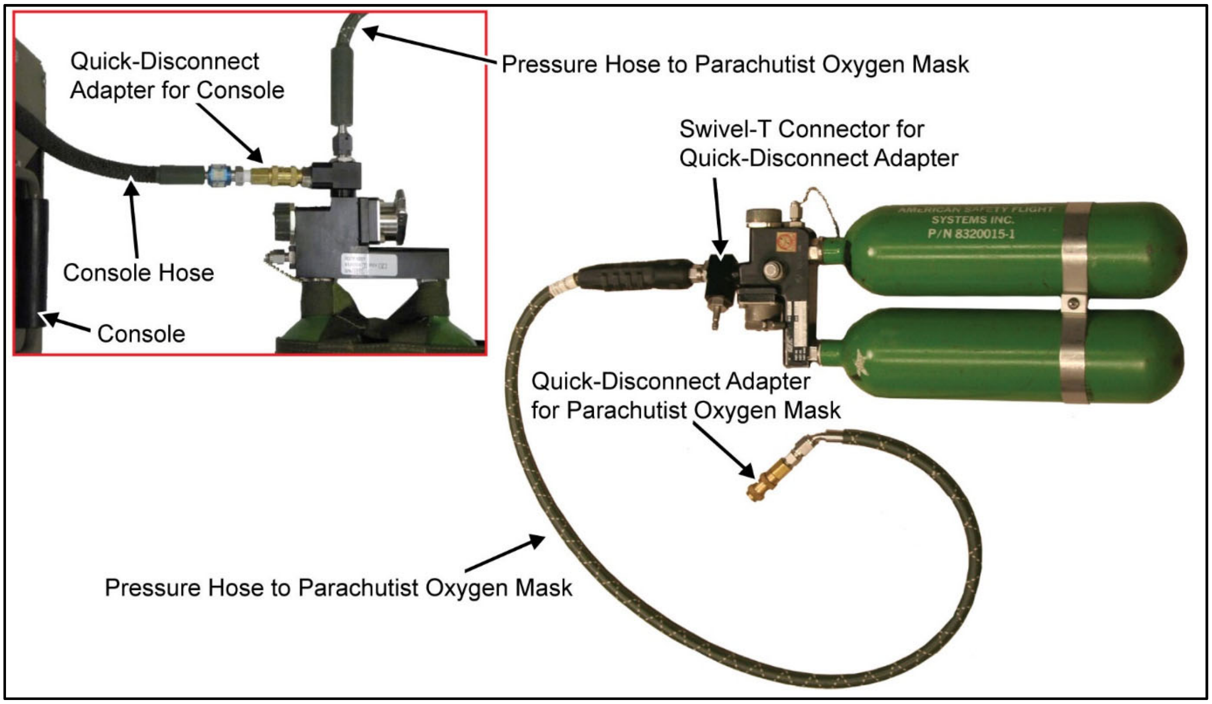


Figure 13-7. The Twin-53-cubic-inch portable bailout oxygen system with the quick-disconnect oxygen hose

13-43. The parachutist cannot overbreathe the Twin-53-cubic-inch system. When inhaling more volume than the unit delivers, an ambient air valve opens up negating the breathing starvation sensation felt with other constant-flow systems as cylinder pressure decreases.

13-44. The Twin-53-cubic-inch portable bailout oxygen system assembly with the quick-disconnect oxygen hose has a special port on the bailout bottle regulator that allows simultaneous hookup of the prebreather unit without disconnecting the quick-disconnect hose to the POM. The parachutist makes only one disconnection upon standing up. The connection hose from the prebreather connects to the quick-disconnect adapter on the bailout bottle regulator, thus preventing any ambient air from entering the parachutist's system while prebreathing. When preparing to exit the aircraft, the parachutist stands up, ensures the bailout system bottle is on and the pressure gauge is correct, disconnects from the prebreather, and jumps.

Rigging the Portable Bailout Oxygen Systems and Parachutist Oxygen Mask to the RA-1 Advanced Ram-Air Parachute System

13-45. The following paragraphs outline the steps for rigging the POM and various portable oxygen systems to the RA-1 ARAPS.

Rigging the Twin-53-Cubic Inch Portable Bailout Oxygen System and Parachutist Oxygen Mask to the RA-1 Advanced Ram-Air Parachute System

13-46. To rig the complete POM assembly with the Twin-53-cubic-inch portable bailout oxygen system to the RA-1 ARAPS (figure 13-8, page 13-16), the parachutist—

- Preadjusts (size) the RA-1 for ease of donning the system before adding the portable bailout oxygen system. Chapter 4 covers basic preadjustment of the RA-1.
- Places the oxygen cylinders into the detachable oxygen system pouch with the on/off switch to his front. He secures it with the hook-pile straps (figure 13-8, page 13-16) rerouted away from the on/off switch. He then secures the oxygen system pouch with Twin-53 oxygen bottle to the barrel locks on

the RA-1 container. He disconnects the waistband and places the oxygen system pouch on the waistband. The jumper slides the oxygen system pouch on the waistband using the upper channel on the oxygen system pouch (sliding the waistband buckle through the upper channel). The jumper ensures the oxygen system pouch is on the inside of the waistband. He then slides the oxygen system pouch on the waistband as far as it will go and secures the oxygen system pouch to the waistband.

A

Jumper presizes and adjusts his RA-1, attaches the oxygen bailout system to the parachute container and routes the oxygen supply hose. Jumper ensures the oxygen cylinder is placed into the detachable pouch with the ON/OFF valve to the front. Jumper secures the hook-pile straps over the regulator, threads the waistband through the detachable pouch keepers on the front/outside of the pouch, and attaches the pouch to the barrel locks on the RA-1 container.

B

Jumper stands and assistant places the RA-1 on the jumper's back while supporting the bailout system. Jumper secures the chest strap and leg straps at this time.

C

Jumper and assistant ensure that the waistband is routed under the horizontal strap and behind the main lift web and leg strap pad. Jumper secures the waistband at this time.

D

Assistant checks to ensure oxygen supply hose is routed through the upper right retainer band attached to the equipment tie-down loop.

E

Assistant then ensures that the oxygen supply hose is routed between the biometric harness and the jumper's back and the oxygen supply hose is routed through the carrying handle and retainer band from bottom to top and behind the jumper's neck. Assistant adjusts the oxygen supply hose slack as needed and places the oxygen hose over the left riser protective flap.

F

Jumper secures his helmet, attaches his parachutist oxygen mask, and ensures the lanyard is attached to the oxygen mask and the chin strap is routed through the lanyard. Jumper attaches the oxygen quick-disconnect fitting at the end of the oxygen supply hose to the oxygen mask and ensures he can move his head in all directions and that the hose is adjusted properly.

Figure 13-8. Completed rigging of the Twin-53-cubic-inch portable oxygen bailout system

- Before the jumper dons the RA-1, he attaches one retainer band using a girth-hitched knot to the upper equipment loop on the right side of the RA-1 container. The jumper attaches another retainer band using a girth-hitched knot to the top container carrying handle loop of the RA-1 (figure 13-9).

Figure 13-9. Oxygen delivery hose attached

- Routes the oxygen delivery hose up and through the top attached equipment loop retainer band. The jumper pulls the delivery hose up through the retainer band and container carrying handle and over the left riser protective flap and adjusts the slack as needed.
- Places the RA-1 ARAPS on his back by sitting or using the buddy system for donning the RA-1 ARAPS.
- If sitting, the jumper loosely secures the chest strap through the chest strap friction adapter then stands. If standing, the assistant will place the RA-1 system on the jumper's back, and the jumper will then loosely secure the chest strap through the chest strap friction adapter.
- Attaches leg straps.
- Adjusts horizontal adjustment straps.
- Ensures the waistband where it exits the oxygen system pouch keeper is routed under the right lateral adjusting strap and right main lift web across the jumper's front. Ensures the waistband is routed over the left main lift web, over the weapon (side mounted) and left lateral adjusting strap, and through the keeper on the accessory pouch. Secures the friction adapter with excess webbing rolled outboard with a heavyweight retainer band or slack retainer.
- Uses an assistant to ensure the oxygen supply hose assembly is attached to the upper equipment loop retainer band, runs between the jumper's back and parachute container and through the retainer band, and is routed bottom to top of the container carrying handle.
- Uses an assistant to pull the oxygen supply rigid hose assembly and quick disconnect up behind the neck and over the jumper's left shoulder riser protective flap.
- Attaches the POM to the left side of the helmet bayonet receiver or the ACH-ARC single/double-strap assembly fasteners to the corner buckle receiver on the rail system.
- Attaches the POM to the quick-disconnect assembly on the oxygen delivery hose.
- Secures the POM to his face and ensures the head can freely move from side to side. If the oxygen delivery hose is too tight, the assistant or jumper readjusts the oxygen delivery hose or replaces it with a longer oxygen delivery hose. If the oxygen delivery hose is too loose, the assistant or jumper readjusts the slack or replaces it with a shorter oxygen delivery hose.

DANGER

Insufficient oxygen at higher altitudes during an extended time under parachute canopy could lead to injury or death.

Rigging the 120-Cubic-Inch Portable Bailout Oxygen System and Parachutist Oxygen Mask to the RA-1 Advanced Ram-Air Parachute System

13-47. To rig the complete 120-cubic-inch portable bailout oxygen system and POM to the RA-1 ARAPS, the parachutist—

- Preadjusts (size) the RA-1 for ease of donning the system before adding the portable bailout oxygen system. Chapter 4 covers basic preadjustment of the RA-1.
- Places the oxygen cylinder into the detachable oxygen system pouch with the on/off switch to his front. He secures it with the hook-pile straps rerouted away from the on/off switch. He then secures the oxygen system pouch with 120-cubic-inch oxygen bottle to the barrel locks on the RA-1 container. He disconnects the waistband and slides the waistband buckle through the middle to top keeper (figure 13-6, page 13-14) on the outside of the oxygen system pouch. The jumper ensures the oxygen system pouch is on the inside of the waistband. He then slides the pouch on the waistband as far as it will go and secures the pouch to the waistband.
- Before the jumper dons the RA-1, he attaches one retainer band using a girth-hitched knot to the upper equipment loop on the right side of the RA-1 container. The jumper attaches another retainer band using a girth-hitched knot to the top container carrying handle loop of the RA-1.
- Routes the oxygen delivery hose up and through the top attached equipment loop retainer band. The jumper pulls the delivery hose up through the retainer band and container carrying handle and over the left riser protective flap and adjusts the slack as needed.
- Places the RA-1 ARAPS on his back by sitting or using the buddy system for donning the RA-1 ARAPS.
- If sitting, the jumper loosely secures the chest strap through the chest strap friction adapter then stands. If standing, the assistant will place the RA-1 system on the jumper's back, and the jumper will then loosely secure the chest strap through the chest strap friction adapter.
- Attaches leg straps.
- Adjusts horizontal adjustment straps.
- Ensures the waistband, where it exits the oxygen system pouch keeper, is routed under the right lateral adjusting strap and right main lift web across the jumper's front. Ensures the waistband is routed over the left main lift web, over the weapon (side mounted) and left lateral adjusting strap, and through the keeper on the accessory pouch. Secures the friction adapter with excess webbing rolled outboard with a heavyweight retainer band or slack retainer.
- Uses an assistant to ensure the oxygen supply hose assembly is attached to the upper equipment loop retainer band, runs between the jumper's back and parachute container and through the carrying handle retainer band, and is routed bottom to top of the container carrying handle.
- Ensures the rigid oxygen supply hose assembly and quick disconnect runs between the jumper's back and the parachute container through the BOC carrying handle and out the top of the container carrying handle. Ensures the oxygen supply hose is secured by a retainer band to the container handle.
- Uses an assistant to pull the oxygen supply rigid hose assembly and quick disconnect up behind the neck and over the jumper's left shoulder riser protective flap.
- Attaches the POM to the left side of the helmet bayonet receiver or the ACH-ARC single-strap assembly fasteners to the corner buckle receiver on the rail system.
- Attaches the POM to the quick-disconnect assembly on the oxygen delivery hose.
- Secures the POM to his face and ensures the head can freely move from side to side. If the oxygen delivery hose is too tight, the jumper readjusts the oxygen delivery hose or replaces it with a longer oxygen delivery hose. If the oxygen delivery hose is too loose, the jumper readjusts the slack or replaces it with a shorter oxygen delivery hose.

Rigging the Parachutist Oxygen Mask and Composite 3000-psi Jump Bottle System to the RA-1 Advanced Ram-Air Parachute System

13-48. When wearing the POM and conducting MFF HAHO operations above 7,500 feet MSL, parachutists are recommended to use an approved composite 3,000 psi jump bottle system or similar high capacity oxygen bottle system in lieu of the Twin-53 bottle. The Twin-53, Twin-50, and 120-cubic-inch bailout bottles are not recommended for MFF HAHO operations with the RA-1 ARAPS at opening altitudes above 17,500 feet MSL.

13-49. The composite 3,000-pound psi jump bottle system is compatible with the POM and RA-1 ARAPS, and it can be filled with nearly twice the amount of oxygen as the Twin-53 or other systems mentioned above to sustain the jumper during MFF HAHO operations from 25,000 feet MSL to landing.

13-50. The composite jump bottle system (figure 13-10) represents the next generation in parachutist oxygen equipment for MFF operations. The composite jump bottle can be used with the POM and regulator assembly.

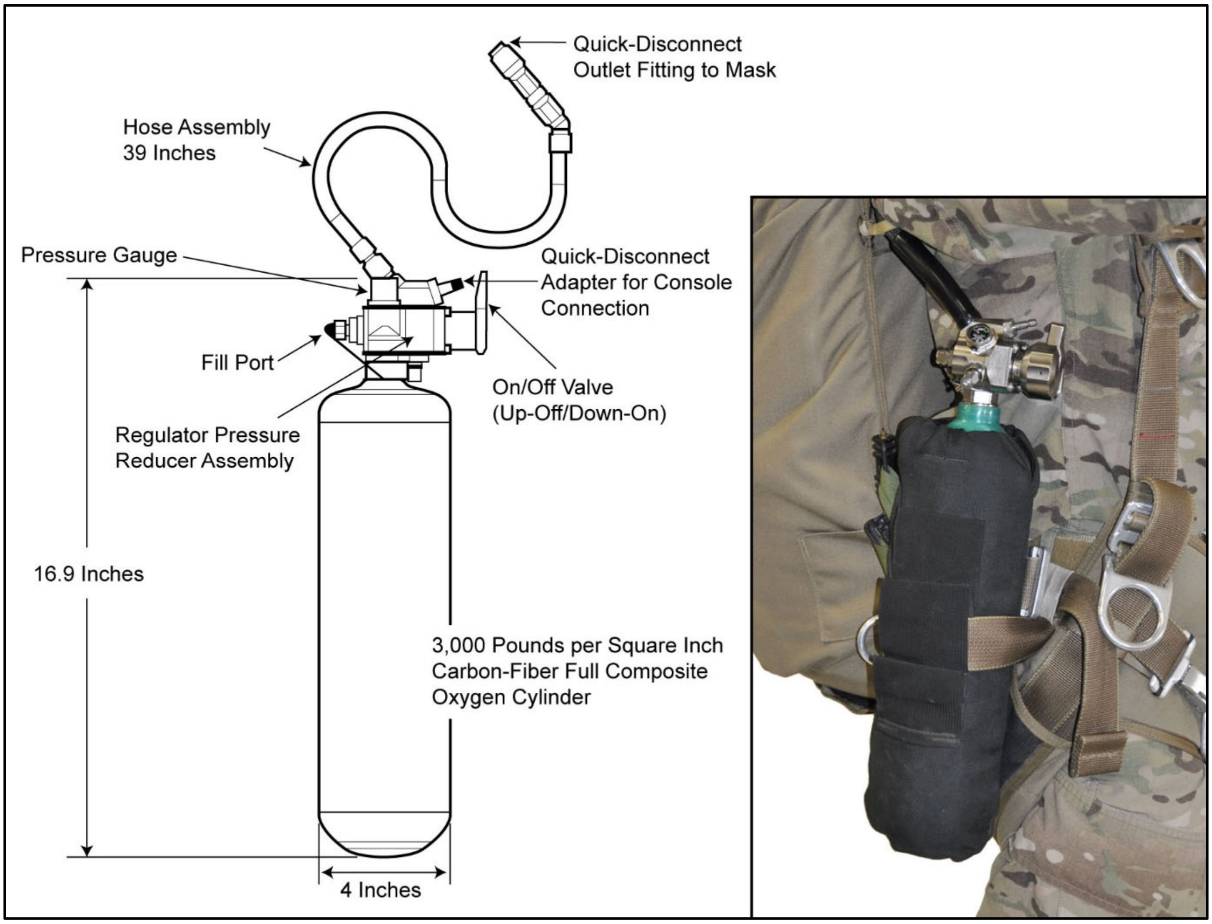


Figure 13-10. Composite 3,000 psi jump bottle system

13-51. The composite jump bottle system uses state-of-the-art material technology to provide significantly increased oxygen supply durations while reducing the overall weight of the system.

13-52. The system consists of a lightweight, inner aluminum-lined carbon-fiber full composite oxygen cylinder and pressure reducer assembly. When filled to 3,000 psi gauge, it provides 410 liters of breathable oxygen, which gives the jumper 45-percent more breathable oxygen than comparable systems.

13-53. The system is supplied with a 39-inch small diameter flexible hose, which can connect to either the POM or other mask systems used by MFF parachutists. The new hose is a smaller diameter with an outlet fitting quick-disconnect socket that mates with a 1/8-inch plug on the systems. This minimizes interference with jump equipment and offers greater mobility. When connected to the console, the pressure reducer assembly regulator has a console interface feature that automatically shuts off.

13-54. The composite jump bottle system has a weight of 5.5 lbs (unfilled), and it can be jumped at 35,000 feet (10,668 meters) with an operating environment temperature of (-65 to 120 degrees Fahrenheit) or (-54 to 49 degrees Celsius). The system has an outlet pressure of 40 to 50 psi gauge (2.8 to 3.4 bar gauge) and flows up to 150 standard liters per minute.

13-55. The composite 3,000 psi bottle and oxygen system pouch are attached to the RA-1 waistband and barrel locks (figure 13-11) on the container, and it can be removed when not jumping oxygen. The 39-inch small-diameter flexible oxygen hose is also routed and attached to the container in the same manner as the Twin 53-cubic-inch oxygen delivery hose.

Figure 13-11. A composite 3,000 psi bottle and pouch attached to the jumper

13-56. To rig the complete composite 3,000 psi jump bottle system with the POM assembly to the RA-1 ARAPS, the parachutist—

- Preadjusts (size) the RA-1 for ease of donning the system before adding the portable bailout oxygen system.
- Before the jumper dons the RA-1 ARAPS, he attaches one retainer band using a girth-hitched knot (figure 13-9, page 13-17) to the upper equipment loop on the right side of the RA-1 container. The jumper attaches another retainer band (figure 13-9, page 13-17) using a girth-hitched knot to the top container carrying handle loop of the RA-1.
- Places the composite oxygen cylinder into the detachable oxygen system pouch with the on/off switch to his front. He secures the oxygen system pouch by the draw string and black closing fastener rerouted away from the on/off switch. The jumper slides the detachable oxygen system pouch on the waistband using the upper channel (for best fit) on the oxygen system pouch (sliding the waistband buckle through the upper channel and secures the system). He ensures the detachable oxygen system pouch is secured to the waistband, ensures the detachable oxygen system pouch is to the inside of the waistband, attaches the barrel locks, and secures the waistband.
- Routes the oxygen delivery hose up through the upper side equipment loop retainer band to the retainer band on the carrying handle. The jumper pulls the delivery hose up through the retainer band and container carrying handle and over the left riser protective flap, adjusting the slack as needed.
- Places the RA-1 ARAPS on his back by sitting or using the buddy system for donning the RA-1 ARAPS.

- Loosely secures the chest strap through the chest strap friction adapter then stands.
- Attaches leg straps.
- Adjusts horizontal adjustment straps.
- Ensures the waistband where it exits the oxygen system pouch keeper is routed under the right lateral adjusting strap and right main lift web across the jumper's front. Ensures the waistband is routed over the left main lift web, over the weapon (side mounted) and left lateral adjusting strap, and through the keeper on the accessory pouch. Secures the friction adapter with excess webbing rolled outboard and secured with a heavyweight retainer band or slack retainer.
- Ensures the rigid oxygen supply hose assembly and quick disconnect runs between the jumper's back and the parachute container.
- Pulls the oxygen supply rigid hose assembly and quick disconnect up behind the jumper's neck and over the jumper's left shoulder.
- Attaches the POM to the left side of the helmet bayonet receiver or the ACH-ARC single-strap assembly fasteners to the corner buckle receiver on the rail system.
- Attaches the POM to the quick-disconnect assembly on the oxygen delivery hose.
- Secures the POM to his face and ensures the head can freely move from side to side. If the oxygen delivery hose is too tight, the jumper readjusts the oxygen delivery hose or replaces it with a longer oxygen delivery hose. If the oxygen delivery hose is too loose, the jumper readjusts the slack or replaces it with a shorter oxygen delivery hose.

SIX-MAN OXYGEN CONSOLE

13-57. The portable oxygen system allows six parachutists to prebreathe 100-percent oxygen that can be used during flight on fixed-wing aircraft and helicopters as a supplemental or emergency oxygen source. The system was designed as a self-contained, easy-to-operate, small, lightweight, and nearly maintenance-free oxygen system (figure 13-12, page 13-22).

Note: TM 1-1680-377-13&P-5 and TM 10-1670-329-13&P provide further information.

13-58. The six oxygen-supply hose assemblies interconnect the console with the jumper's oxygen bottles. Oxygen is stored under 1,800 psi or 2,100 psi in two 646-cubic-inch tandem-connected storage cylinders, which are charged through the filler valve assembly connected to the oxygen charging assembly (part number T80-30007-9). The oxygen charging assembly is in turn attached to a high-pressure oxygen source. Oxygen duration is based on altitude and individual consumption requirements.

13-59. The six-man OXCON portable oxygen system can be used on these aircraft:

- **C-17.** The console is secured to the existing floor fittings on the aircraft.
- **C-130.** The console is secured to the 5,000-pound tie-downs on the aircraft floor.
- **V-22 Osprey.** The consoles are restrained on the floor on the starboard side, using ratchet straps in accordance with Navy requirements for a 20G load.

13-60. The outer housing consists of 4130 aircraft sheet steel and recesses or steel guards to protect the system's critical components. The OXCON dimensions are: length—27 5/16 inches, width—13 6/16 inches, and height—11 inches. The weight is 91 lbs (empty) and 103 lbs (charged). The hoses are two each of three lengths: 72 inches, 90 inches, and 98 inches. Color-coding identifies certain parts, such as hoses and their mating parts, to prevent misconnection.

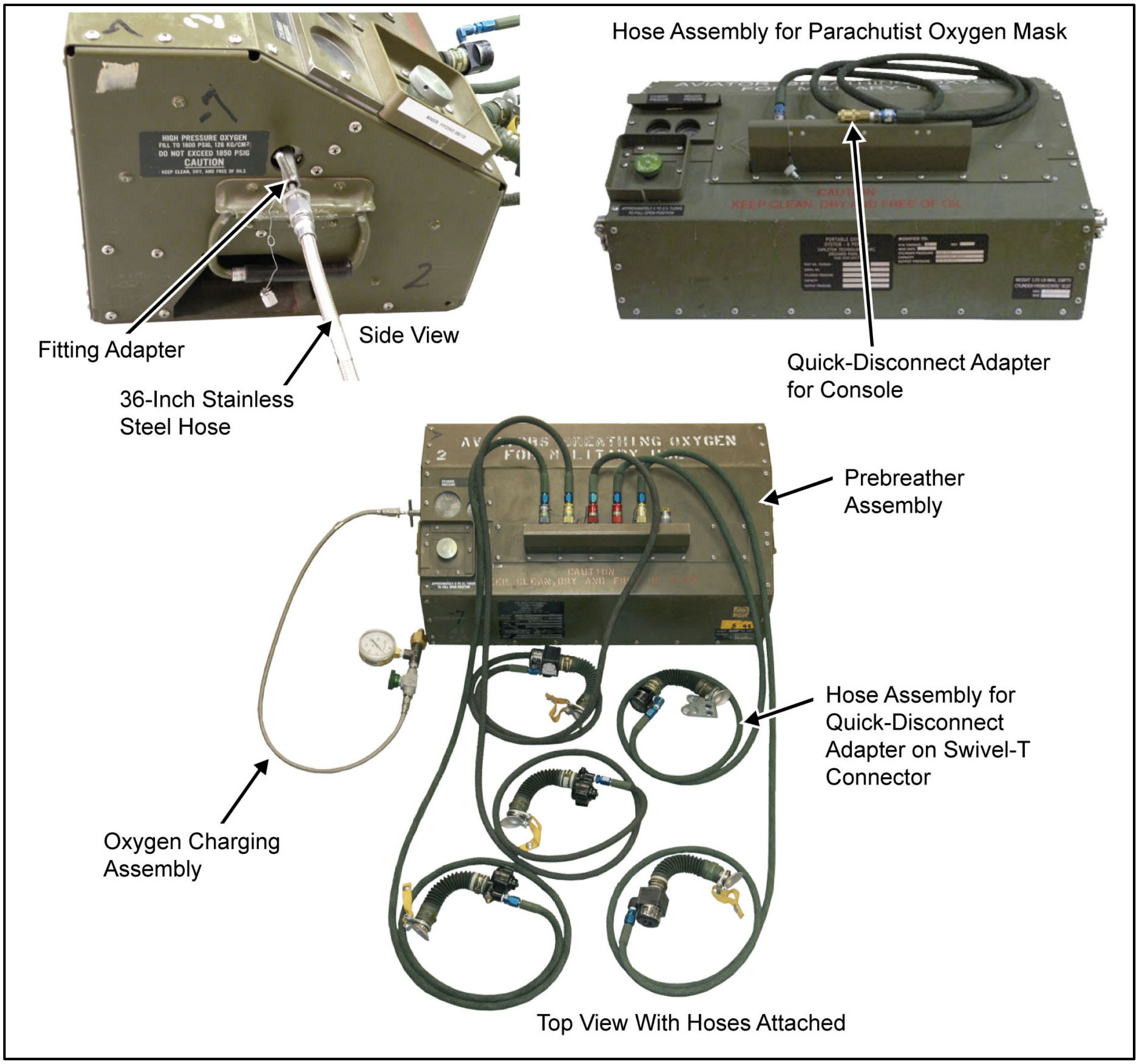


Figure 13-12. Six-man oxygen console

13-61. The six-man OXCON system has 100-percent oxygen capability for six individuals for approximately 1 hour at 10,000 to 35,000 feet MSL. The console is primarily intended for use by MFF parachutists during MFF HAHO and HALO operations. Other system features include the following:

- Weighs 106 lbs when filled (charged).
- Measures 27.3 inches wide, 13.37 inches deep, and 10.99 inches high.
- Can provide oxygen for one to six parachutists.
- Has modular components.
- Is constructed to survive an 8G (gravitational force) forward crash load.
- Has a recessed refilling point.
- Has an easily gripped and guarded ON/OFF knob.
- Has color-coded and color-indexed oxygen connectors to help ensure proper hose connections, and it includes optional hose lengths to fit parachutist seating requirements.
- Has a steel guard around oxygen hose connectors.
- Interfaces with other pressure-demand masks and associated connectors.
- Can be refilled while being used.

OXYGEN CONSOLE

13-62. The OXCON is a portable, self-contained, deck-mounted oxygen supply system designed to deliver 100-percent aviator's breathing oxygen to as many as six parachutists from ground level up to 35,000 feet MSL for approximately 1.5 hours. The OXCON supplies 100-percent oxygen to the parachutist's mask by means of a quick-disconnect low-pressure delivery hose (65 to 75 psi) connected to the bailout bottle worn on the right side of the parachute.

13-63. Up to six delivery hoses can be attached to the OXCON—three on the front of the unit and three on the back. Some hoses are equipped with a flow indicator for a visual confirmation that oxygen is flowing to the parachutist. To ensure the parachutist's oxygen supply is not interrupted when it is time to disconnect from the OXCON, the connection of the hose cannot be made without the bailout bottle's ON/OFF lever in the ON position. The 70 psi coming from the OXCON's delivery hose overrides the bailout bottle's operation, ensuring the parachutist gets 100-percent oxygen to the mask and does not consume any of the oxygen from the bailout bottle. The OXCON is supplied with six delivery hoses and a jumpmaster hose extension. Because of its configuration—three hoses on the left side and three on the right—the OXCON must be centerline mounted in the aircraft.

Note: Figure 13-13 displays one example of rigging the OXCON and K-bottle inside the aircraft. The loadmaster has final approval authority for securing equipment inside the aircraft.

Note: Some aircrews and squadrons may require no metal-to-metal contact between the OXCON and the deck of the aircraft. Plywood should be used when no metal-to-metal contact is authorized.

Note: Oxygen equipment will be rigged and placed in position (jumper configuration) where it will be best used during the MFF operation.

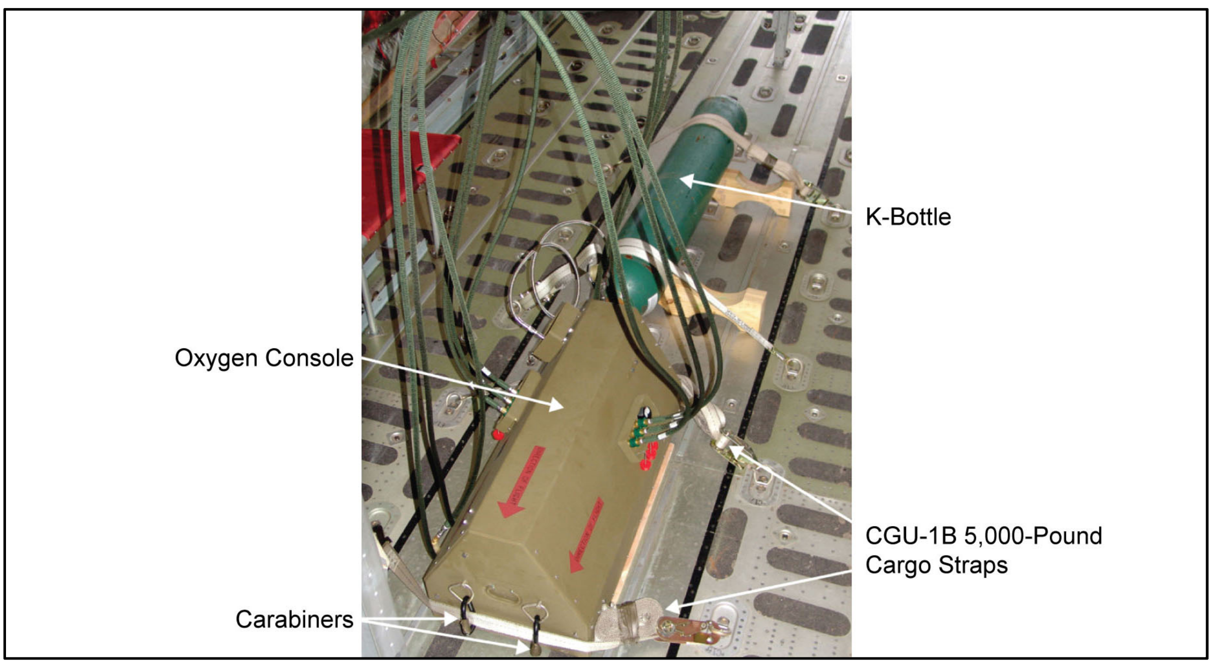


Figure 13-13. Oxygen console rigged in C-130 aircraft

13-64. To extend the duration of the OXCON, a K-bottle of aviator's breathing oxygen may be attached and cascaded into the console when it is rigged in the aircraft. CGU-1B 5,000-pound cargo straps are used to secure the OXCON and the K-bottles to the deck of the aircraft. To ensure that no metal-to-metal contact occurs, a piece of plywood can be placed under the OXCON, but cradles must be used to hold the K-bottles in place.

13-65. The following are the procedures to rig the OXCON on the deck of approved aircraft:

- Determine how many OXCONs are going to be used during the mission.
- Position the OXCONs with the arrow pointing in the direction of flight. Ensure all gear is positioned properly before securing.
- Look for the location of tie-down rings and the accessibility of hoses to the jumpers.

Note: Some squadrons may require no metal-to-metal contact between the OXCON and the deck of the aircraft. Plywood should be used when no metal-to-metal contact is authorized.

- If supplemental K-bottles are used, ensure wooden 4- by 4-inch cradles are available for each bottle. Place cradles in the proper direction and within reach of the charging assemblies.

Note: Use Stubai 85 carabiners or equivalent with at least 5,000-pound breaking strength to tie down because the ends of the tie-down straps do not fit through the tie-downs on the OXCON.

Note: The locking barrels on the carabiners need to face out and close downward. They should be taped so that vibration of the aircraft does not unlock the carabiner barrels.

- Fasten both sides of the cradle to the deck using CGU-1B 5,000-pound cargo tie-downs with the direction of pull toward each other, and tape the excess straps.
- Tightly stretch a length of 1/2-inch tubular nylon between the centerline stanchions in the aircraft to hold the hoses up and out of the way.

WARNING

OXCON hoses are under high pressure. Accidentally unhooking the hose from the OXCON unit may result in injury to a parachutist.

- If supplemental K-bottles are used, keep the charging assembly between the K-bottle and OXCON securely looped and taped so it cannot be snagged (figure 13-14).
- Wrap the cargo strap around the K-bottle once before tightening (figure 13-15, page 13-25).

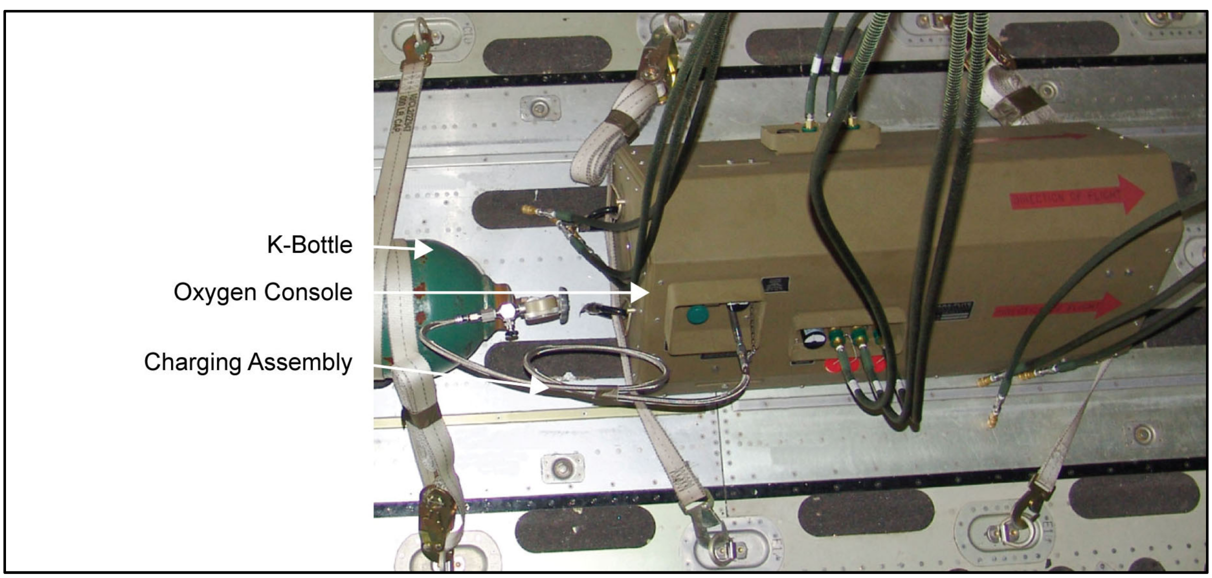


Figure 13-14. Charging assembly looped and taped out of the way of jumpers

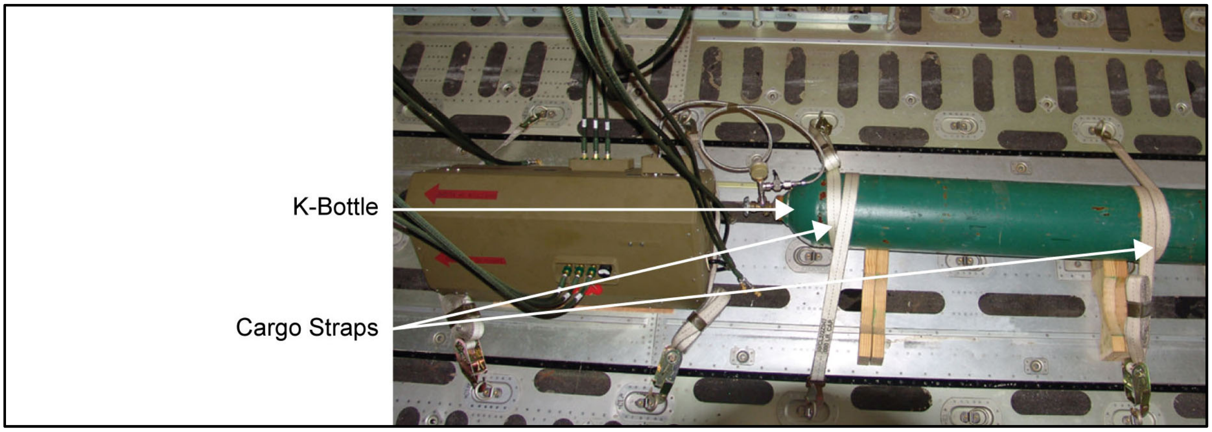


Figure 13-15. Side and top view of strap on K-bottle

PHANTOM 3,000 PSI HIGH-CAPACITY PORTABLE OXYGEN CONSOLES

13-66. The Parachutist High Altitude Next Generation Technology Oxygen Mask (PHANTOM) console is available in two configurations (figure 13-16): high capacity and ultra-high capacity. The high capacity console, with a single cylinder design, supports up to 10 users. The ultra-high capacity console includes three cylinders and can support up to 25 users. Both systems stand upright, creating a smaller footprint to reduce the space needed for the system. The design of the system with storage compartments for oxygen hoses allows user to maintain all hoses within the system. Gauges and switches are easily read and controlled from the top of the system. Handles and wheels allow the installer the ease of installation when placing it on the aircraft. Case-attached anchoring points for securing the system inside the aircraft make the rigging process to the aircraft anchoring points much easier. The system comes with long main oxygen supply hoses and five port quick-disconnect adaptors (figure 13-17, page 13-26) that can be stationed at different locations in front of the jumper, thus reducing the requirement of placing another console near the jumper.

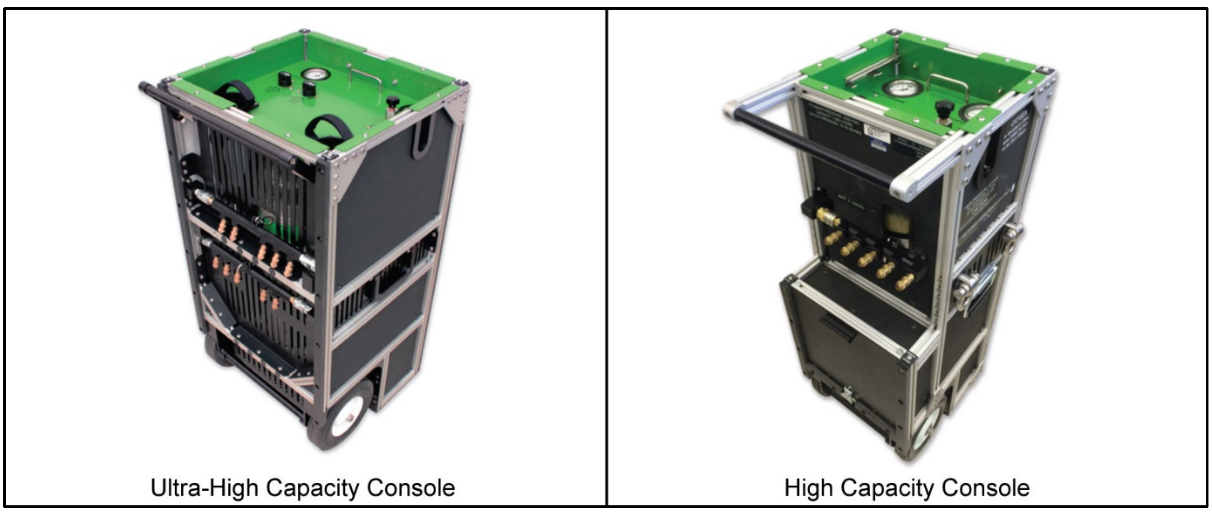


Figure 13-16. PHANTOM consoles

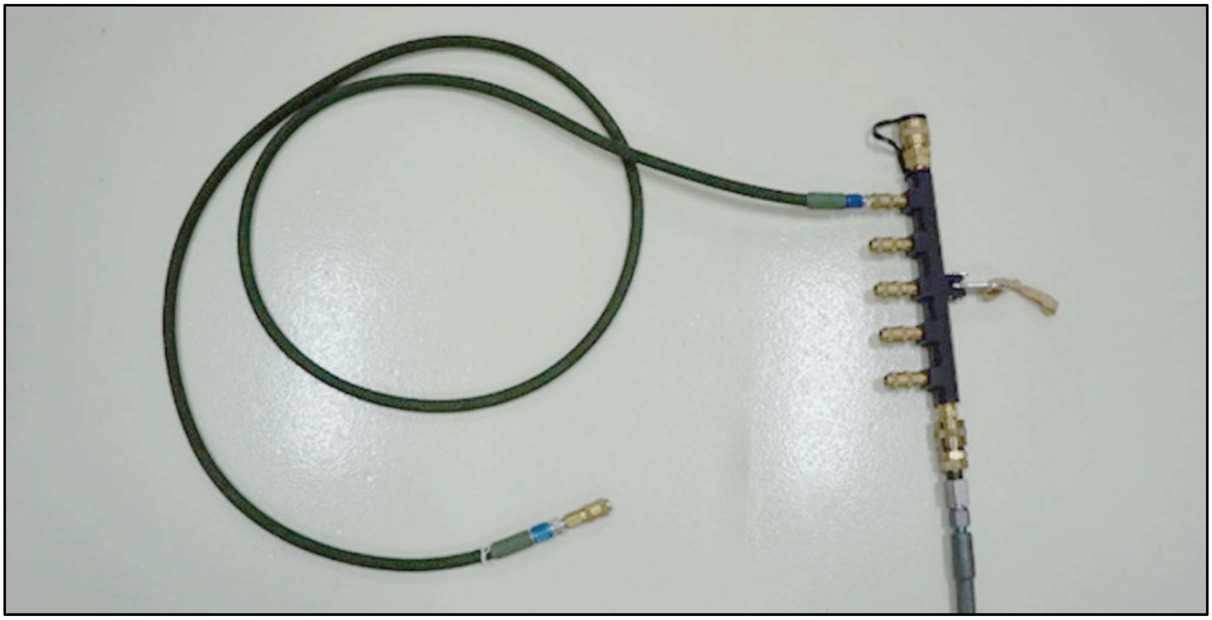


Figure 13-17. Main oxygen supply hose from console with five port adaptor and jumper oxygen supply hose

13-67. The key features for the high capacity system and the ultra-high capacity system are as follows:

- High oxygen storage capacity of—
  - 3,600 standard liters: single cylinder.
  - 10,800 standard liters: three cylinders.
- Certified to Standardization Agreement 7056 requirements for prebreathing.
- Heavy duty wheels simplify transport.
- Stands upright taking up less room inside the aircraft.
- Large pressure gauges for increased readability.
- High flow quick disconnect for flexible distribution.
- Integral spare jump bottle storage.
- Two manifolds provided for use with 10 jumpers (additional manifolds available for expanded use).

13-68. The specifications for the high capacity system and the ultra-high capacity system are as follows:

- Medium oxygen.
- Maximum fill pressure: 3,000 psi gauge.
- Weight: training systems (with aluminum lined cylinders) include—
  - Single Cylinder: 85 lbs empty (38.6 kg); 97 lbs filled (44.0 kg).
  - Three Cylinders: 165 lbs empty (75.0 kg); 200 lbs filled (90.9 kg).
- Gunfire certified systems (with brass lined cylinders) include—
  - Single Cylinder: 105 lbs empty (47.7 kg); 115 lbs filled (52.3 kg).
  - Three Cylinders: 226 lbs empty (102.7 kg); 256 lbs filled (116.3 kg).
- Dimensions include—
  - Single cylinder: 15 inches wide x 17 inches deep x 39 inches high (38 cm x 43 cm x 99 cm).
  - Three cylinders: 21 inches wide x 20 inches deep x 39 inches high (53 cm x 51 cm x 99 cm).

PREBREATHER ATTACHMENT ONBOARD THE AIRCRAFT

13-69. The prebreather oxygen assembly is normally located under the troop seats, and the oxygen supply hoses are routed up and behind the seats. The prebreather may also be positioned centerline in the aircraft using 10,000-pound tie-down fittings (C-17), 5,000-pound tie-down fittings (C-130), or securing straps.

13-70. When using 10,000-pound tie-down fittings, the parachutist places the two large holes in the base plate of the prebreather over existing 10,000-pound tie-down fitting holes in the floor of the C-17 aircraft. Through the openings in the side of the prebreather, he places two 10,000-pound fittings (one through each end) into the mating receptacle, which should now be visible through the prebreather's base plate. He then locks the fittings in place. These fittings will provide all the security necessary to hold the prebreather in place.

13-71. When using the OXCON tie-down assembly, the parachutist places the two large holes in the prebreather's base plate over the attached 5,000-pound ringed tie-down fittings in the floor of the C-130 aircraft. Next, he places the securing adapters over the exposed rings and pushes the pins through the holes in the adapters until they lock. These fittings will provide all the security necessary to hold the prebreather in place (figure 13-18).

13-72. Cargo straps are not necessary for added security when using the 10,000-pound tie-down fittings or OXCON tie-down assembly. If cargo straps are used in place of the tie-down fittings, the parachutist places the straps through the securing access holes at each end of the prebreather and cinches the cargo straps tightly to existing fittings.

Note: The prebreather carrying handles are not designed for use as securing points.

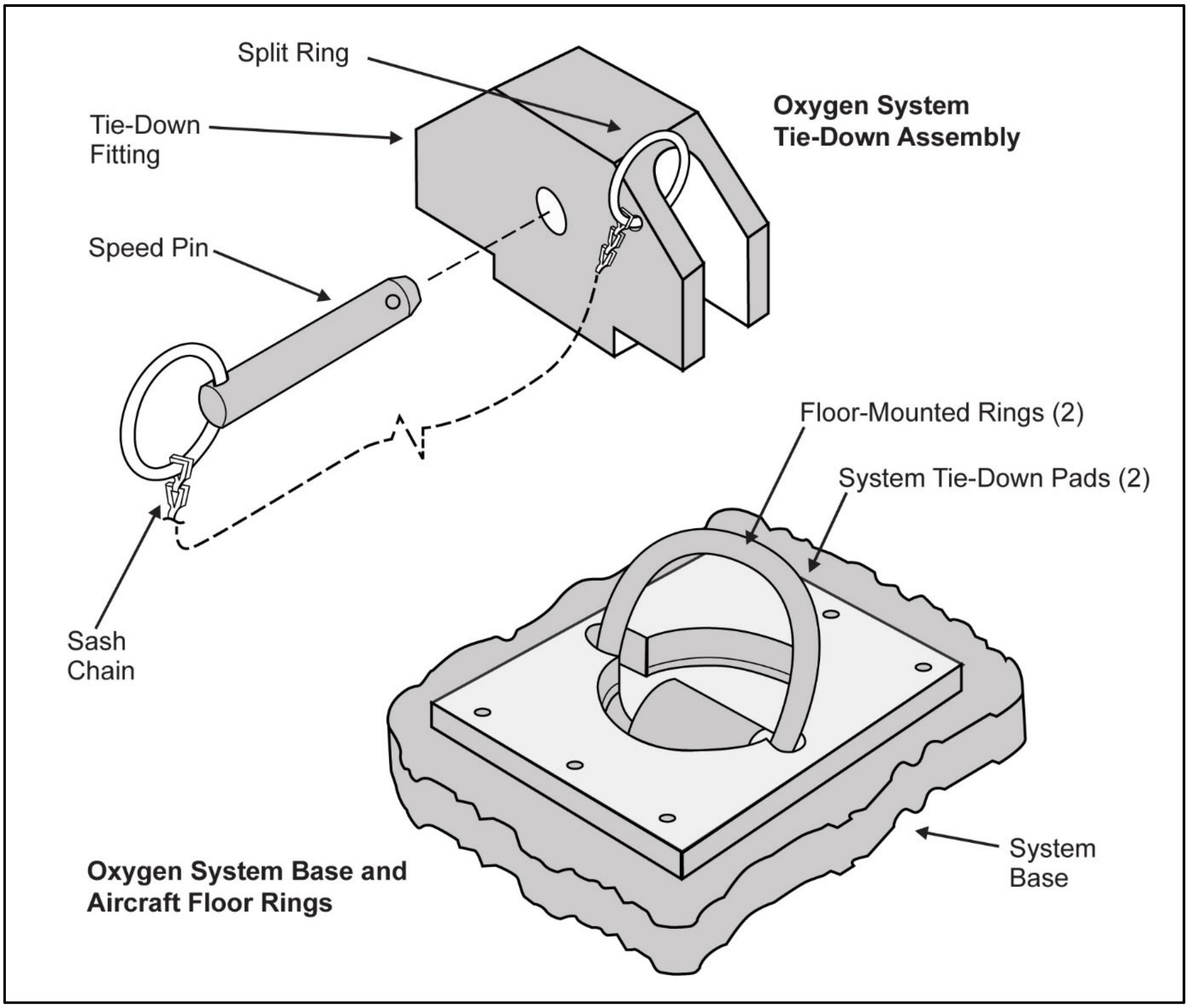


Figure 13-18. Tie-down assembly and installation components

THE PRICE CHECK

13-73. Each letter of the acronym PRICE represents an area of, or a specific item of, oxygen equipment the parachutist must check. The PRICE check makes no provision for inspecting the mask or protective helmet. The parachutist must check each of the following:

- **P—Pressure.** Checks for full pressure on the system in use.
- **R—Regulator.** Checks everything on the regulator in use. He checks for dents, cracks, broken gauges, grease or oil, and movement of dials and levers. He checks the entire oxygen delivery system for leaks.
- **I—Indicator.** Checks to ensure the flow indicator shows gas is flowing through the regulator from the storage system.
- **C—Connections.** Checks all hose connections.
- **E—Emergency Equipment.** Performs a complete check on any emergency oxygen equipment and the complete bailout system.

OXYGEN SAFETY PERSONNEL AND PREFLIGHT CHECKS

13-74. Oxygen safety personnel (parachute rigger or another MFF jumpmaster with experience on the equipment) must be onboard each aircraft during MFF operations when supplemental oxygen is used. They must have received physiological training and unit-level technical training on the oxygen systems being used. For jumps from 20,000 feet or above, one U.S. Air Force physiological technician per 16 jumpers will be requested with the aircraft and will be onboard for the jump. The oxygen safety personnel or the U.S. Air Force physiological technician will—

- Plan for all oxygen equipment required for the mission. He will provide one additional mask of each size and one additional and complete bailout system per six parachutists. He will plan for one additional open oxygen station per every six parachutists in the event of a hose or regulator failure.
- Conduct preflight inspection and preflight operational checks of all oxygen equipment (figures 13-19 through 13-23, pages 13-29 through 13-31).
- Supervise the transportation and installation of prebreathers and oxygen cylinders onboard the aircraft.
- Issue oxygen supply hoses to each parachutist and supervise hose connection.
- Prior to the aircraft procedure signal MASK being given, fully open shutoff valves on prebreathers.

DANGER

Never partially close the shutoff valve during oxygen use. Closing the valve (even partially) will result in a restriction of oxygen flow to the parachutist, possibly incapacitating or causing serious injury or death to the parachutist.

- After the aircraft procedure signal MASK is given, ensure the parachutists don their masks properly and receive oxygen.
- Periodically check oxygen pressure and equipment function during use (every 10 minutes).
- Monitor each parachutist for signs of hypoxia, the bends, chokes, neurological hits, and skin manifestations or paresthesia.
- Assist the parachutist with the activation of the bailout systems and inspect all bailout systems to make sure the systems were activated.
- Check the parachutist’s hose connections on the OXCON. If the parachutist still indicates a problem, the technician activates the bailout system, moves the parachutist to an open station, and the technician deactivates the bailout system.

WARNING

It is essential problems associated with faulty bailout bottles are identified early in the prebreathing cycle. If the affected parachutist has not been breathing 100-percent oxygen, the prebreathing clock starts over once a new bailout bottle is properly installed. This could delay the jump or disqualify that parachutist from jumping.

Preflight Inspection of Portable Bailout Oxygen System
• Cylinders are lime green and stenciled in white with the words AVIATOR'S BREATHING OXYGEN. • No cracks, dents, or gouges are on the cylinders. • Cylinder clamp and roller are secured and on the bottom third of the cylinders. • Cylinders are tight into the pressure reducer body. • Reducer body is not cracked or damaged. • Filler valve, pressure gauge, and relief valve are tight into the pressure reducer body. • Cap on the filler valve is secure, and the filler cap lanyard is secured to both the cylinder and filler valve. • Pressure gauge face is not damaged and the dial indicator is not sticking. • ON/OFF control valve is secured to the pressure reducer body with four tightened Allen screws. • Guide rails of the ON/OFF control valve are undamaged. Operating lever operates properly and the detent will hold the valve in the ON and the OFF positions. • Union elbow is secured tightly to the top of the pressure reducer, and the elbow directs the hose over the pressure gauge. • Hose assembly is not frayed or crushed, and the cloth covering is not worn and is free of oil and other contaminants.

Figure 13-19. Portable bailout oxygen system preflight inspection checklist

Preflight Operational Function Check Procedures
• Ensure the system is fully charged at 70 degrees Fahrenheit. • Connect a mask to the outlet orifice and ensure that it is secure and that excessive force is not required to connect and disconnect the mask. • Turn the system on and seal the mask to the face. • Inhale—yellow sleeve (on the flow indicator) rises. • Exhale—yellow sleeve (on the flow indicator) falls, Inhalation should be normal with no undue exertion. • Ensure there is no oxygen flow from the relief valve. • Turn the system off, reseal the mask to the face, and ensure parachutist can breathe through the ambient air port. • Connect a hose and regulator assembly to the ambient air port; ensure that they are secure and that excessive force is not required to connect and disconnect.

Figure 13-20. Portable bailout oxygen system preflight operational function checklist

Preflight Inspection of 6-Man Prebreather
• Unit has no obvious damage. • Gauge faces are not broken. • Dial indicators are not sticking. • All screws are present and not backing out. • Handles are not separating from the unit. • Filler cap is present and tied down to the unit. • All female disconnect plugs are present and tied down to disconnect. • Female disconnects are not distorted, and the pins of the male connectors of the hose assemblies will engage with the collar of the female disconnect. • Female disconnects are safety-wired to the adjacent female disconnects. • Connector manifold guard does not interfere with the operation of the female disconnects or male connectors of the hose and regulator assembly. • Both sets of screws in the ON/OFF knob are present and not backing out. • ON/OFF valve system is not bent. • Container is not cut, severely damaged, or corroded. • Unit is fully charged up to 1,800 psi at 70 degrees Fahrenheit.

Figure 13-21. Sample prebreather preflight inspection checklist of 6-man prebreather

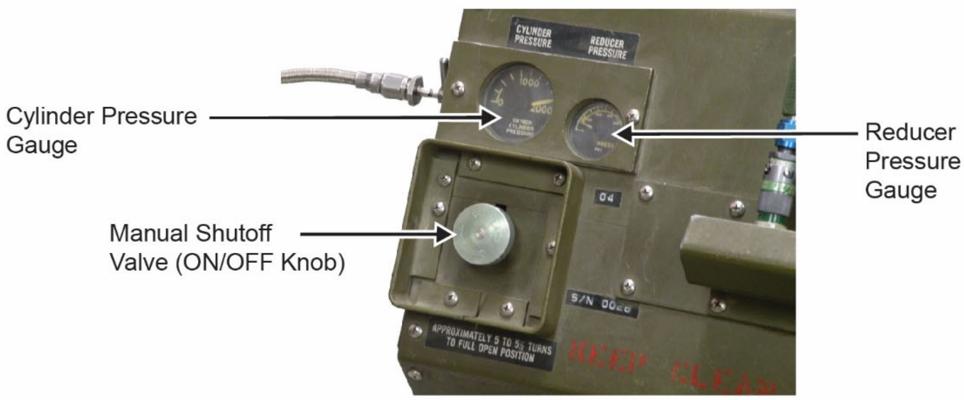
Preflight Inspection of the Hose and Regulator Assembly
• Each male connector has the proper number of pins (red: 2 pins, yellow: 3 pins, gray: 4 pins), and the mating probe is not distorted. • Male connector is tight into the hose assembly. • Wire wrapping is not frayed and hose is not crushed. • Cloth covering is free of oil and other contaminants. • Red male connector is connected to the 72-inch hose, yellow connector is connected to the 90-inch hose, and gray connector is connected to the 98-inch hose. • Hose is tightly connected to the regulator. • Regulator is not cut or cracked. • No foreign object or debris is in equalization port. • Hose and check-valve assembly is clamped to the regulator, and the clamp is safety-wired. • Cover is spring-loaded and seated evenly over the check valve. • Check-valve is spring-loaded.

Figure 13-22 Sample prebreather preflight inspection checklist of hose and regulator assembly

Preflight Operational Function Check Procedures

- Turn the shutoff valve counterclockwise to the fully opened position (about 5 1/2 turns) (figure 13-24).
- Ensure the reducer pressure gauge indicates 40 to 60 psi (figure 13-24).
- Remove each disconnect plug, depress the poppet of each disconnect (figure 13-25, page 13-32), and ensure oxygen flows from each disconnect.
- Close shutoff valve and ensure reducer pressure remains steady (minimum of 70 psi).
- Bleed off the pressure through the disconnect manifold.
- Install all hose and regulator assemblies to their appropriate disconnect (figure 13-25, page 13-32). Be sure to bleed manifold pressure before attaching hose and regulator assemblies.
- Connect the POM to each hose and regulator assembly.
- Open shutoff valve (about 5 1/2 turns).
- Listen for and feel the oxygen flow from each mask. Disconnect all but one mask and note the reducer pressure for 3 to 5 seconds. The reducer pressure should not drop below 70 psi.

Figure 13-23. Sample prebreather operational function checklist



Notes:
1. Cylinder pressure gauge needle should indicate 1,800 pounds per square inch (psi).
2. Reducer pressure gauge needle should indicate minimum of 70 psi.

Figure 13-24. Pressure gauge and manual shutoff valve

DANGER

Personnel must NEVER partially close the shutoff valve during oxygen use; it will result in a restriction of oxygen flow to the parachutist.

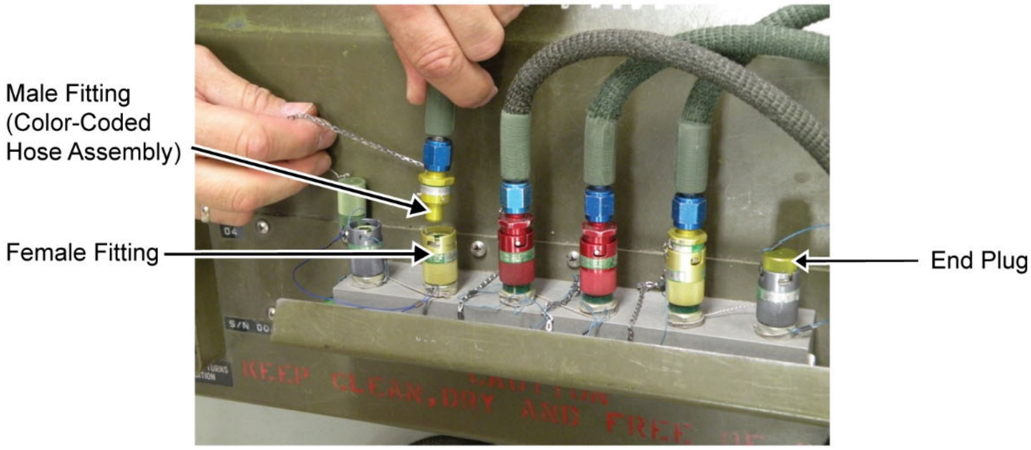


Figure 13-25. Removing end plugs and depressing poppets

13-75. When connected to an external oxygen system on an aircraft with an open door or ramp, all attached equipment will be connected and inspected before takeoff. Jumpmasters need to remain vigilant and ensure jumpers do not manipulate or adjust their equipment in such a way that would cause an inadvertent deployment of the main or reserve pilot chute.

13-76. When connected to an external oxygen source, it is recommended that the primary jumpmaster disconnect his oxygen hose before he allows the ramp or door to be opened. The assistant jumpmaster or oxygen safety will ensure all jumpers are disconnected from their hoses before the ramp or door is opened.

13-77. The oxygen safety will not perform primary jumpmaster or assistant jumpmaster duties. While it is recommended that the oxygen safety does not jump, he may jump providing no jumpers remain on the aircraft and only if it is absolutely operationally required.

AIRCRAFT PROCEDURES AND OXYGEN JUMP COMMANDS

13-78. The MFF jumper must be thoroughly familiar with all signals and the commands and required actions for each signal. Standardization of procedural signals and jump commands permit interoperability of all MFF-capable units. Safety significantly increases when the jumper understands the jumpmaster's intent and the jumpmaster understands the jumper's desired response. Aircraft noise, the MFF parachutist helmet, and the POM make verbal communication extremely difficult. Therefore, the jumper receives aircraft procedure signals and jump commands by hand-and-arm signals.

Note: For the purpose of this segment, commands and signals are written in capital letters.

13-79. Signals used between aircraft boarding and the jump command STAND UP are procedure signals. The aircraft procedure signals discussed in the following paragraphs begin before takeoff. The jumpmaster gives these signals. The following sequence depicts the procedures used by the jumpmasters and jumpers when jumping with oxygen:

- **LOAD AIRCRAFT.** On jumpmaster's signal, load aircraft in reverse chalk order, then—
  - Wait to be seated by the oxygen safety.
  - Receive console hose from the oxygen safety or physiological technician and connect to the OXCON.
- **DON HELMETS.** Don helmets and fasten seat belts.
- **UNFASTEN SEAT BELTS.** At 1,001 feet AGL unfasten seat belts at the jumpmaster's command.
- **20 MINUTES.** At the 20-minute warning, everyone awake and keep eyes on the jumpmaster.
- **10 MINUTES.** At the 10-minute warning, stay alert and keep eyes on the jumpmaster.

- **Obtain Update on Winds.** Updated winds from the DZ, expressed in knots.
- **CYPRES/PIN CHECK.** Jumpers receive a CYPRES and pin check.
- **MASK.** On the command MASK:
  - **Connect Oxygen Fitting.** Connect right side oxygen fitting.
  - **CHECK OXYGEN.** Ensure you have a positive oxygen flow and extend a thumbs-up to the center of the aircraft. Hold the thumbs-up signal until the jumpmaster checks the entire aircraft and returns a thumbs-up. Follow this procedure every time the jumpmaster initiates an oxygen check.

Note: Do not remove helmets during MFF oxygen operations. Clear goggles must be worn during MFF oxygen operations. If at any time you experience oxygen-related problems, extend your arm, palm down, toward the center of the aircraft.

Note: If the jumper's helmet and oxygen mask is removed for any reason the jumper must be inspected again.

- **STAND UP.** Stand up, face the rear of the aircraft, check CYPRES, pins and the oxygen bottle of the jumper to your front ensuring they are on and have sufficient pressure (Gauge needle should be at 1 or above. Notify the jumpmaster, assistant jumpmaster, oxygen safety, or physiological technician of any deficiencies that are identified). Check your handles and equipment, place right hand on the quick disconnect.
- **MOVE TO THE REAR.** Given approximately 1 minute from TOT. Pass signal back. The oxygen safety or physiological technician, assistant jumpmaster, and jumper will disconnect from the console and ensure they have a positive flow of oxygen. The first jumper moves to the hinge of the ramp or 1 meter from the jump door.
- **STAND BY.** Given approximately 15 seconds from TOT. Return a thumbs-up. First jumper moves to edge of the ramp or to the jump door.
- **GO.** Given at the release point. Exit as briefed.
- **ABORT.** Given when release conditions are not favorable. Back up to the hinge of the ramp or 1 meter from the door and await further instructions.
- **After Exiting.** Leave the mask connected until landing.
- **After Landing.** Turn off the oxygen bottle and disconnect the mask. Place the mask in the prescribed container and replace red caps on all fittings.

13-80. The following commands and/or signals from the jumpmaster during oxygen MFF operations will remain the same as for nonoxygen jumps:

- DON HELMET.
- UNFASTEN SEAT BELTS.
- EMERGENCY BAILOUT.
- TIME WARNINGS.
- WIND SPEED.
- GUSTING WINDS.
- STAND UP.
- MOVE TO THE REAR.
- STAND BY.
- GO.
- ABORT.

13-81. Additional commands used during MFF oxygen jumps are described in the following paragraphs.

MASK

13-82. The jumpmaster signals mask when the parachutist must begin using supplemental oxygen (figure 13-26). Upon receiving this signal, the parachutist dons his mask and checks to make sure the oxygen system is functioning properly.

Figure 13-26. MASK signal

CHECK OXYGEN

13-83. The jumpmaster signals CHECK OXYGEN immediately after the signal to mask and periodically after that (figure 13-27). At a minimum, the jumpmaster gives the signal following the 20- and 10-minute time warnings. Upon receiving this signal, the parachutist returns the thumbs-up signal if everything is functioning correctly.

Figure 13-27. CHECK OXYGEN signal

OXYGEN PROBLEM

13-84. If there is an oxygen problem, the parachutist (figure 13-28) extends an arm in front of his body with his hand open, palm down.

Figure 13-28. OXYGEN PROBLEM signal

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Chapter 14
Drop Zone Operations

This chapter outlines the basic selection criteria, markings, and procedures used in support of MFF operations, as well as the qualifications and responsibilities of key DZ support personnel. U.S. Army units are advised to reference USASOC Regulation 350-2 for additional information and updates.

A DZ is any designated area where personnel and equipment may be delivered by means of parachute or free drop. DZs for MFF operations are selected during premission planning using all available intelligence sources. The ground unit commander selects the DZs where they can best support the ground tactical plan. The air mission commander recommends approach headings and selects initial and subsequent timing points based upon the routes to the DZ, terrain obstructions, ease of DZ identification, and enemy defenses. Final approval of selected DZs is a joint decision made by the ground unit commander and the supporting air unit.

DROP ZONE PERSONNEL QUALIFICATIONS AND RESPONSIBILITIES

14-1. The airborne commander designates key personnel for each MFF operation. These key personnel are the primary jumpmaster, assistant jumpmaster, safety personnel, oxygen safety personnel (when required), departure airfield control officer, DZ safety officer or DZ support team leader, and the malfunction officer. The qualifications and responsibilities of DZ support personnel are listed in the paragraphs below.

> ***Note:*** USASOC Regulation 350-2 and TC 3-21.220 includes further discussion of responsibilities during airborne operations.

JOINT DROP ZONE RESPONSIBILITIES

14-2. DZ size and selection are the joint responsibility of the air component commander or Commander, Air Force Special Operations Command, and the supported force commander. The supporting air unit is responsible for airdrop accuracy and safety of flight. The supported ground unit is responsible for establishment, operation, safety on the DZ, and the elimination or acceptance of ground hazards associated with the DZ. The jumpmaster is responsible for accuracy when jumpmaster-directed release procedures are used. AFI 13-217 provides additional information on joint DZ responsibilities.

> ***Note:*** The jumpmaster will determine the minimum size DZ based on the number of personnel to be dropped, jumper proficiency, and prevailing winds.

14-3. If the selected DZ is not in the Assault Zone Availability Report, the unit must complete the DZ survey request in full (as detailed in paragraph 14-8), and it must state whether the unit has obtained permission to conduct the exercise. Any other information relating to the area being used as a DZ should also be stated, such as the following:

- Nearest facility capable of landing type of aircraft being used for mission (must include name, title, and phone number of the individual contacted for authority to land).
- Medical facility for medical evacuation and hospital support.
- Communications capabilities (for FLASH/priority of report).
- If the drop is to be made on civilian-owned land or on a non-Department of Defense government reservation, written permission from the owner/agency must be attached to the request. This approval process should be completed in conjunction with review and advice from the organization's judge advocate.
- Airspace clearance from the Federal Aviation Administration or the local range control agency.
- Facilities available for storing and/or repacking of air items.
- Wind historical data for time and date of drop.
- Any other pertinent information.

14-4. The supporting air unit is responsible for airdrop accuracy and safety of flight. The supported ground unit is responsible for the establishment of a DZ, DZ operations, safety measures on the DZ, and the elimination or acceptance of ground hazards associated with the DZ. The jumpmaster is responsible for accuracy when jumpmaster-directed release procedures are used.

DROP ZONE SELECTION CRITERIA

14-5. The joint force commander gives guidance on DZ size in operation plans and operation orders. The ground unit commander selects the general area of the DZ where it will best support the ground tactical plan. DZ selection should be based on the following criteria:

- **Mission Supporting.** Some of the main considerations when selecting a DZ that supports the mission include—
  - Method of insertion (MFF HALO or HAHO).
  - Elevation and drop altitude.
  - Location and capability of enemy forces.
  - Recognizability during limited visibility.
  - Distance from the objective area.
  - Terrain between the DZ and the objective area.
  - Built-up areas.
  - Time available for movement to the objective area.
  - Amount of equipment being carried.
  - Physical characteristics of available DZs and surrounding areas.
  - Relative number of obstacles in the area.
  - Proximity to alternate and contingency DZs.
- **Supporting Aircraft.** When considering the capabilities of the supporting aircraft, parachutists take the following into account:
  - Type of aircraft.
  - Capabilities of the aircraft.
  - Skill level of the aircrew.
  - Availability of backup aircraft if the primary aircraft experiences mechanical problems.
- **Infiltration Route.** The primary, alternate, and contingency DZs should be selected so that the aircraft can fly them in order without making major course corrections. Air routes to and from the DZ should not conflict with other air operations, restrictive terrain, restrictive airspace, or fall within the enemy's air defense umbrella.

- **Security.** The DZ must provide security from the enemy threat. The DZ should be located away from enemy positions and built-up areas.
- **Weather and Astronomical Conditions.** Seasonal weather and astronomical conditions in the area must be considered. If conducting a water jump, the tides, waves, currents, and sea state must be considered.
- **Size.** There is no minimum size for MFF DZs according to AFI 13-217. The jumpmaster will determine the minimum size of an MFF DZ based upon the experience and capabilities of the parachutists. An area 50 meters by 100 meters is the recommended minimum DZ size for training.
- **Undesired Landing Areas (Drop Zone Hazards).** Some considerations include the following:
  - **Rising Terrain.** Landing into the hill could cause injury and thermal updrafts could keep jumpers in the air longer.
  - **Tall Timber.** Falling out of a tree might cause serious injuries; there is a high probability of a lengthy letdown of the reserve from the top of a tree. Snags have been known to fall over if landed in, which could also snap tops, increasing the likelihood of injury. Turbulence near treetops could make it difficult to land safely at the desired impact point. Parachutes could get hung in trees, disclosing the infiltration location.
  - **Hill Side.** The steepness of hills could be a safety problem if a jumper does not contour the hill.
  - **Power Lines.** These could be hard to see, especially in fading light, and there is a greater risk for serious injury.
  - **Fences.** These blend in with the landscape and present a hazard.
  - **Deadfall.** High risk of extremities catching as the parachute carries the jumper forward on landing.
  - **Ice.** There is a higher probability of injury occurring if a jumper busts through ice. The situation will likely be more serious if bodies of water are undetected due to snowy landscape. More jumpers will be needed to help assist with recovery and medical attention. Recovery time could take away from the mission.
  - **Water.** Landing in water could require additional equipment and personnel to recover lost and damaged equipment. Recovery time could take away from the mission.
  - **Rocky Ground.** Large outcroppings can be notorious for blocking wind. Landings could be rough. More jumpers may be needed to assist with medical attention.
- **Aerial Power Line Restrictions.** For the purpose of this publication, all restrictions apply to aerial power lines operating at 50 volts or greater. Power lines present a significant hazard to jumpers. Jumpers can sustain life-threatening injuries from electric shock and/or falls from a collapsed canopy. To reduce this hazard, power lines should not be located within 1,000 meters of any DZ boundary. If power lines are located within 1,000 meters of any boundary, coordination with the power company must be made to shut off power not later than 15 minutes prior to TOT. If power cannot be interrupted, the flying mission commander, aircrew, and jumpmaster must conduct a risk assessment of the mission. Included, as a minimum, are the type of jump, jumper experience, aircrew experience, ceiling, and surface/altitude wind limits required to approve, suspend, or cancel the operation. To further minimize risks, consideration should be given to altering the mission profile to raise or lower drop altitudes, change DZ run-in/escape headings, or remove inexperienced jumpers from the stick. If possible, power lines should be marked with visual markings (lights, smoke, or visual signal-17 panels).

WARNING

At no time will military personnel attempt to climb power line poles to position or affix markings to wires or poles.

DROP ZONE SURVEYS

14-6. A DZ survey is required for all airdrop training missions involving U.S. personnel and equipment. Completing the DZ survey process involves conducting a physical inspection of the DZ and documenting the DZ information on Air Force Form 3823 (Drop Zone Survey). The using unit completes the DZ survey and forwards it through appropriate channels for review and approval. The using unit is defined as the unit whose personnel or equipment are being airdropped.

14-7. The DZ survey review process involves the following steps:

- **Step 1.** The surveyor/MFF jumpmaster (Air Force Form 3823, Item 4a) physically surveys the DZ and completes the ground portion of the form. Once completed, the form is forwarded to the ground operation's review authority for approval (Air Force Form 3823, Item 4c). The ground operation's review authority is normally the surveyor's commander or designated representative. This review ensures the form is complete, accurate, and meets the criteria for planned airborne operations.
- **Step 2.** The using unit representative forwards the survey to the U.S. Air Force regional/wings tactic office for a safety-of-flight review (Air Force Form 3823, Item 4d). A safety-of-flight review is completed by an airdrop-qualified pilot or navigator on all DZ surveys. The purpose of a safety-of-flight review is to ensure an aircraft can safely ingress and egress the DZ.
- **Step 3.** The representative of the regional/wings tactic office forwards the survey to the appropriate operations group commander for review and final approval (Air Force Form 3823, Item 4e). This approval assures that the safety-of-flight review has been conducted and the DZ is considered safe for specified airdrop operations.
- **Step 4.** Once Air Force Form 3823, Item 4e, has been completed, the survey is approved for use. Copies of the survey are forwarded to Headquarters, Air Mobility Command/DOKT, 402 Scott Drive, Scott Air Force Base, Illinois 62225-5320, for inclusion into the Zone Availability Report database.

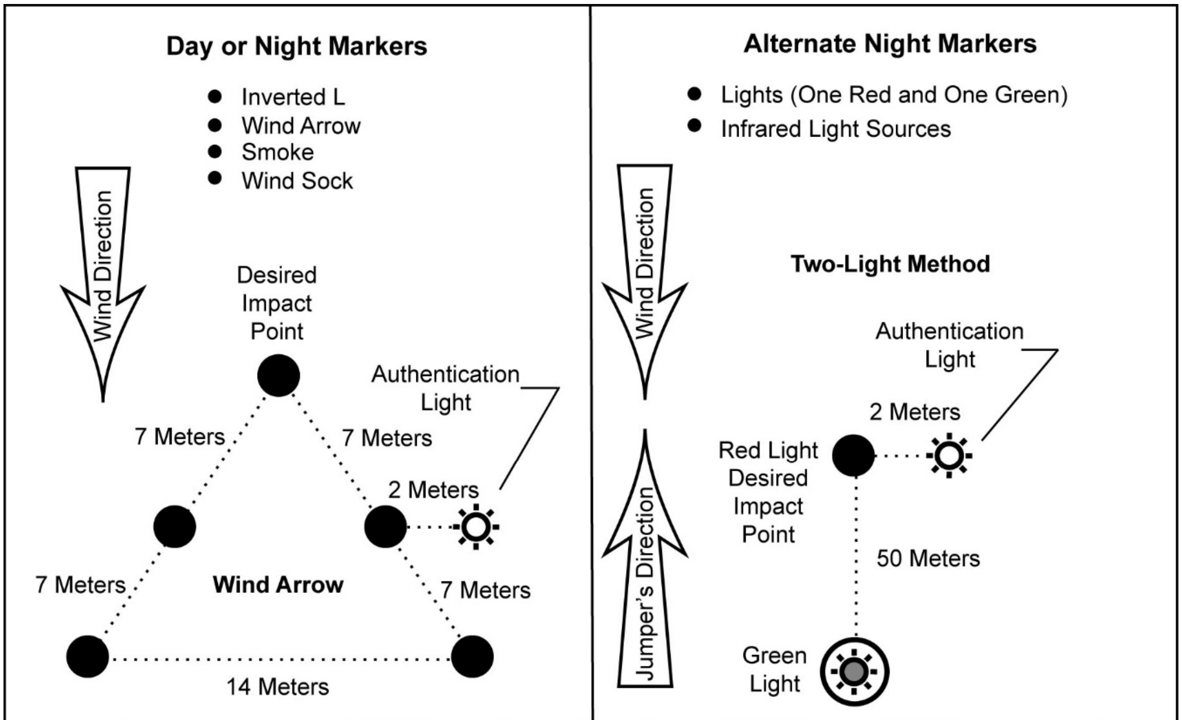
14-8. The Zone Availability Report is a comprehensive listing of approved assault zones available for use by the Department of Defense. Use of the Zone Availability Report will expedite mission planning, enhance safety, and avoid duplication of surveys. Information contained in the Zone Availability Report does not replace the need for a completed DZ survey before conducting airdrop operations. Completed surveys are available via facsimile on-demand system (also located at Scott Air Force Base, Illinois, at DSN 576-2899 or commercial [618] 256-2899).

MILITARY FREE-FALL DROP ZONE MARKINGS

14-9. MFF infiltrations usually take place on blind DZs because of the general ineffectiveness of visual markings when viewed from high altitudes (MFF HALO) and extended distances (MFF HAHO). DZ identification is normally by location in relation to major terrain features.

14-10. DZ markings are sometimes used when the tactical situation permits, and it is desirable to indicate wind direction to the descending parachutists (figure 14-1, page 14-5). ATP 3-18.10, FM 3-21.38, and AFI 13-217 outline approved marking techniques. Markers that can be used with the approved markers are the wind sock, wind streamer, wind blade, wind arrow, smoke, two-light method (one red and one green), wind T, and infrared light source.

14-11. There are several types of wind socks (figure 14-2, page 14-5) that are used on airfields and DZs for MFF and civilian skydiving. Normally, a wind sock is what is seen on airfields for aircraft, but it can assist jumpers as well in determining the direction and velocity (somewhat) of the wind. Wind socks come in 5-, 10-, and 15-knot categories, determined by the erectness of the wind sock, to let the user know an estimate of the velocity. Naturally, the jumper will have to know the type of wind sock in use in order for it to be of benefit for velocity approximation.



Notes:
1. An authenticator, when used, can be placed at any marker station.
2. White lights should not be used, if possible, to minimize confusion with buildings, streetlights, vehicles, and other light sources.
3. Any combination or pattern for ground markings may be used. The key is to coordinate markers with the ground party to ensure all parachutists understand them and to show wind direction.

Figure 14-1. Military free-fall drop zone markings

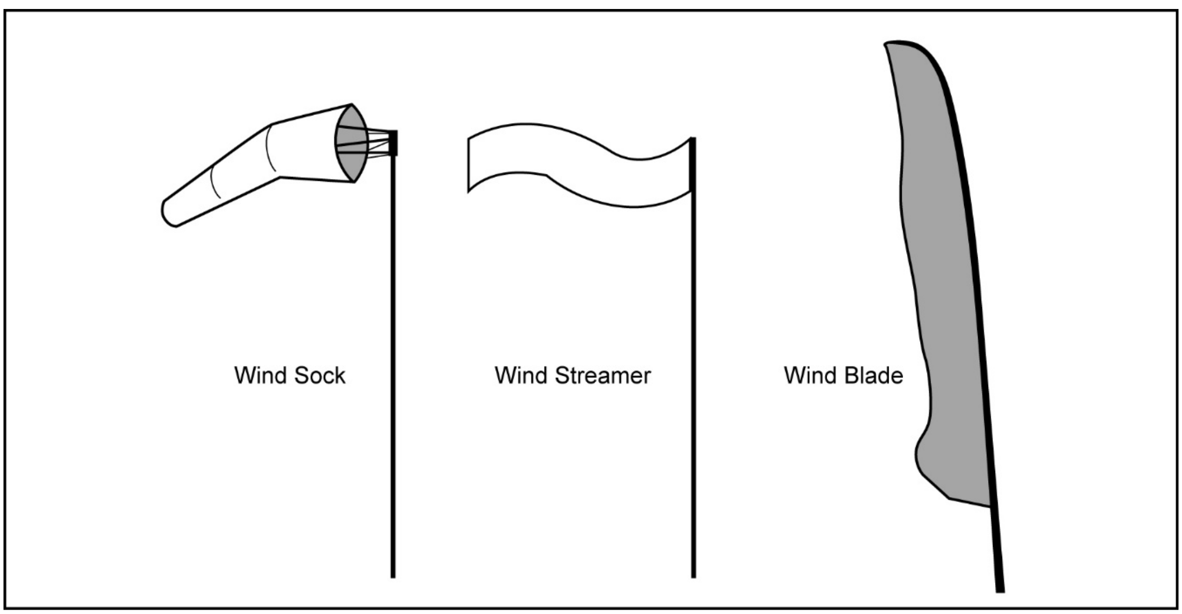


Figure 14-2. Examples of wind socks

14-12. For MFF, the 15-knot wind sock is used since this upward end of the scale is closest to the maximum landing conditions. On most civilian DZs, the wind blade or tetrahedron is used. These do not give an approximation on the wind speed; however, they are much easier to be seen by jumpers in the air. On MFF DZs, the wind V or other wind direction device is required, and depending on the DZ, there may be permanent wind socks, such as on Philips DZ at the MFF School in Yuma, Arizona.

NONSTANDARD DROP ZONE MARKINGS

14-13. The tactical situation may dictate the use of nonstandard DZ markings. When nonstandard markings or identification procedures are used, it is imperative that all appropriate participants be thoroughly briefed.

14-14. The unmarked DZ is not authenticated with any type of visual or electronic marking. Unmarked DZs are normally used for contingency operations and may not have a DZ party present. Air Force Special Tactics personnel; combat rescue officers; para-rescue; rescue squadron assigned or supporting survival, evasion, resistance, and escape specialists; and USSOCOM-assigned forces are authorized to drop on unmarked DZs. During training missions, a DZ control party must be on site for safety.

14-15. The two DZ marking systems commonly used during MFF operations are the wind arrow and the two-light system (figure 14-1, page 14-5):

- **Wind Arrow.** The wind arrow is formed by placing visual markers on the ground in the shape of an arrowhead. The arrow is aligned pointing into the wind. The arrow tip marker is placed on the desired impact point. Jumpers fly their approach to land facing the direction of the arrow.
- **Two-Light System.** The two-light system consists of one red light and one green light. The red light is placed on the desired impact point, and the green light is placed between 15 and 50 meters downwind. Jumpers will be briefed on the actual separation of lights. Jumpers fly their approach to landing from green light to red light.

WATER DROP ZONE MARKINGS

14-16. Water drops can be conducted on marked or unmarked DZs. Marked DZs will have mutually agreed-upon markings (visual or electronic). Markings that do not mimic local maritime navigational aids (buoys, channel markers, and so on) should be selected. Appendix H provides additional information on water DZs.

Note: Ground parties and aircrews must coordinate and brief NO-DROP markings for all types of DZs, to include water DZs.

EN ROUTE AND TERMINAL NAVIGATIONAL AIDS

14-17. A variety of electronic navigational aids are available to support DZ operations, including the tactical air navigation system, zone marker, or radar beacons. These navigational aids are used at the discretion of the joint force air component commander, joint force special operations component commander, or mission commander. For MFF airdrops, the beacons will be placed on the point of impact (AFI 13-217).

HIGH-ALTITUDE RELEASE POINT AND DROP ZONE DETECTION

14-18. Location in relation to major terrain features identifies the HARP. Appendix F contains methods of computing the HARP. The HARP may be marked, if known, when the tactical situation permits. In heavily vegetated, mountainous, or urban terrain and during conditions of restricted visibility, DZs and HARPs may be difficult to detect. Electronic beacons or radar transponders and appropriate tracking devices help aircraft personnel and parachutists locate DZs or HARPs. Expedient methods, such as balloons and pyrotechnics, may also help aircraft personnel and parachutists locate DZs or HARPs. In situations in which secrecy is important, aircraft and parachutists equipped with automatic direction-finding equipment may conduct drops using only the radio homing beacon. Parachutists may also use the GPS with portable terminals.

AIRCRAFT OR MILITARY FREE-FALL HIGH-ALTITUDE HIGH-OPENING TEAM IDENTIFICATION

14-19. In air-to-ground identification, the aircraft or MFF HAHO team identifies itself to the reception committee by arriving in the objective area within the specified time limit. The aircraft or MFF HAHO team also identifies itself by approaching at the designated drop altitude and track (aircraft).

14-20. In ground-to-air identification, the reception committee identifies itself to the aircraft or team by displaying the correct marking pattern within the specified time limit and by using the proper authentication code signal.

AUTHENTICATION SYSTEM

14-21. There is no standard authentication system for unconventional warfare reception operations. During mission planning, the commanders concerned agree on the authentication system they will use. Signal operation instructions prescribe the authentication procedures.

14-22. Authentication may take the form of a coded light source, panel signal, radio contact, homing beacon, or combinations thereof. Authentication may be used individually or with the marking pattern. When using a homing beacon or radar transponder for authentication, the commanders concerned will jointly agree upon the positioning and turn-on and turn-off times during mission planning.

14-23. Detachments conducting MFF operations during special reconnaissance missions will not have the opportunity, in most cases, of being assisted by a reception committee or lighted DZ during the infiltration. For this type of operation, the detachment will require additional planning and rehearsals. Training with NVG, electronic navigation devices, compasses, communications while under canopy, rough terrain landings, caching of equipment, thrall map and terrain analysis of desired impact point, and all contingency plans for lost jumpers or medical situations must be taken into consideration. This type of mission is not limited to just special reconnaissance; it can also be used to get into position for direct action by giving the detachment the element of surprise by not having large numbers of vehicles, hovering aircraft flying into the area, or foot traffic moving toward the objective, causing the target to be empty upon arrival. Additional forces in vehicles or by helicopters (from staging areas) should assist the detachment as soon as the detachment begins to move on the objective. This timing is critical to the MFF detachment and to the success of the mission.

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Appendix A

RA-1 Jumpmaster Personnel Inspection

This appendix describes the inspection sequence that jumpmasters use in MFF parachute operations. Jumpmasters must detect and identify deficiencies with hands and eyes working together, starting at the front of the jumper, moving toward the rear, top to bottom, and right to left. This appendix covers the JMPI sequence for the RA-1 when jumping OTS ripcord and BOC for administrative nontactical, combat equipment, and MFF oxygen operations.

Note: All references to right or left are the jumper's right or left, unless otherwise indicated.

> **WARNING**
>
> **Changes to the JMPI procedures may occur as new equipment and procedures are developed. Jumpmasters should ensure that they are using the latest JMPI procedures taught at the USAJFKSWCS MFF School when conducting JMPIs.**

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR ADMINISTRATIVE, NONTACTICAL MILITARY FREE-FALL JUMPS

A-1. Figure A-1, pages A-1 through A-7, describes the JMPI sequence conducted for OTS and BOC configuration for administrative, nontactical MFF jumps.

Note: All helmets will be inspected using the same inspection sequence as the ACH.

(1) **Proper Harness Fit.** Start the inspection sequence by first ensuring the jumper has the harness properly fitted. This is done by placing the index and middle finger of each hand inside the base ring of the three-ring riser release assembly. Visually inspect both base rings, and ensure they are approximately 1⁄2-inch above the hollow of the jumper's shoulders. If the harness is improperly fitted, it must be corrected before continuing.

Key Words: "PROPER FIT"

(2) **Helmet and Goggles.** Visually inspect the helmet, ensuring it fits properly and is serviceable. Place your hands on either side of the helmet and visually inspect the goggles. Ensure the goggles are present, clear in color, and free of damage.

(3) Turn the jumper's head to your left; visually inspect the goggle strap ensuring the goggles are secured to the helmet. Then, turn the jumper's head to your right; visually inspect the goggle strap ensuring the goggles are secured to the helmet.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps

(4) **ACH (Front) with Head-Loc Retention System and ARC.** Place both hands on the front right side of the ACH, fingers and thumbs extended and joined pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace across the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head to the rear. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

(5) Place the right index finger on the front left adjustable strap and trace down to front left Head-Loc tab, checking for twists and overall serviceability. Once at the front left Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left adjustable strap to the low profile chin buckle, ensuring it is serviceable, not cracked, and properly secured. Now, bypass the low profile chin buckle and trace the chinstrap portion under the jumper's chin to where it is sewn into the front right adjustable strap to ensure that both portions of the chinstrap are routed under the jumper's chin and are not twisted, cut, or frayed. Next, trace the front right adjustable strap up to the front right Head-Loc tab checking for twists and overall serviceability. Once at the front right Head-Loc tab, ensure it is serviceable and not cracked, then continue tracing the right adjustable strap back up to the helmet.

(6) Leaving your right hand on the chinstrap as your reference hand, open up the riser protective flap, form your left hand into a C shape and place your fingers under the inboard side of the right main riser. Without masking, trace forward with your hand along the riser ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and that there are no broken strands on the stitching.

(7) Leave your left hand in place and with your right hand, grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated.

Grasp the medium ring, give it a 1⁄4-turn, and ensure it rotates freely and is not elongated. Grasp the base ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(8) Place your right index finger next to the clamps on the ends of the main canopy release cable housings; visually ensure the clamps are present. TRACE the housing up and under the jumper's right riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left hand grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK the main canopy release cable running end and ensure it is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, CHECK"

Note: When inspecting the RA-1 in the BOC configuration, skip to step 11, there will be no main ripcord handle present.

(9) With your left hand, trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure the clamp is present. Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the main ripcord handle and terminates with two swage balls.

Key Words: "TWO SWAGE BALLS"

(10) Place your left index and middle finger in the elastic stow pocket. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(11) With your right hand, push the main canopy release handle toward the main ripcord and pin it back with your left thumb. With your right index finger, inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. With your right index finger, trace the hook-pile tape of the main canopy release handle, ensuring it is at least 50-percent mated.

(12) Form a knife-cutting edge with your right hand and place it behind the chest strap. Move from your left to right inspecting the chest strap extension. Once you have inspected the chest strap extension, sweep the friction adapter with your right thumb to ensure proper routing of the chest strap.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

(13) When you encounter the excess rolled and stowed portion of the chest strap, give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect excess webbing to ensure it is rolled outboard and stowed properly with a heavyweight retaining band or slack retainer.

(14) Continue to inspect the chest strap in its entirety, then visually check the jumper's left side or hip for a weapon. State what you see.

Key Words: "WEAPON" OR "NO WEAPON"

(15) If no weapon is found or after you have inspected the weapon, bring your left index and middle finger underneath the reserve ripcord and place the two fingers inside the elastic stow pocket of the reserve ripcord handle. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(16) The left hand stays in place and the right hand becomes the working hand. With your right index finger, ensure two swage balls are present on the end of the reserve ripcord cable.

Key Words: "TWO SWAGE BALLS"

(17) Inspect the cable and ensure it is properly routed and that there are no broken strands. Make sure the cable runs through the reserve ripcord handle, and continue tracing the cable to where it enters the housing. Ensure a clamp is present securing the cable housing to the harness.

(18) Your right hand opens the riser protective flap while keeping your left hand in place. Form your right hand into a C shape and place your fingers under the inboard side of the left main riser. Without masking, trace forward with your hand along the riser ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and that there are no broken strands on the stitching.

(19) Leave your right hand in place and with your left hand, grasp the *small* ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *medium* ring; give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *base* ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(20) Move your right index finger to the main canopy release cable housing. TRACE the housing up and under the jumper's left riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left index finger, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK to ensure that the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK to ensure that the main canopy release cable running end is properly stowed in stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, AND CHECK"

(21) With your left index finger, elongate the yellow lanyard of the RSL. At the same time, pinch grip the snap fastener on the red release lanyard of the RSL shackle. Pinch with your thumb and forefinger to make sure it is properly secured.

Key Word: "SNAP"

(22) Visually inspect the RSL shackle while touching it with your right index finger, ensuring it is assembled correctly and is properly oriented with the pelican hook facing up toward the jumper's head.

Key Word: "SHACKLE"

(23) Visually inspect for the ring while touching it with your right index finger. Ensure that the pelican hook is routed through the ring and it separates the yellow nylon of the RSL from the shackle.

Key Word: "RING"

(24) With your left index finger, elongate the yellow lanyard on the RSL. Visually inspect the RSL to ensure it is not misrouted under or through the main canopy release assembly.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

Key Words: "FREE AND CLEAR"

(25) Forming a knife-cutting edge with both hands, place your right hand behind the jumper's left main lift web just below the equipment attaching ring. Place your left hand behind the jumper's right main lift web, just below the equipment attaching ring.

(26) Ensure the LEFT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

(27) Sweep the main lift web with your right hand looking for twists. Place your right thumb on the main lift web excess and pull down at the friction adapter, exposing the colored stitching indicating the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your right thumb, sweep the main lift web friction adapter. Next, visually inspect for proper stowage of excess webbing.

Key Words: "I SEE GREEN" OR WHATEVER COLOR IS VISIBLE"

(28) Ensure the RIGHT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

(29) Sweep the main lift web with your left hand looking for twists. Place your left thumb on the main lift web excess and pull down at the friction adapter, exposing the colored stitching indicating the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your left thumb, sweep the main lift web friction adapter. Next, visually inspect for proper stowage of excess webbing. The jumpmaster must ensure both colors with respect to the sizing stitching on the main lift webs match; if they do not, the jumpmaster will ensure they do before continuing with the inspection.

Key Words: "I SEE GREEN" OR WHATEVER COLOR IS VISIBLE "CORRECT/INCORRECT"

When the jumper is wearing a CMWH, if a weapon IS present, after inspecting the lower equipment ring, rotate the weapon up toward the jumper with your right hand to expose the waistband.

Instruct the jumper: "JUMPER, HOLD."

Key Word: "WAISTBAND"

(30) With an overhand motion, palm facing you, the RIGHT hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

(31) With the left hand palm facing you, in an overhand motion place your fingers on the origin of the waistband as it appears from the container. This is a visual inspection as well as a physical inspection of the origin to ensure the waistband is sewn at least 50-percent to the harness-container assembly.

Key Word: "ORIGIN"

(32) Trace the waistband forward with your left hand, inspecting from your left to your right ensuring there are no twists. Ensure the waistband is routed under the right lateral adjusting strap until your left hand meets the right main lift web. Insert your right hand making skin-to-skin contact with your left hand palm facing you, fingers pointing skyward. Inspect for proper routing under the right main lift web and inspect the waistband ensuring there are no twists. When you encounter the excess rolled and stowed portion of the waistband, give it a 1⁄4-turn outward and inspect behind it ensuring there are no twists. Inspect excess webbing, making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer. Once you encounter the friction adapter, insert your LEFT hand, palm facing out in an overhand motion. Sweep the waistband with your LEFT or RIGHT thumb, inspecting for proper routing. Continue to inspect the waistband until your left hand meets the left main lift web. Insert your right hand, making skin-to-skin contact with your left hand, ensuring the waistband is routed under the left main lift web and left lateral adjusting strap. Continue with the right hand on the waistband, ensuring it is sewn at least 50-percent to the harness-container assembly.

(33) With either an underhand or overhand motion, palm facing you, the right hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug. If the accessory pouch is present, ensure the waistband is routed through the keeper.

Key Word: "SNUG"

Instruct the jumper: "JUMPER, SQUAT."

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

(34) Your right hand is now your reference hand. Forming a knife-cutting edge with your left hand, place it under the gate of the jumper's right leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(35) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(36) With your right hand, hook the leg strap with your thumb or fingers next to your left hand, making skin-to-skin contact to the inside or outside of the jumper's leg. Trace with your right hand along the leg strap, inspecting ensuring that there are no twists until you reach the saddle or until your hand stops between the jumper's legs.

(37) Keeping your right hand in place, reach around the back of the jumper with your left hand and make skin-to-skin contact with your right hand, hooking the thumb or fingers of your left hand between the padded portion of the saddle and the jumper's leg. Continue to trace up, inspecting and ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap you must continue the inspection of the leg strap on that same side.)

(38) Keep your left hand in place as your reference hand. Forming a knife-cutting edge with your right hand, place it under the gate of the jumper's left leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(39) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled outboard and stowed properly with a heavyweight retaining band or slack retainer.

(40) With your left hand, hook the leg strap with your thumb or fingers next to your right hand making skin-to-skin contact to the inside or outside of the jumpers' leg strap. Trace with your left hand along the leg strap, inspecting for no twists until you reach the saddle or until your hand stops between the jumper's legs.

(41) Keeping your left hand in place, reach around the back of the jumper with your right hand and make skin-to-skin contact with your left hand, hooking the thumb or fingers of your right hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap you must continue the inspection of the leg strap on that same side.)

Note: If the jumper wears a CMWH, command the jumper to: "RECOVER." Otherwise, continue your inspection as follows.

(42) With an overhand motion of your left hand, grasp the jumper's left wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face. Attempt to rotate the altimeter around the jumper's wrist. It should be snug and not excessively loose. Look at the face of the altimeter and read aloud where the needle is set, then read aloud the setting you have written on your hand. At this point you are inspecting for the proper setting of the altimeter. As you read the altimeter face, you are inspecting to ensure the lens is clear and free of damage.

Key Words: "+500, +500 CORRECT," OR "500, +500 INCORRECT"

(43) With your right forefinger or thumb, give the altimeter face a gentle tap to ensure it is present. Use your right forefinger or thumb to tug on the heavyweight retainer band to ensure it is properly attached to the wrist strap.

Key Words: "TAP, SNAP, JUMPER TURN"

Instruct the Jumper: "JUMPER, TURN."

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

(44) **ACH (Rear) with Head-Loc Retention System and ARC.** Once the jumper has turned 180 degrees, place both hands on the left side of the ACH, fingers and thumbs extended and joined fingers pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head forward. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

(45) Place the right index finger on the right rear adjustable strap and trace down to the right rear Head-Loc tab, checking for twists and overall serviceability. Once at the right rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the right rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Leave the right index finger in place; now trace down to the left rear Head-Loc tab, checking for twists and overall serviceability. Once at the left rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Conduct a visual inspection of the nape pad to ensure it is present, secure, serviceable, and has not been reversed.

(46) Move your right hand to the CYPRES control unit in its clear window.

(47) With your right index finger, find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current free-fall operation.

Key Words: "1500/35 A, CORRECT" OR "2500/29 A, INCORRECT"

(48) With your right index finger, find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

Key Word: "NO LED"

(49) Next, move your right index finger over to the CYPRES control unit's digital readout screen. Read aloud the millibar setting on the screen. Read aloud the setting that you have written on your hand. At this point, you are inspecting for the proper setting of the CYPRES.

Key Words: "788"…. "788" "CORRECT", OR "INCORRECT"

(50) Grasp the reserve flap with both hands and lift up to expose the reserve components.

(51) With either hand, find the reserve ripcord cable as is protrudes from its housing on the back of the jumper's left shoulder. Inspect the reserve ripcord cable housing, ensuring there is a clamp at the end securing it to the harness container. Inspect the routing of the reserve ripcord cable, ensuring it runs through the upper guide ring and the RSL assist ring and through the lower guide ring. Ensure the RSL yellow lanyard is secured by the hook-pile tape located next to the reserve ripcord cable. The RSL assist ring should be located in between the upper and lower guide rings, and all rings should lay flat and be oriented in the same direction.

Key Words: "RING, YELLOW, RING"

(52) Continue to inspect for proper routing and no broken strands on the reserve ripcord cable until you encounter the shoulder of the reserve locking pin.

(53) Once you are at the top of the pin, inspect it to make sure it is not shouldered inside the grommet, the pin is not bent and inserted into the protective sleeve. Inspect the CYPRES closing loop of the reserve (white Dyneema material loop) for frays.

Note: For JMPI of the RA-1 in the BOC configuration, refer to steps 54–60 below.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, JUMPER BEND"

(54) Moving your hands simultaneously, open and pin the protector flap of the main parachute with both hands.

(55) Slide your right hand across the left flap. It should stop at the edge of the right flap; ensuring proper closing sequence.

Key Words: "LEFT, RIGHT"

(56) Verify that the main locking pin is oriented from right to left, pointed upward through the main closing loop ensuring it is not frayed. Trace the bridle from the main locking pin eyelet ensuring both bar-tack stitches are present and the bridle attachment point is not frayed.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

Key Words: "NOT FRAYED, BAR TACKING"

(57) Continue to trace the bridle down and verify that it is secured under the closing flap.

(58) Inspect the routing of the bridle from the closing flap to the BOC stow pocket to ensure it is secured under the bridle stowage flap and there is no excess bridle exposed.

(59) Verify that the pilot chute handle is accessible and that there is no excess pilot chute exposed.

(60) At this time, slap the BOC. This signifies that the JMPI is now complete.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR COMBAT EQUIPMENT AND WEAPON

A-2. This section describes the combat equipment inspection sequence that jumpmasters use in MFF parachute operations. Jumpmasters must detect and identify deficiencies with hands and eyes working together, starting at the front of the jumper, moving toward the rear, top to bottom, and right to left.

Note: All references to right or left are the jumper's right or left, unless otherwise indicated.

WARNING

Changes to the JMPI procedures may occur as new equipment and procedures are developed. Jumpmasters should ensure that they are using the latest JMPI procedures taught at the USAJFKSWCS MFF School when conducting JMPIs.

A-3. Figure A-2, pages A-7 through A-13, describes the JMPI sequence of the M-4 rifle left-side mounted and CMWH sequence conducted for OTS and BOC.

(1) **Proper harness fit.** Start the inspection sequence by first ensuring the jumper has the harness properly fitted. This is done by placing the index and middle finger of each hand inside the base ring of the three-ring riser release assembly. Visually inspect both base rings, ensure they are approximately 1⁄2-inch above the hollow of the jumper's shoulders. If the harness is improperly fitted, it must be corrected before continuing.

Key Words: "PROPER FIT"

(2) **Helmet and goggles.** Visually inspect the helmet ensuring it fits properly and is serviceable. Place your hands on either side of the helmet and visually inspect the goggles. Ensure the goggles are present, clear in color, and free of damage.

(3) Turn the jumper's head to your left; visually inspect the goggle strap ensuring the goggles are secured to the helmet. Then turn the jumper's head to your right; visually inspect the goggle strap ensuring the goggles are secured to the helmet.

(4) **ACH (Front) with Head-Loc Retention System and ARC.** Place both hands on the front right side of the ACH, fingers and thumbs extended and joined pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace across the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH, tilt the jumper's head to the rear. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon

(5) Place the right index finger on the front left adjustable strap and trace down to the front left Head-Loc tab, checking for twists and overall serviceability. Once at the front left Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left adjustable strap to the low profile chin buckle, ensuring it is serviceable, not cracked, and properly secured. Now, bypass the low profile chin buckle and trace the chinstrap portion under the jumper's chin to where it is sewn into the front right adjustable strap. Ensure that both portions of the chinstrap are routed under the jumper's chin and are not twisted, cut, or frayed. Next, trace the front right adjustable strap up to the front right Head-Loc tab, checking for twists and overall serviceability. Once at the front right Head-Loc tab, ensure it is serviceable and not cracked, then continue tracing the right adjustable strap back up to the helmet.

(6) Leaving your right hand on the chinstrap as your reference hand, open up the riser protective flap, form your left hand into a C shape, and place your fingers under the inboard side of the right main riser. Without masking, trace forward with your hand along the riser ensuring that there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(7) Leave your left hand in place and with your right hand, grasp the *small* ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *medium* ring and give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Grasp the *base* ring and give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(8) Place your right index finger next to the clamps on the ends of the main canopy release cable housings; visually ensure the clamps are present. TRACE the housing up and under the jumper's right riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left hand, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK the main canopy release cable running end, ensuring it is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, CHECK"

Note: When inspecting the RA-1 in the BOC configuration, skip to step 11, there will be no main ripcord handle present.

(9) With your left hand, trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure the clamp is present. Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the main ripcord handle and terminates with two swage balls.

Key Words: "TWO SWAGE BALLS"

(10) Place your left index and middle finger in the elastic stow pocket. Give your fingers a 1⁄4-turn out and look inside ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(11) With your right hand, push the main canopy release handle toward the main ripcord and pin it back with your left thumb. With your right index finger, inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. With your right index finger, trace the hook-pile tape of the main canopy release handle, ensuring it is at least 50-percent mated.

(12) Form a knife-cutting edge with your right hand and place it behind the chest strap. Move from your left to right, inspecting the chest strap extension. Once you have inspected the chest strap extension, sweep the friction adapter with your right thumb to ensure proper routing of the chest strap.

(13) When you encounter the excess rolled and stowed portion of the chest strap, give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect excess webbing to ensure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer.

(14) Continue to inspect the chest strap in its entirety, then visually check the jumper's left side or hip for a weapon. State what you see.

Key Word: "WEAPON"

(15) Place your left index and middle fingers on the chest strap; visually ensure the weapon sling is routed over the top of it and runs under the left main lift web and over the jumper's shoulder.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(16) Keep your left hand in place as your reference hand. With your right index finger, find the weapon sling as it protrudes from under the main lift web and over the jumper's shoulder. Trace the sling until it is attached to the weapon tie-down loop with 1⁄4-inch cotton webbing tied in a soft knot (bowknot). Give the cotton webbing a tug to make sure it is properly secured.

Note: Depending on the size of the jumper, weapon, weapon sling and buttstock configuration, the 1⁄4-inch cotton webbing will be girth-hitched on the sling up to 6 inches from the sling swivel or girth-hitched to the buttstock. Jumpmaster discretion should be used in order to determine the best possible attachment configuration. He must ensure the weapon will not move out from behind the accessory pouch, is not protruding high on the jumper's shoulder, or does not inhibit the jumper's movement.

(17) Continue to trace the weapon's sling to its attachment point on the buttstock. Give the sling a tug to make sure the sling is attached to the weapon.

(18) Bring your right hand down and behind the jumper's arm to find the pistol grip; give it a slap. You are inspecting for proper orientation of the weapon. Ensure the pistol grip is pointing toward the rear of the jumper.

(19) Once you have reached the accessory pouch, with your right hand find the zipper and ensure it is zipped. Next, with your right thumb and index finger, press on the snap fastener and ensure it is snapped at the top of the accessory pouch. Give the accessory bag a tug upward to ensure it is properly attached to the barrel lock.

Key Words: "ZIP, SNAP, TUG"

(20) Drop down to the weapon's lower sling attaching point. Give the sling a tug and ensure it is secured to the weapon.

(21) Trace the sling and ensure it runs up and over the handguards. Make sure the sling runs under the waistband and under the main lift web. Bring your right index finger to where the sling protrudes from under the main lift web and trace up to the chest strap.

(22) After you have inspected the weapon, bring your left index and middle finger underneath the reserve ripcord and place the two fingers inside the elastic stow pocket of the reserve ripcord handle. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(23) The left hand stays in place and the right hand becomes the working hand. With your right index finger, ensure two swage balls are present on the end of the reserve ripcord cable.

Key Words: "TWO SWAGE BALLS"

(24) Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the reserve ripcord handle, and continue tracing the cable to where it enters the housing. Ensure a clamp is present securing the cable housing to the harness. The left hand stays in place and the right hand becomes the working hand.

(25) Your right hand opens the riser protective flap while keeping your left hand in place. Form your right hand into a C shape and place your fingers under the inboard side of the left main riser. Without masking, trace forward with your hand along the riser ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(26) Leave your right hand in place and with your left hand, grasp the *small* ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *medium* ring and give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Grasp the *base* ring and give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(27) Move your right index finger to the main canopy release cable housing. TRACE the housing up and under the jumper's left riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left index finger, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK to ensure that the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK to ensure that the main canopy release cable running end is properly stowed in stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, AND CHECK"

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(28) With your left index finger, elongate the yellow lanyard of the RSL. At the same time, pinch grip the snap fastener on the red release lanyard of the RSL shackle. Pinch with your thumb and forefinger to make sure it is properly secured.

Key Word: "SNAP"

(29) Visually inspect the RSL shackle while touching it with your right index finger, ensuring it is assembled correctly and is properly oriented with the pelican hook facing up toward the jumper's head.

Key Word: "SHACKLE"

(30) Visually inspect for the ring while touching it with your right index finger. Ensure that the pelican hook is routed through the ring, and it separates the yellow nylon of the RSL from the shackle.

Key Word: "RING"

(31) With your left index finger, elongate the yellow lanyard on the RSL. Visually inspect the RSL to ensure it is not misrouted under or through the main canopy release assembly.

Key Words: "FREE AND CLEAR"

(32) Forming a knife-cutting edge with both hands, place your right hand behind the jumper's left main lift web just below the equipment attaching ring. Place your left hand behind the jumper's right main lift web just below the equipment attaching ring.

(33) Ensure the LEFT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

(34) Sweep the main lift web with your right hand looking for twists. Place your right thumb on the main lift web excess and pull down at the friction adapter exposing the colored stitching that indicates the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your right thumb, sweep the main lift web friction adapter. Next, visually inspect for proper stowage of excess.

Key Words: "I SEE GREEN" (OR WHATEVER COLOR IS VISIBLE)

(35) Ensure the RIGHT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

(36) Sweep the main lift web with your left hand looking for twists. Place your left thumb on the main lift web excess and pull down at the friction adapter exposing the colored stitching indicating the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your left thumb, sweep the main lift web friction adapter. Next, visually inspect for proper stowage of excess webbing. The jumpmaster must ensure both colors with respect to the sizing stitching on the main lift webs match; if they do not match, the jumpmaster will ensure they do before continuing on with the inspection.

Key Words: "I SEE GREEN" OR WHATEVER COLOR IS VISIBLE "CORRECT/INCORRECT"

When the jumper is wearing a CMWH, if a weapon IS present, after inspecting the lower equipment ring, rotate the weapon up toward the jumper with your right hand to expose the waistband.

Instruct the Jumper: "JUMPER, HOLD."

Key Word: "WAISTBAND"

(37) With an overhand motion, palm facing you, the RIGHT hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

(38) With the left hand, palm facing you, in an overhand motion, place your fingers on the origin of the waistband as it appears from the container. This is a visual inspection as well as a physical inspection of the origin to ensure the waistband is sewn at least 50-percent to the harness-container assembly.

Key Word: "ORIGIN"

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

Trace the waistband forward with your left hand, inspecting from your left to your right, ensuring there are no twists and that the waistband is routed under the right lateral adjusting strap until your left hand meets the right main lift web. Insert your right hand, making skin-to-skin contact with your left hand palm facing you, fingers pointing skyward. Inspect for proper routing under the right main lift web and inspect the waistband ensuring that there are no twists. When you encounter the excess rolled and stowed portion of the waistband, give it a 1⁄4-turn outward and inspect behind it ensuring there are no twists. Inspect excess webbing making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer. Once you encounter the friction adapter, sweep it with your RIGHT thumb inspecting for proper routing. Continue to inspect the waistband, ensuring it is routed over the left main lift web, weapon and left lateral adjusting strap, routed through the keeper on the accessory pouch, and sewn at least 50-percent to the harness-container assembly. Note: For side-mounted weapons, the waistband is routed over the left main lift web and lateral adjusting strap. For CMWH, the routing is under both the left main lift web and lateral adjusting strap. The waistband routing through the M-4 carrying handle is optional.

(39) With either an underhand or overhand motion, palm facing you, the right hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

Instruct the Jumper: "JUMPER, SQUAT."

(40) Your right hand is now your reference hand. Forming a knife-cutting edge with your left hand, place it under the gate of the jumper's right leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(41) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring there are no twists. Inspect excess webbing making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer.

(42) With your right hand, hook the leg strap with your thumb or fingers next to your left hand, making skin-to-skin contact to the inside or outside of the jumper's leg. Trace with your right hand along the leg strap, inspecting and ensuring that there are no twists until you reach the saddle, or until your hand stops between the jumper's legs.

(43) Keeping your right hand in place, reach around the back of the jumper with your left hand and make skin-to-skin contact with your right hand, hooking the thumb or fingers of your left hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on that same side.)

(44) Keep your left hand in place as your reference hand. Forming a knife-cutting edge with your right hand, place it under the gate of the jumper's left leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(45) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(46) With your left hand, hook the leg strap with your thumb or fingers next to your right hand, making skin-to-skin contact to the inside or outside of the jumper's leg strap. Trace with your left hand along the leg strap, inspecting and ensuring that there are no twists until you reach the saddle or until your hand stops between the jumper's legs.

(47) Keeping your left hand in place, reach around the back of the jumper with your right hand and make skin-to-skin contact with your left hand, hooking the thumb or fingers of your right hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on that same side.)

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

Note: If the jumper wears a CMWH, command the jumper: "RECOVER." Otherwise continue your inspection as follows.

(48) With an overhand motion of your left hand, grasp the jumper's left wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face. Attempt to rotate the altimeter around the jumper's wrist. It should be snug and not excessively loose. Look at the face of the altimeter and read aloud where the needle is set; then read aloud the setting you have written on your hand. At this point you are inspecting for the proper setting of the altimeter. As you read the altimeter face, you are inspecting to ensure the lens to be clear and free of damage.

Key Words: "+500, +500 CORRECT", OR "500, +500 INCORRECT"

(49) With your right forefinger or thumb, give the altimeter face a gentle tap to ensure it is present. Use your right forefinger or thumb to tug on the heavyweight retainer band to ensure it is properly attached to the wrist strap.

Key Words: "TAP, SNAP, JUMPER TURN"

Instruct the Jumper: "JUMPER, TURN."

(50) **ACH (Rear) with Head-Loc Retention System and ARC.** Once the jumper has turned 180 degrees, place both hands on the left side of the ACH, fingers and thumbs extended and joined, fingers pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head forward. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

(51) Place the right index finger on the right rear adjustable strap and trace down to the right rear Head-Loc tab, checking for twists and overall serviceability. Once at the right rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the right rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Leave the right index finger in place; now trace down to the left rear Head-Loc tab checking for twists and overall serviceability. Once at the left rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Conduct a visual inspection of the nape pad to ensure it is present, secure, serviceable, and has not been reversed.

(52) Move your right hand to the CYPRES control unit in its clear window.

(53) With your right index finger, find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current free-fall operation.

Key Words: "1500/35 A, CORRECT" OR "2500/29 A, INCORRECT"

(54) With your right index finger, find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

Key Word: "NO LED"

(55) Next, move your right index finger over to the CYPRES control unit's digital readout screen. Read aloud the millibar setting on the screen. Read aloud the setting that you have written on your hand. At this point you are inspecting the proper millibar setting of the CYPRES.

Key Words: "788"…. "788" "CORRECT", OR "INCORRECT"

(56) Grasp the reserve flap with both hands and lift up to expose the reserve components.

(57) With either hand, find the reserve ripcord cable as is protrudes from its housing on the back of the jumper's left shoulder. Inspect the reserve ripcord cable housing, ensuring there is a clamp at the end securing it to the harness container. Inspect the routing of the reserve ripcord cable, ensuring it runs through the upper guide ring and the RSL assist ring and through the lower guide ring. Ensure the RSL yellow lanyard is secured by the hook-pile tape located next to the reserve ripcord cable. The RSL assist ring should be located in between the upper and lower guide rings, and all rings should lay flat and be oriented in the same direction.

Key Words: "RING, YELLOW, RING"

(58) Continue to inspect for proper routing and no broken strands on the reserve ripcord cable until you encounter the shoulder of the reserve locking pin.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(59) Once you are at the top of the pin, inspect it to make sure it is not shouldered inside the grommet, the pin is not bent and inserted into the protective sleeve. Inspect the CYPRES closing loop of the reserve (white Dyneema material loop) for frays.

Note: For JMPI of the RA-1 in the BOC configuration refer to the BOC configuration below.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, JUMPER BEND"

(60) Moving your hands simultaneously, open up and pin the protector flap of the main parachute with both hands.

(61) Slide your right hand across the left flap; it should stop at the edge of the right flap, ensuring proper closing sequence.

Key Words: "LEFT, RIGHT"

(62) Verify that the main locking pin is oriented from right to left and pointed upward through the main closing loop ensuring it is not frayed. Trace the bridle from the main locking pin eyelet ensuring both bar-tack stitches are present and the bridle attachment point is not frayed.

Key Words: "NOT FRAYED, BAR TACKING"

(63) Continue to trace the bridle down and verify that it is secured under the closing flap.

(64) Inspect the routing of the bridle from the closing flap to the BOC stow pocket to ensure it is secured under the bridle stowage flap and that there is no excess bridle exposed.

(65) Verify that the pilot chute handle is accessible and that there is no excess pilot chute exposed.

(66) At this time, slap the BOC. This signifies that your inspection is now complete.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR PORTABLE BAILOUT OXYGEN SYSTEM AND COMBAT EQUIPMENT

A-4. This section describes the JMPI sequence for the portable bailout oxygen system and combat equipment use in MFF parachute operations. Jumpmasters must detect and identify deficiencies with hands and eyes working together, starting at the front of the jumper, moving toward the rear, top to bottom, and right to left.

Note: All references to right or left are the jumper's right or left, unless otherwise indicated.

WARNING

Changes to the JMPI procedures may occur as new equipment and procedures are developed. Jumpmasters should ensure that they are using the latest JMPI procedures taught at the USAJFKSWCS MFF School when conducting JMPIs.

A-5. Figure A-3, pages A-14 through A-21, describes the JMPI sequence of the portable bailout oxygen system and combat equipment for OTS and BOC.

(1) Position yourself in front of the jumper and state the presentation of the jumper.

Key Word: "O2"

Begin by visually checking to ensure that the mask is attached to the left side of the jumper's helmet.

(2) With your right hand, grasp the mask on the outside portion on the hardshell and rotate the mask out to the right making the inside visible. Visually inspect the inside to ensure cleanliness. Look for the presence of the pressure demand relief valve cover with (brass ring), microphone element, anti-suffocation valve, and exhalation valve. With your left index finger, point to the exhalation valve, and ensure that it is present and free of holes and tears. Sound off with VALVE.

Key Word: "VALVE"

(3) Using your left index finger as a guide, place it inside the mask at the top (12 o'clock position) and trace it in a clockwise direction while gently peeling back the lip, exposing the inside of the mask. You are inspecting for tears, dirt, or damage to the inner soft-shell portion. Continue this process until you come back around to the 12 o'clock position.

Key Words: "NO DEBRIS"

Do another sweep on the outer portion of the inner softshell, making sure there is no damage to the mask that would hinder a good seal to the jumper's face.

(4) With your right hand, gently pull out and rotate the mask on the jumper's face. With the left hand, connect the release buckle on the right side of the jumper's helmet, ensuring the male portion is fully seated into the female portion of the buckle with a click. Leave your left hand in place as a reference.

(5) With the right index finger, trace from the Fastex buckle on the left side of the mask up to the left oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the left oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Leave your right hand in place as your reference hand.

(6) With your left index finger, trace from the release buckle on the right side of the mask up the right oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the right oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Your left hand now becomes your reference hand.

Note: If using the oxygen double straps with the ACH-ARC, you must begin your trace of the front left oxygen strap where the swivel clip attaches to the swivel clip shoe on the left ARC. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Next, trace the front right adjustable oxygen strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the front left adjustable oxygen strap until you reach the Fastex buckle; ensure it is properly assembled and serviceable. Then, trace from the Fastex buckle back along the back left adjustable oxygen strap until you reach the Head-Loc tab. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the back left adjustable oxygen strap until you reach the swivel clip. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Repeat the process for the right oxygen straps, starting at the front right swivel clip and tracing to the Snapdragon buckle. After inspecting the right oxygen straps, continue the mask inspection as normal.

(7) With your right index finger, start at the nose of the jumper and conduct a 360-degree inspection of the mask on the jumper's face. Ensure the edges of the mask are not pinched or rolled under on the jumper's face. Give the mask a shake ensuring there is a good seal.

Key Words: "PROPER FIT"

(8) Bring your right index finger to the T-nut at the 2 o'clock position on the mask. Make sure it is present. In a clockwise motion, inspect the remaining three T-nuts.

Key Words: "1, 2, 3, 4 SCREWS"

At this time, grasp the union elbow and medium-pressure delivery hose with your right hand as a reference.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment

(9) Visually inspect the hardshell for cracks. With your left hand, ensure the exhalation valve cover is secure by attempting to turn it clockwise. Inspect under the cover for the spring and for overall cleanliness.

Key Words: "TIGHT, NO DEBRIS"

(10) With your left index finger, point to the intercom block on the top of the mask ensuring it has two screws present, then attempt to seat the intercom cord if used.

Key Words: "TWO SCREWS"

(11) Next, point to the anti-suffocation valve rubber boot ensuring it is present and facing down.

Key Word: "BOOT"

(12) Visually inspect the regulator for damage and overall cleanliness. With your left hand, gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(13) Leave your left hand in place and with your right hand, push the hose toward the mask to ensure the quick disconnect is properly seated, then pull on the hose to make sure that the quick disconnect is securely attached to the regulator.

Key Words: "PUSH IN-PULL OUT"

(14) Next, move your left index finger and thumb to the brass nut portion of the quick disconnect and your right index finger and thumb to the silver adapter nut; attempt to turn it inspecting for tightness. Inspect the remaining B-nut for tightness with the silver adapter nut in sequence to the union elbow.

Key Words: "TIGHT, TIGHT"

(15) Leaving your right hand in place on the union elbow, seek out the securing lanyard and give it a tug with your left index finger. Inspect the securing lanyard, ensuring it is attached to the mask on the jumper's left bottom attaching strap and the chinstrap is routed through the securing lanyard.

Key Words: "SECURE"

At this time, Instruct the jumper: "JUMPER, TURN YOUR HEAD TO THE RIGHT." Ensure that there is a proper amount of slack in the medium-pressure delivery hose. Note: Any extreme excess can be pushed back between the jumper's back and the pack tray.

(16) From the union elbow, trace the medium-pressure delivery hose with your right hand as it routes over the jumper's left shoulder and toward the back of the jumper's pack tray. The hose should be routed through both a girth-hitched heavyweight retainer band on the carrying handle and the carrying handle itself on the top-center of the jumper's container.

Key Words: "THROUGH AND THROUGH"

Move to the right side of the jumper.

Instruct the jumper: "JUMPER, RAISE YOUR ARM."

(17) With your left hand, trace the medium-pressure delivery hose as it protrudes from behind the jumper's back, and ensure the hose is routed through a heavyweight retainer band attached to one of the right-side equipment tie-down loops. Continue tracing the hose from the retainer band to the rubber sleeve above the B-nut. Grasp the B-nut and attempt to twist it, ensuring it is tight. Grasp the Swivel T and turn, ensuring the connection rotates freely.

Key Words: "TIGHT, TURN"

(18) With your right index finger, point to the oxygen pressure gauge and state where the needle is in reference to the "1800" on the face of the gauge.

Key Words: "ONE OR ABOVE" or "BELOW ONE"

(19) With your right index finger and thumb, turn the filler port cap clockwise ensuring it is tight.

Key Words: "TIGHT"

(20) With your left hand, pull up on the oxygen system pouch ensuring it is secured with the barrel locks to the pack tray.

Key Word: "TUG"

(21) Using the thumb of your left hand, turn the on/off toggle switch to the ON position in preparation for jump operations.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

Key Words: "LOCK ON"

Step in front of your jumper. Instruct your jumper: "JUMPER, BREATHE IN, BREATHE OUT." Listen for the flow of oxygen. It should stop when the jumper exhales.

(22) With your left hand, grasp the oxygen strap just above the release buckle. With your right hand, disconnect the mask from the right side of the jumper's helmet. Begin your inspection of the jumper from "Proper Harness Fit" and continue as normal.

Note: After the oxygen inspection, the jumpmaster will continue the JMPI as the same sequence for a combat equipment jumper.

(23) **Proper Harness Fit.** Start the inspection sequence by first ensuring the jumper has the harness properly fitted. This is done by placing the index and middle finger of each hand inside the base ring of the three-ring riser release assembly. Visually inspect both base rings to ensure they are approximately 1⁄2-inch above the hollow of the jumper's shoulders. If the harness is improperly fitted, it must be corrected before continuing.

Key Words: "PROPER FIT"

(24) **Helmet and Goggles.** Visually inspect the helmet ensuring it fits properly and is serviceable. Place your hands on either side of the helmet and visually inspect the goggles. Ensure the goggles are present, clear in color, and free of damage.

(25) Turn the jumper's head to your left; visually inspect the goggle strap ensuring the goggles are secured to the helmet. Then, turn the jumper's head to your right; visually inspect the goggle strap ensuring the goggles are secured to the helmet.

(26) **ACH (Front) with Head-Loc Retention System and ARC.** Place both hands on the front right side of the ACH, fingers and thumbs extended and joined pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace across the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head to the rear. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

(27) Place the right index finger on the front left adjustable strap and trace down to the front left Head-Loc tab, checking for twists and overall serviceability. Once at the front left Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left adjustable strap to the low profile chin buckle, ensuring it is serviceable, not cracked, and properly secured. Now, bypass the low profile chin buckle and trace the chinstrap portion under the jumper's chin to where it is sewn into the front right adjustable strap to ensure both portions of the chinstrap are routed under the jumper's chin and are not twisted, cut, or frayed. Next, trace the front right adjustable strap up to the front right Head-Loc tab checking for twists and overall serviceability. Once at the front right Head-Loc tab, ensure it is serviceable and not cracked, then continue tracing the right adjustable strap back up to the helmet.

(28) Leaving your right hand on the chinstrap as your reference hand, open up the riser protective flap, form your left hand into a C shape, and place your fingers under the inboard side of the right main riser. Without masking, trace forward with your hand along the riser inspecting and ensuring that there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(29) Leave your left hand in place and with your right hand, grasp the *small* ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *medium* ring and give it a 1⁄4-turn; ensure it rotates freely and is not elongated. Grasp the base ring and give it a shake; ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(30) Place your right index finger next to the clamps on the ends of the main canopy release cable housings; visually ensure the clamps are present. TRACE the housing up and under the jumper's right riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left hand, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK the main canopy release cable running end, ensuring it is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, CHECK"

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

Note: When inspecting the RA-1 in the BOC configuration, skip to step 33, there will be no main ripcord handle present.

(31) With your left hand, trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure the clamp is present. Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the main ripcord handle and terminates with two swage balls.

Key Words: "TWO SWAGE BALLS"

(32) Place your left index and middle finger in the elastic stow pocket. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(33) With your right hand, push the main canopy release handle toward the main ripcord and pin it back with your left thumb. With your right index finger, inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. With your right index finger, trace the hook-pile tape of the main canopy release handle, ensuring it is at least 50-percent mated.

(34) Form a knife-cutting edge with your right hand and place it behind the chest strap. Move from your left to right, inspecting the chest strap extension. Once you have inspected the chest strap extension, sweep the friction adapter with your right thumb to ensure proper routing of the chest strap.

(35) When you encounter the excess rolled and stowed portion of the chest strap, give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect excess webbing to ensure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer.

(36) Continue to inspect the chest strap in its entirety then visually check the jumper's left side or hip for a weapon. State what you see.

Key Words: "WEAPON" OR "NO WEAPON"

(37) Place your left index and middle fingers on the chest strap; visually ensure the weapon sling is routed over the top of it and runs under the left main lift web and over the jumper's shoulder.

(38) Keep your left hand in place as your reference hand. With your right index finger, find the weapon sling as it protrudes from under the main lift web and over the jumper's shoulder. Trace the sling until it is attached to the weapon tie-down loop with 1⁄4-inch cotton webbing tied in a soft knot (bowknot). Give the cotton webbing a tug to make sure it is properly secured.

Note: Depending on the size of the jumper, weapon, weapon sling and buttstock configuration the 1⁄4-inch cotton webbing will be girth-hitched on the sling up to 6 inches from the sling swivel or girth-hitched to the buttstock. Jumpmaster discretion should be used in order to determine the best possible attachment configuration. He must ensure the weapon will not move out from behind the wing flap, not protrude high on the jumper's shoulder, or inhibit the jumper's movement.

(39) Continue to trace the weapon's sling to its attachment point on the buttstock. Give the sling a tug to make sure the sling is attached to the weapon.

(40) Bring your right hand down and behind the jumper's arm to find the pistol grip; give it a slap. You are inspecting for proper orientation of the weapon. Ensure the pistol grip is pointing toward the rear of the jumper.

(41) Once you have reached the accessory pouch, with your right hand find the zipper and ensure it is zipped. Next, with your right thumb and index finger, press on the snap fastener and ensure it is snapped at the top of the accessory pouch. Give the accessory bag a tug upward to ensure it is properly attached to the tube fastener.

Key Words: "ZIP, SNAP, TUG"

(42) Drop down to the weapon's lower sling attaching point. Give the sling a tug and ensure it is secured to the weapon.

(43) Trace the sling and ensure it runs up and over the handguards. Make sure the sling runs under the waistband and the under main lift web. Bring your right index finger to where the sling protrudes from under the main lift web and trace up to the chest strap.

(44) Continue your inspection as normal, starting at the reserve ripcord stow pocket.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

(45) If no weapon is found or after you have inspected the weapon, bring your left index and middle finger underneath the reserve ripcord and place the two fingers inside the elastic stow pocket of the reserve ripcord handle. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(46) The left hand stays in place and the right hand becomes the working hand. With your right index finger, ensure two swage balls are present on the end of the reserve ripcord cable.

Key Words: "TWO SWAGE BALLS"

(47) Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the reserve ripcord handle, and continue tracing the cable to where it enters the housing. Ensure a clamp is present securing the cable housing to the harness. The left hand stays in place and the right hand becomes the working hand.

(48) Your right hand opens the riser protective flap while keeping your left hand in place. Form your right hand into a C shape and place your fingers under the inboard side of the left main riser. Without masking, trace forward with your hand along the riser ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(49) Leave your right hand in place and with your left hand, grasp the *small* ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the *medium* ring and give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Grasp the *base* ring and give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(50) Move your right index finger to the main canopy release cable housing. TRACE the housing up and under the jumper's left riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left index finger, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK to ensure that the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK to ensure that the main canopy release cable running end is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, AND CHECK"

(51) With your left index finger, elongate the yellow lanyard of the RSL. At the same time, pinch grip the snap fastener on the red release lanyard of the RSL shackle. Pinch with your thumb and forefinger to make sure it is properly secured.

Key Word: "SNAP"

(52) Visually inspect the RSL shackle while touching it with your right index finger, ensuring it is assembled correctly and is properly oriented with the pelican hook facing up toward the jumper's head.

Key Word: "SHACKLE"

(53) Visually inspect for the ring while touching it with your right index finger. Ensure that the pelican hook is routed through the ring and it separates the yellow nylon of the RSL from the shackle.

Key Word: "RING"

(54) With your left index finger, elongate the yellow lanyard on the RSL. Visually inspect the RSL to ensure it is not misrouted under or through the main canopy release assembly.

Key Words: "FREE AND CLEAR"

(55) Forming a knife-cutting edge with both hands, place your right hand behind the jumper's left main lift web just below the equipment attaching ring. Place your left hand behind the jumper's right main lift web just below the equipment attaching ring.

(56) Ensure the LEFT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

(57) Sweep the main lift web with your right hand looking for twists. Place your right thumb on the main lift web excess and pull down at the friction adapter, exposing the colored stitching indicating the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your right thumb, sweep the main lift web friction adapter. Next, visually inspect for proper stowage of excess.

Key Words: "I SEE GREEN" OR WHATEVER COLOR IS VISIBLE"

(58) Ensure the RIGHT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Word: "STOWED"

(59) Sweep the main lift web with your left hand looking for twists. Place your left thumb on the main lift web excess and pull down at the friction adapter, exposing the colored stitching indicating the jumper's sizing of the main lift web. State the color you see on the sizing stitches located on the main lift web. With your left thumb, sweep the main lift web friction adapter.

Next, visually inspect for proper stowage of excess webbing. The jumpmaster must ensure both colors with respect to the sizing stitching on the main lift webs match. If they do not match, the jumpmaster will ensure they do before continuing on with the inspection.

Key Words: "I SEE GREEN" OR WHATEVER COLOR IS VISIBLE "CORRECT/INCORRECT"

When the jumper is wearing a CMWH, if a weapon IS present, after inspecting the lower equipment ring, rotate the weapon up toward the jumper with your right hand to expose the waistband.

Instruct the jumper: "JUMPER, HOLD."

Key Word: "WAISTBAND"

(60) With your left hand, pull up and out on the manifold of the oxygen and with an overhand motion, palm facing you; the right hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

(61) The left hand will seek out the origin of the waistband to ensure the waistband is sewn at least 50-percent to the harness-container assembly.

Key Word: "ORIGIN"

(62) Trace the waistband forward with your left hand, inspecting from your left to right ensuring that there are no twists. Inspect for proper routing through the oxygen pouch keepers.

Key Words: "THROUGH AND THROUGH"

The left hand forms a knife-cutting edge and is inserted under the waistband where it exits the oxygen pouch keeper. The left hand continues to inspect for proper routing under the right lateral adjusting strap until it meets the right main lift web. Insert your right hand, making skin-to-skin contact with your left hand palm facing you, fingers pointing skyward. Continue to inspect for proper routing under the right main lift web and inspect the waistband ensuring that there are no twists. When you encounter the excess rolled and stowed portion of the waistband, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing, making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer. Once you encounter the friction adapter, sweep it with your RIGHT thumb, inspecting for proper routing. Continue to inspect the waistband, ensuring it is routed over the left main lift web, weapon and left lateral adjusting strap, routed through the keeper on the accessory pouch, and sewn at least 50-percent to the harness-container assembly. Note: For side-mounted weapons, the waistband is routed over the left main lift web and lateral adjusting strap. For CMWH, the routing is under both the left main lift web and lateral adjusting strap. The waistband routing through theM-4 carrying handle is optional.

(63) With either an underhand or overhand motion, palm facing you, the right hand seeks out the lateral adjustment strap and ensures that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

Instruct the jumper: "JUMPER, SQUAT."

(64) Your right hand is now your reference hand. Forming a knife-cutting edge with your left hand, place it under the gate of the jumper's right leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

(65) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer.

(66) With your right hand, hook the leg strap with your thumb or fingers next to your left hand, making skin-to-skin contact to the inside or outside of the jumper's leg. Trace with your right hand along the leg strap, inspecting for no twists until you reach the saddle, or until your hand stops between the jumper's legs.

(67) Keeping your right hand in place, reach around the back of the jumper with your left hand and make skin-to-skin contact with your right hand, hooking the thumb or fingers of your left hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection.

Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on that same side.

(68) Keep your left hand in place as your reference hand. Forming a knife-cutting edge with your right hand, place it under the gate of the jumper's left leg strap snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and is free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(69) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled outboard and stowed properly with a heavyweight retainer band or slack retainer.

(70) With your left hand, hook the leg strap with your thumb or fingers next to your right hand, making skin-to-skin contact to the inside or outside of the jumper's leg strap. Trace with your left hand along the leg strap, inspecting and ensuring that there are no twists until you reach the saddle, or until your hand stops between the jumper's legs.

(71) Keeping your left hand in place, reach around the back of the jumper with your right hand and make skin-to-skin contact with your left hand, hooking the thumb or fingers of your right hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring that there are no twists until you reach the top of the saddle or the V on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on that same side.)

Note: If the jumper wears a CMWH, command the jumper: "JUMPER, RECOVER." Otherwise continue your inspection as follows.

(72) With an overhand motion of your left hand, grasp the jumper's left wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face. Attempt to rotate the altimeter around the jumper's wrist. It should be snug and not excessively loose. Look at the face of the altimeter and read aloud where the needle is set; then read aloud the setting you have written on your hand. At this point, you are inspecting for the proper setting of the altimeter. As you read the altimeter face, you are inspecting to ensure that the lens is clear and free of damage.

Key Words: "+500, +500 CORRECT", OR "500, +500 INCORRECT"

(73) With your right forefinger or thumb, give the altimeter face a gentle tap to ensure it is present. Use your right forefinger or thumb to tug on the heavyweight retainer band to ensure it is properly attached to the wrist strap.

Key Words: "TAP, SNAP, JUMPER TURN"

Instruct the jumper: "JUMPER, TURN."

(74) **ACH (Rear) with Head-Loc Retention System and ARC.** Once the jumper has turned 180 degrees, place both hands on the left side of the ACH, fingers and thumbs extended and joined fingers pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head forward. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

(75) Place the right index finger on the right rear adjustable strap and trace down to the right rear Head-Loc tab, checking for twists and overall serviceability. Once at the right rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the right rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Leave the right index finger in place; now, trace down to the left rear Head-Loc tab checking for twists and overall serviceability.

Once at the left rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Conduct a visual inspection of the nape pad to ensure it is present, secure, serviceable, and has not been reversed.

(76) Move your right hand to the CYPRES control unit in its clear window.

(77) With your right index finger, find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current free-fall operation.

Key Words: "1500 35 A, CORRECT" OR "2500 29 A, INCORRECT"

(78) With your right index finger, find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

Key Word: "NO LED"

(79) Next, move your right index finger over to the CYPRES control unit's digital readout screen. Read aloud the millibar setting on the screen. Read aloud the setting that you have written on your hand. At this point, you are inspecting for the proper millibar setting of the CYPRES.

Key Words: "788"…. "788" "CORRECT", OR "INCORRECT"

(80) Grasp the reserve flap with both hands and lift up to expose the reserve components.

(81) With either hand, find the reserve ripcord cable as is protrudes from its housing on the back of the jumper's left shoulder. Inspect the reserve ripcord cable housing ensuring there is a clamp at the end securing it to the harness container. Inspect the routing of the reserve ripcord cable, ensuring it runs through the upper guide ring and the RSL assist ring and through the lower guide ring. Ensure the RSL yellow lanyard is secured by the hook-pile tape located next to the reserve ripcord cable. The RSL assist ring should be located in between the upper and lower guide rings, and all rings should lay flat and be oriented in the same direction.

Key Words: "RING, YELLOW, RING"

(82) Continue to inspect for proper routing and no broken strands on the reserve ripcord cable until you encounter the shoulder of the reserve locking pin.

(83) Once you are at the top of the pin, inspect it to make sure it is not shouldered inside the grommet, the pin is not bent and inserted into the protective sleeve. Inspect the CYPRES closing loop of the reserve (white Dyneema material loop) for frays.

Note: For JMPI of the RA-1 in the BOC configuration refer to the BOC configuration below.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, JUMPER BEND"

(84) Moving your hands simultaneously, open up and pin the protector flap of the main parachute with both hands.

(85) Slide your right hand across the left flap; it should stop at the edge of the right flap, ensuring proper closing sequence.

Key Words: "LEFT, RIGHT"

(86) Verify that the main locking pin is oriented from right to left, pointed upward through the main closing loop, ensuring it is not frayed. Trace the bridle from the main locking pin eyelet ensuring both bar-tack stitches are present and the bridle attachment point is not frayed.

Key Words: "NOT FRAYED, BAR TACKING"

(87) Continue to trace the bridle down and verify that it is secured under the closing flap.

(88) Inspect the routing of the bridle from the closing flap to the BOC stow pocket to ensure it is secured under the bridle stowage flap and there is no excess bridle exposed.

(89) Verify that the pilot chute handle is accessible and that there is no excess pilot chute exposed.

(90) At this time, slap the BOC. This signifies that your inspection is now complete.

Figure A-3. Jumpmaster personnel inspection sequence for the Twin-53 portable bailout oxygen system and combat equipment (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR THE PARACHUTIST OXYGEN MASK AND THE 3000-PSI OXYGEN SYSTEM

A-6. Figure A-4, pages A-22 through A-24, describes the inspection sequence of the POM and the 3,000 psi oxygen system.

(1) Position yourself in front of the jumper and state the presentation of the jumper.

Key Word: "O2"

Begin by visually checking that the mask is attached to the left side of the jumper's helmet.

(2) With your right hand, grasp the mask on the outside portion on the hardshell and rotate the mask out to the right, making the inside visible. Visually inspect the inside to ensure cleanliness. Look for the presence of the pressure-demand relief valve cover with (brass ring), microphone element, anti-suffocation valve, and exhalation valve. With your left index finger, point to the exhalation valve and ensure that it is present and free of holes and tears and sound off with VALVE.

Key Word: "VALVE"

(3) Using your left index finger as a guide, place it inside the mask at the top (12 o'clock position) and trace it in a clockwise direction, while gently peeling back the lip and exposing the inside of the mask. You are inspecting for tears, dirt, or damage to the inner soft-shell portion. Continue this process until you come back around to the 12 o'clock position.

Key Words: "NO DEBRIS"

Do another sweep on the outer portion of the inner softshell, making sure there is no damage to the mask that would hinder a good seal to the jumper's face.

(4) With your right hand, gently pull out and rotate the mask on the jumper's face. With the left hand, connect the release buckle on the right side of the jumper's helmet, ensuring the male portion is fully seated into the female portion of the buckle with a click. Leave your left hand in place as a reference.

(5) With the right index finger, trace from the Fastex buckle on the left side of the mask up the left oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the left oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Leave your right hand in place as your reference hand.

(6) With your left index finger, trace from the release buckle on the right side of the mask up the right oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the right oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Your left hand now becomes your reference hand.

Note: If using the oxygen double straps with the ACH-ARC, you must begin your trace of the front left oxygen strap, where the swivel clip attaches to the swivel clip shoe on the left ARC. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Next, trace the front right adjustable oxygen strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the front left adjustable oxygen strap until you reach the Fastex buckle, ensuring it is properly assembled and serviceable. Then, trace from the Fastex buckle back along the back left adjustable oxygen strap until you reach the Head-Loc tab. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the back left adjustable oxygen strap until you reach the swivel clip. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Repeat this process for the right oxygen straps starting at the front right swivel clip and tracing to the snapdragon buckle. After inspecting the right oxygen straps, continue POM inspection as normal.

(7) With your right index finger, start at the nose of the jumper and conduct a 360-degree inspection of the mask on the jumper's face. Ensure the edges of the mask are not pinched or rolled under on the jumper's face. Give the mask a shake to ensure there is a good seal.

Key Words: "PROPER FIT"

Figure A-4. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and 3,000 psi oxygen system

(8) Bring your right index finger to the T-nut at the 2 o'clock position on the mask. Make sure it is present. In a clockwise motion, inspect the remaining three T-nuts.

Key Words: "1, 2, 3, 4 SCREWS"

At this time, grasp the union elbow and medium-pressure delivery hose with your right hand as a reference.

(9) Visually inspect the hardshell for cracks. With your left hand, ensure the exhalation valve cover is secure by attempting to turn it clockwise. Visually check to see if the open side of the exhalation valve cover is facing generally up. Inspect under the cover for the spring and overall cleanliness.

Key Words: "TIGHT, NO DEBRIS"

(10) With your left index finger, point to the intercom block on the top of the mask, ensuring it has two screws present, and then attempt to seat the intercom cord, if used.

Key Words: "TWO SCREWS"

(11) Next, point to the anti-suffocation valve rubber boot to ensure it is present and facing down.

Key Word: "BOOT"

(12) Visually inspect the regulator for damage and overall cleanliness. With your left hand, gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(13) With your left hand, grab the outer portion of the mask, and with your right hand, push the hose toward the mask to ensure the quick disconnect is properly seated. Next, pull on the hose to make sure that the quick disconnect is securely attached to the regulator.

Key Words: "PUSH IN-PULL OUT"

Next, move your left index finger and thumb to the brass nut portion of the quick disconnect and move your right index finger and thumb to the silver adapter nut and attempt to turn it, inspecting for tightness. Inspect the remaining B-nut for tightness with the silver adapter nut in sequence to the union elbow.

Key Words: "TIGHT, TIGHT"

(14) Leaving your right hand in place on the union elbow, seek out the securing lanyard and give it a tug with your left index finger. Inspect the securing lanyard, ensuring it is attached to the mask on the jumper's left bottom attaching strap and the chinstrap is routed through the securing lanyard.

Key Words: "SECURE"

At this time, instruct the jumper: "JUMPER, TURN YOUR HEAD TO THE RIGHT." Ensure that there is a proper amount of slack in the medium-pressure delivery hose.

Note: Any extreme excess can be pushed back between the jumper's back and pack tray.

(15) From the union elbow, trace the medium-pressure delivery hose with your right hand as it routes over the jumper's left shoulder and toward the back of the jumper's pack tray. The hose should be routed through both a girth-hitched heavyweight retainer band on the carrying handle and the carrying handle itself on the top-center of the jumper's container.

Key Words: "THROUGH AND THROUGH"

Move to the right side of the jumper. Instruct the jumper: "JUMPER, RAISE YOUR ARM."

(16) With your left hand, trace the medium-pressure delivery hose as it protrudes from behind the jumper's back and ensure the hose is routed through a heavyweight retainer band attached to the top right-side equipment tie-down loop. Continue tracing the hose from the retainer to the rubber sleeve above the B-nut. Grasp the B-nut and attempt to twist it, ensuring it is tight. Grasp the medium-pressure delivery hose and attempt to twist it to the right, ensuring it does not rotate.

Key Words: "TIGHT, TIGHT"

(17) With your left hand, grasp the drawstring and ensure it is securing the oxygen bottle and the keeper has the drawstring pulled tight against the neck of the oxygen bottle. Pull on the drawstring and ensure there is no excess drawstring hanging out by tucking it into the oxygen system pouch.

Key Words: "SECURE"

(18) With your right index finger, point to the oxygen pressure gauge and state where the needle is in reference to the "1800" on the face of the gauge.

Figure A-4. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and 3000 psi oxygen system (continued)

Key Words: "ONE OR ABOVE" or "BELOW ONE"

(19) With your right index finger and thumb, turn the filler port cap clockwise, ensuring it is tight.

Key Words: "TIGHT"

(20) With your left hand, pull up on the oxygen system pouch, ensuring it is secured with the barrel lock to the pack tray.

Key Word: "TUG"

(21) Using the thumb of your right hand, lift up on the lever to release the lock and turn the on/off toggle switch to the ON position in preparation for jump operations.

Key Words: "LOCK ON"

Step in front of your jumper. Instruct the jumper: "JUMPER, BREATHE IN, BREATHE OUT." Listen for the flow of oxygen. It should stop when the jumper exhales.

(22) With your left hand, grasp the oxygen strap just above the release buckle; with your right hand, disconnect the mask from the right side of the jumper's helmet. Begin your inspection of the jumper from "Proper Harness Fit" and continue as normal.

Figure A-4. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and 3,000 psi oxygen system (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR THE PARACHUTIST DROP BAG OR RUCKSACK WORN FRONT-MOUNTED, USING THE SINGLE-POINT RELEASE SYSTEM

A-7. Figure A-5, pages A-24 through A-26, describes the inspection sequence of the PDB or rucksack worn front-mounted, using the single point release.

A-8. Because of the nature of the inspection sequence of the RA-1, the following notes have been developed to ensure a complete inspection of the RA-1 parachute and attached equipment, while wearing equipment worn on the front of the jumper.

Notes:

1. The inspection sequence of the parachutist wearing the RA-1, weapon, and oxygen system must be completed before attaching the front-mounted ruck or PDB.

2. The inspection of the front-mounted ruck or PDB must be completed before attaching the front-mounted ruck or PDB.

(1) Stand in front of the PDB with the shoulder straps away from you.

Key Word: "PDB"

(2) Ensure the PDB is symmetrical and the weight is balanced as best as possible.

(3) Ensure the top section is filled out and the loops are centered on the container.

(4) With both hands, grasp the equipment attaching straps below the equipment attaching strap snap hooks and stand the PDB up on end so the top of the PDB is facing up toward you.

(5) Start your inspection with the jumper's left equipment attaching strap snap hook. Ensure the opening gate portion is facing toward the jumper. Take your right index finger and function the opening gate of the D-ring attaching strap for spring tension. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the D-ring attaching strap down to the triangle link.

Figure A-5. Jumpmaster personnel inspection sequence for the parachutist drop bag or rucksack worn front-mounted, using the single-point release system

(6) Next, check for the proper routing of the left attaching loops. Ensure the black loop is routed through the triangle link on the adjustable D-ring attaching strap. Ensure the white loop is routed through the black loop. With your right thumb or index finger, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure the red loop is routed through the grommet on the leg strap release assembly. Ensure the release handle cable is properly routed through the red loop.

Key Words: "BLACK, WHITE, RED"

(7) Continue down with your right index finger, elongate the release handle lanyard. Inspect to ensure that the release handle lanyard is not misrouted or excessively twisted.

(8) Leaving your right hand in place, pick up your inspection with your left hand on the right D-ring attachment strap. Ensure the opening gate portion is facing toward the jumper. With your left index finger, function the gate on the right D-ring attaching strap snap hook, ensuring it has spring tension. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the D-ring attaching strap down to the triangle link.

(9) Next, check for the proper routing of the right attaching loops. With your left index finger, ensure the black loop is routed through the triangle link on the right adjustable D-ring attaching strap. Ensure that the white loop is routed through the black loop. With your left thumb, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure that the red loop is routed through the grommet on the leg strap release assembly.

Key Words: "BLACK, WHITE, RED"

(10) Bring both index fingers down and place them on top of the single-point release handle cross strap. With your thumbs, lift up and forward on the top portion of the cross strap. Inspect the hook-pile tape portion to ensure it is properly mated to the release handle.

(11) With both index fingers, lift up and back on the top of the single-point release handle cross strap. Inspect the release handle cables and ensure they are properly routed through the cross strap and not twisted.

(12) With your right index finger, follow the left cable as it passes through the red loop. Continue to inspect the release handle cable and ensure it is stowed in the stowage flute and that the female portion of the left leg strap release assembly is not upside down. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess webbing is stowed properly with a single heavyweight rubber retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until you reach the padded portion of the leg strap. Tug on the padded portion of the strap to ensure it is attached to the PDB and is not torn at the reinforced box stitching attaching point.

(13) With your left index finger, follow the right cable as it passes through the red loop. Continue to inspect the release handle cable and ensure it is stowed in the stowage flute and that the female portion of the right leg strap release assembly is not upside down. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess is stowed properly with a single heavyweight rubber retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until you reach the padded portion of the leg strap. Tug on the padded portion to ensure it is attached to the PDB and not torn at the reinforced box stitching attaching point. As you tug on the leg strap, lay the PDB down so the back of the PDB faces up exposing the lowering line attachment V-ring.

Figure A-5. Jumpmaster personnel inspection sequence for the parachutist drop bag or rucksack worn front-mounted, using the single-point release system (continued)

(14)	Continue your inspection by grasping the lowering line where it attaches to the PDB with your right hand, while simultaneously grasping the lowering line quick-ejector snap with your left hand. Ensure that the lowering line is girth-hitched around the V-ring. Using your right hand, give the lowering line a tug at the attachment point, ensuring it is secured. Next, with your right index finger, trace up on the lowering line and ensure that it enters the stow pocket on the left side (as worn by the jumper). Inspect the left side of the pocket to ensure the hook-pile tape is present, properly mated with the hook-pile tape portion of the lowering line, and that there is no excess exposed outside of the pocket. Look at the hook-pile tape lowering line pocket. With the right index finger and thumb on either side of the pocket, trace the pocket, inspecting the hook-pile tape portion to ensure it is completely mated and serviceable. While tracing the pocket, feel for the presence of a doubled heavyweight retainer band wrapped around the lowering line S-folds. Inspect the right side of the stow pocket to ensure there is no excess lowering line outside of the stow pocket. Also, inspect to ensure that the quick-ejector portion of the lowering line is coming out of the right side of the pocket.
(15)	Continue to inspect the lowering line until you encounter the yellow release lanyard. The end of the lanyard should be secured to the lowering line with two wraps of 1-inch masking tape.
(16)	Next, inspect the quick-ejector snap. Rotate it so the gate is visible from the side. With your left index finger, flick the opening gate to ensure that it has spring tension and is free of damage. With your thumb, press on the quick-ejector snap activating lever to ensure it is seated properly on the ball detent. Finally, sweep the heavyweight retainer band to ensure it is present.

Figure A-5. Jumpmaster personnel inspection sequence for the parachutist drop bag or rucksack worn front-mounted, using the single-point release system (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR THE PARACHUTIST DROP BAG OR RUCKSACK WORN FRONT-MOUNTED, USING THE SPECIAL OPERATIONS FORCES HARNESS

A-9. Figure A-6, pages A-26 and A-27, describes the inspection sequence of the PDB or rucksack worn front-mounted, using the SOF harness.

A-10. Because of the nature of the inspection sequence of the RA-1, the following notes have been developed to ensure a complete inspection of the RA-1 parachute and attached equipment, while wearing equipment worn on the front of the jumper.

Notes:

1. The inspection sequence of the parachutist wearing the RA-1, weapon, and oxygen system must be completed before attaching the front-mounted ruck or PDB.

2. The inspection of the front-mounted rucksack or PDB must be completed before attaching the front-mounted rucksack or PDB.

(1)	Stand in front of the rucksack. Orient the rucksack shoulder straps up with equipment attaching straps facing you.
Key Word: "RUCKSACK"	
(2)	Leaving the ruck on its long axis, grasp the equipment attaching straps just below the pelican hook swivel portion. Visually inspect the pelican hooks to ensure they are fully seated. Then, visually inspect the pelican hook release handles hook-pile tape portion and ensure they are mated at least 50-percent.
(3)	Perform a 1⁄4-turn outboard with your right hand, exposing the adjustable portion of the attaching strap (below the pelican hook). Visually inspect the right attaching strap to ensure there are no twists or frays and that the straps are generally sized to the jumper.

Figure A-6. Jumpmaster personnel inspection sequence for the parachutist drop bag or rucksack worn front-mounted, using the special operations forces harness

(4) Drop the attaching strap onto the ruck and move to the friction adapter, giving it a sweep with your right thumb and checking for proper routing. Then, visually ensure the excess is rolled/stowed outboard with a slack retainer or a doubled-over retainer band.

(5) Continue down the right attaching strap, inspecting the metal attaching link and box stitching for torn stitching and serviceability. While your right hand stays in place, repeat the inspection with your left hand.

(6) Perform a 1⁄4-turn outboard with your left hand, exposing the adjustable portion of the attaching strap (below the pelican hook). Visually inspect the left attaching strap to ensure there are no twists or frays and that the straps are generally sized to the jumper.

(7) Drop the attaching strap onto the ruck, and move to the friction adapter, giving it a sweep with your left thumb and checking for proper routing. Ensure the excess is rolled and stowed outboard with a slack retainer or a doubled-over retainer band.

(8) Continue down the right attaching strap, inspecting the metal attaching link and box stitching for torn stitching and serviceability. Sweep and pull the equipment attaching straps toward you (off the ruck between your feet) to provide a clear view of the horizontal and vertical straps.

(9) Inspect the horizontal strap to ensure it is properly routed around the rucksack (no twists and fits snug against the ruck) and terminates at the friction adapter. Sweep the friction adaptor for proper routing. Next, grasp and tug on the bight of the quick release ensuring tension and that it is approximately 3 inches. Finally ensure any excess webbing is rolled and stowed with a doubled-over retainer band or tape.

(10) Sequentially inspect the vertical straps (left/right or right/left) to ensure they are properly routed around the rucksack (no twists and fits snug against the ruck) and terminate at the friction adapter. Sweep the friction adaptor for proper routing. Next, grasp and tug the quick release bight ensuring tension and that it is approximately 3 inches in length. Finally, ensure any excess webbing is rolled and stowed with a doubled-over retainer band or tape.

(11) With your left and right hands, sweep the respective shoulder straps outboard sharply, feeling the shoulder straps on the back of your hands, and ensuring the shoulder straps are secure to the rucksack.

Key Word: "SECURE"

(12) Grasp the hook-pile tape lowering line above the girth hitch and provide a 1⁄4-turn to expose the girth hitch. Visually inspect for north and south girth around the X of the two vertical straps and give a sharp tug to ensure it is secured.

Key Word: "SECURE"

(13) Continue to trace the hook-pile tape lowering line to the Velcro keeper to ensure it is properly secured and that there is no excess lowering line sticking out.

(14) Ensure the hook-pile tape lowering line is secured to the ruck with two heavyweight retainer bands.

(15) Ensure the hook-pile tape lowering line is secured with a double-wrapped heavyweight retainer band in the middle of the rolled and stowed portion.

(16) Ensure the Velcro keeper is present, properly secured, and that there is no excess lowering line sticking out.

(17) Continue to inspect the hook-pile tape lowering line until you encounter the yellow release lanyard and ensure that it is cut to 6 inches. (If it is not, it must be secured with 1-inch masking tape.)

(18) Ensure the closing gate of the snap hook on the hook-pile tape lowering line is present and has spring tension with no gap between the snap hook and the closing gate.

(19) Look at the quick-ejector snap release lever to ensure the ball detent is properly seated, and then press on the release lever with your thumb.

(20) Sweep the retainer band to ensure it is present and double wrapped.

(21) Finally, perform an overall visual inspection of the rucksack to ensure all free running ends of straps are taped and secured (with the exception of the shoulder straps).

Figure A-6. Jumpmaster personnel inspection sequence for the parachutist drop bag or rucksack worn front-mounted, using the special operations forces harness (continued)

JUMPMASTER PERSONNEL INSPECTION KEY WORDS FOR RA-1 EQUIPMENT AND OXYGEN

A-11. Table A-1 provides JMPI key words for RA-1 equipment and oxygen.

Table A-1. Jumpmaster personnel inspection key words for RA-1 equipment and oxygen

Administrative	Combat Equipment	Oxygen
Proper Fit	Parachutist Drop Bag	Oxygen
Trace, Place, Check, Check	Black, White, Red	* Valve
Two Swage Balls	Black, White, Red	No Debris
Proper Pocket		Proper Fit
Weapon or No Weapon	Weapon	1, 2, 3, 4, Screws
Proper Pocket	Port (For Center-Mounted Weapon Harness Only)	Tight, No Debris
Two Swage Balls		Two Screws
Free and Clear		Boot
Trace, Place, Check, Check		Tight
Snap, Shackle, Ring		Push In, Pull Out
Free and Clear		Tight, Tight
I See Green		
Above or Below		Secure
I See Green		
Above or Below, Waistband		* Turn Your Head to the Right
HOLD (For Center-Mounted Weapon Harness Only)		Through and Through
Jumper Raise Your Arm		Jumper Raise Your Arm
Waistband		Tight, Turn
Origin		Origin
Zip		Tight
Snap		
Two Kitbag Handles		
Jumper Squat		* One or Above/Below One
RECOVER (For Center-Mounted Weapon Harness Only)		Lock On
* “Altimeter Setting” Correct or Incorrect		* Breathe In, Breathe Out
Jumper Turn		
* “Default Setting” Correct or Incorrect		
* “Cybernetic Parachute Release System Setting” Correct or Incorrect		
Little Ring, Big Ring		
Not Shouldered, Bent, or Frayed, White		
Jumper Bend		
Bottom, Top, Left, Right		
Not Shouldered, Bent, or Frayed, White		
Note: The asterisk (*) indicates verbal key words the jumpmaster uses during the JMPI.		

Appendix B

Pilot Brief and Aircraft Inspection Procedures

This appendix provides a sample pilot brief and a sample aircraft checklist. ATP 3-18.10 and TC 3-21.220 provide additional information on these procedures.

PILOT BRIEF

B-1. Figure B-1, pages B-1 through B-5, provides a sample pilot brief.

1. Identify Key Personnel:
   a. Jumpmaster.
   b. Assistant Jumpmaster.
   c. Officer in Charge.
   d. DZ Safety Officer.
2. Free-Fall Concept of Operation:
   a. Unit Designation.
   b. DZ. (Have map or imagery of DZ.)
   c. Type of Jump.
   d. Engines Run On/TOT.
3. Questions to the Aircrew:
   a. Have you conducted this type of DZ?
   b. Have you dropped on this DZ before?
   c. Do you have a GPS Retransmit Kit? (JPADS Antenna/Viper Kit)
   d. Is the aircraft configured for door/ramp operations?
   e. Do you have specific training objectives?
   f. What is the recalculation of HARP on ascent?
4. Aircrew and Troop Safety Briefing:
   a. Time.
   b. Location.
5. Marshaling Area.
6. DZ:
   a. Designation/Location.
   b. Desired Impact Point. (Movement of DIP within the DZ surveyed boundary must be briefed to pilots.)
   c. Elevation (Personal Equipment Point of Impact from the DZ survey).
   d. Major Obstacles.
   e. Proposed HARP location.
   f. Distance and Heading to DIP.

Figure B-1. Sample pilot brief

g. Markings/Identification (Far) V or T (Near) Sock or Blade.

h. Alternate Landing Areas.

7. Forecasted Weather Conditions:
   a. Temperature.
   b. Chance of Precipitation.
   c. Wind Speed.
   d. Cloud Condition.
   e. Visibility and Illumination.
   f. Aircraft Altimeter Setting.
8. Weather Restrictions:
   a. Winds: 18 knots maximum.
   b. Rain: not a restriction.
   c. Lightning: 5 nautical miles (nm).
   d. Clouds: 0–1000 feet AGL (must be clear)
   e. 10,000 Feet MSL and Above: 1,000 feet MSL above and below the aircraft.
   f. 10,000 Feet MSL and Below: 500 feet MSL above the aircraft and 1,000 feet MSL below the aircraft.
9. Flight Route:
   a. Checkpoints.
   b. Altitudes.
10. Aircraft Track and Drop Heading:
    a. Track.
    b. Drop Heading.
11. Jump Altitude:
    a. Above Ground Level.
    b. Mean Sea Level.
12. Drop Speed.
13. Formation Interval (Multiple Aircraft).
14. Number of Personnel:
    a. Parachutist.
    b. Safety(s).
    c. Static Personnel.
    d. Personnel Remaining on Board.
    e. Total Weight.
15. Racetrack:
    a. Number of Lifts.
    b. Number of Passes.
    c. Number of Jumpers Per Stick.
    d. Egress Direction.
    e. Turn Around Time.
16. EAAD:
    a. Type: CYPRES 2.
    b. Cabin Pressurization (does not matter).

Figure B-1. Sample pilot brief (continued)

c. Arming and Disarming Altitude (armed when set).
d. Activation Altitude.
e. No Descent Greater than 5,000 Feet MSL Per Minute.
f. No Ascent or Descent Greater than 1,500 Feet MSL Per Minute While Setting CYPRES in Flight.

17. Aircraft Configuration.
    a. Seating Configuration (floor clear of objects from rear wheel to edge of ramp).
    b. Supplemental Oxygen Location.
18. Cabin Lighting:
    a. Off.
    b. Dim Lights for Night Drops.
19. Airsickness:
    a. Airsickness Bags.
    b. Procedures for Sick Personnel.
20. Latrine Facilities.
    a. Yes.
    b. No.
21. In-Flight Rigging:
    a. Who.
    b. What.
    c. When.
    d. Where.
22. Oxygen Procedures:
    a. Location of Physiological Technician (if needed).
    b. Location of Consoles and Number (if using).
    c. Prebreathing Time (if necessary).
    d. Emergencies:
        (1) Notify pilot.
        (2) 100-percent oxygen.
        (3) Medical personnel to be notified.
        (4) Location of nearest decompression chamber (chamber/DSN phone number/commercial phone number).
23. Free-Fall Bundles:
    a. Type and Number.
    b. Location and Movement.
    c. Ejection Procedures.
    d. Time Delay Between Bundle and Jumpers.
24. Time Warnings (Relayed from Crew to Jumpmaster):
    a. 20 Minutes.
    b. 10 Minutes.
    c. 2 Minutes (Red Light).
    d. 1 Minute (Green Light).

Figure B-1. Sample pilot brief (continued)

25. Jump Caution Lights:
    a. Red (at 2 minutes).
    b. Green (at 1 minute and continue unless unsafe conditions exist for jumpmaster to release).
26. Aircraft Emergencies:
    a. Load Jettison.
    b. Fuselage Fire.
    c. Abandon Aircraft.
    d. Crash Landings.
    e. Ditching.
    f. Rapid Depressurization.
    g. Emergency Bailout (1,000 feet AGL and above to exit, if possible).
27. Towed Jumper Emergencies:
    a. Towed Jumper Procedures (Fixed-Wing Aircraft):
        (1) Jumpmaster will stop all jumpers.
        (2) Jumpmaster will notify the pilot or crew chief of towed jumper.
        (3) Aircraft pilot will notify the DZ safety officer.
        (4) Aircraft will fly level and maintain altitude and should remain upwind of the DZ within the vicinity of the HARP. Pilot will conduct flat rudder turns to keep jumper in center of the ramp, if possible.
        (5) Jumpmaster will identify if the jumper is conscious or unconscious and notify the pilot.
        (6) If the jumper is being towed by his equipment and is conscious, the jumpmaster will first try to free the jumper's equipment.
        (7) If unsuccessful, jumpmaster will cut the hung jumper's equipment free.
        (8) If jumper is conscious, the jumpmaster will request the loadmaster cut the jumper free after consulting with the pilot in command.
        (9) Once the jumper is cut free, the loadmaster will notify the pilot.
        (10) The pilot will let the DZSO know that a jumper has been cut free.
        (11) If the jumper appears to be unconscious, the jumpmaster will make every effort to retrieve the jumper back inside the aircraft.
    b. Towed Jumper Procedures (Rotary-Wing Aircraft).
        (1) If conscious jumper is being towed by his equipment, he will be freed from the aircraft.
        (2) If unconscious, the jumper will be secured and lowered to the ground by the aircraft.
        (3) The pilot will be immediately notified as stated above.
28. Jumpmaster Communications:
    a. Hand and Arm Signals.
    b. Head Set (communications cord for C-17 needs special adaptor).
    c. Relay Through Loadmaster.
29. Visual Signals/Loss of Communications Signals for a No-Drop.
30. Jumpmaster-Directed Release (Spotting Procedures):
    a. Location of the Jumpmaster Ramp or Door.
    b. Heading Corrections: Given in 5-degree increments to loadmaster and pilot through hand and arm signals or the head set. (Turn off heading and hold for 3 to 5 seconds, then back on the original heading.)
    c. Flat turns—no heavy banking.

Figure B-1. Sample pilot brief (continued)

31. Communications Plan (Turn over to DZSO to brief.):
    a. Call Signs:
        (1) DZ.
        (2) Aircraft.
        (3) Range Control.
        (4) Other.
    b. Radio Frequencies:
        (1) PRI.
        (2) ALT.
        (3) GUARD.
        (4) SAR.
        (5) Range Control.
        (6) Other.
    c. Aircraft/DZSO Transmissions:
    (The aircraft pilot will make contact with the DZSO when on station, and the DZSO will update the aircraft pilot with wind direction and velocity to pass onto the jumpmaster.)
        (1) **4 minutes:** Aircraft contacts DZSO. DZSO relays wind direction/velocity and continue (winds out of 290 @ 6 kt/continue).
        (2) **2 minutes:** Aircraft contacts DZSO.
        (3) DZSO will relay wind direction/velocity and clear to drop/no drop.
        (4) **Jumpers Away:** Aircraft will transmit to DZSO the number of jumpers away.
        (5) DZSO will relay to the aircraft the canopy count and strike report (12 o'clock at 600 meters) to be relayed to the jumpmaster uncorrected.
32. Abort Criteria:
    a. No Communications Plan.
    b. Weather.
    c. Unsafe Condition.
33. Confirmation Times:
    a. Load Time.
    b. Station Time.
    c. TOT.
34. Manifests.
35. Questions.

Figure B-1. Sample pilot brief (continued)

AIRCRAFT INSPECTION PROCEDURES

B-2. Figure B-2 provides a sample aircraft inspection checklist.

Aircraft Exterior (Vicinity of the Jump Doors or Ramp):

1. Projections.
2. Sharp Edges.

Aircraft Interior:

1. Seats and Seat Belts.
2. Jump (Green) and Caution (Red) Lights.
3. Cabin Lighting (if required).
4. Jump Doors:
   a. Sharp or Protruding Edges.
   b. Door Latches.
   c. Jump Platforms (if utilized).
   d. Air Deflectors (if utilized).
5. Floors:
   a. Clean.
   b. Excess Equipment Secured.
6. Oxygen Equipment:
   a. Secured.
   b. Operational.
   c. Walk Around Bottles Available for Use.
7. Anchor Line Cable System (if required):
   a. All Nuts and Bolts Present and Tightened.
   b. Cable (no breaks, frays and proper positioning).
   c. Support Brackets Secure.
8. Static Line Retriever System (if required):
   a. Operational.
   b. Cables Secured.
   c. Retriever Bar or Tie-Down Straps, if available.
9. Safety Equipment:
   a. Alarm Bells.
   b. Intercom System.
   c. Fire Extinguishers.
   d. Emergency Exits.
   e. First-Aid Kits.
   f. Over-Water Flight Equipment.
10. Troop Comfort Items:
    a. Air Sickness Bags.
    b. Latrine.

Note: The jumpmaster should ensure the following items are on hand during the inspection:

- 100-mile per hour tape.
- 1/4-inch cotton webbing.
- Kit bag.
- Ear plugs.
- Chemical lights (Chemlights).

Figure B-2. Sample aircraft checklist

Appendix C

Jumpmaster Responsibilities and Currency Qualifications

This appendix establishes jumpmaster responsibilities and qualification requirements for MFF parachute operations, regardless of unit, location, and mission. Units may have to supplement this guidance with SOPs to perform certain missions. USASOC Regulation 350-2, TC 3-21.220, and ATP 3-18.10 include further discussion on jumpmaster responsibilities during airborne operations.

Note: All airborne procedures in TC 3-21.220 will not apply to USASOC airborne operations. For example, the procedures for jumping from the C-27J are provided in this ATP and in ATP 3-18.10.

RESPONSIBILITIES

C-1. The airborne commander designates the key personnel for each airborne operation. These key personnel are the primary jumpmaster, assistant jumpmaster, oxygen safety personnel, departure airfield control officer, DZ safety officer, DZ support team leader, and malfunction officer. A primary and assistant jumpmaster are required on every aircraft. Oxygen safety personnel will be used when required. The airborne commander gives the designated primary jumpmaster control over, and responsibility for, all airborne personnel and their associated equipment onboard a jump aircraft. The primary jumpmaster assigns tasks to the assistant jumpmasters and oxygen safety personnel appointed to help him. The primary jumpmaster can delegate authority but he cannot delegate responsibility. Table C-1, pages C-1 and C-2, lists jumpmaster responsibilities.

Table C-1. Jumpmaster responsibilities

Location	Responsibilities or Actions
At the Unit Area	• Receive operation officer's briefing. • Receive weather-decision or mission-abort criteria from airborne troop commander. • Check manifest (DA Form 1306 [Statement of Jump and Loading Manifest]). • Organize planeload. • Appoint assistant(s) and/or safety personnel. • Brief personnel. • Inspect personnel and equipment. • Conduct prejump training.
At the Departure Airfield	• Coordinate with departure airfield commander. • Make weather decision. • Authorize issue of the parachutes. • Inspect personnel (Appendix A). • Inspect equipment (Appendix A). • Inspect aircraft (Appendix B). • Attend jumpmaster crew briefing (Appendix B). • Give planeside briefing, as appropriate. • Announce station time to personnel.

Table C-1. Jumpmaster responsibilities (continued)

Location	Responsibilities or Actions
In Flight	• Remain ground-oriented. • Constantly check personnel. • Enforce flight rules and regulations. • Issue time warnings. • Oversee preparation, placement, and drop of free-fall bundles. • Give heading corrections to flight crew (when using jumpmaster release). • Perform outside safety checks of the aircraft and DZ before personnel jump. • Issue jump commands. • Visually identify that the aircraft is in the vicinity of the HARP, unless conducting an Adverse Weather Aerial Delivery System jump. (The jumpmaster may use navigational aids to assist in identifying the HARP.)
On the DZ	• Account for personnel and equipment. • Oversee care and evacuation of injured personnel. • Ensure jumpers turn in air items/equipment. • Report to DZ safety officer (peacetime).

QUALIFICATIONS

C-2. For appointment by the airborne commander as either a jumpmaster or assistant jumpmaster for an MFF operation, the individual must be a graduate of the MFF Jumpmaster Course for an approved ARAPS. He must have performed jumpmaster duties within the previous 6 months (180 days) or attended MFF jumpmaster refresher training. An assistant jumpmaster must have performed assistant jumpmaster duties at least twice before being designated as an MFF jumpmaster.

> ***Note:*** The Commanding General, Special Operations Center of Excellence, is the proponent for the conduct of MFF courses of instruction. Only graduates of the Special Operations Center of Excellence-recognized MFF jumpmaster course may perform duties as an MFF jumpmaster when using the RA-1 ARAPS in the MFF configuration. All jumpers must have attended training on the RA-1 ARAPS before conducting any MFF operations with the RA-1 ARAPS.
>
> ***Note:*** All regulations related to conducting MFF for all USASOC Soldiers are covered in USASOC Regulation 350-2.

CARDINAL RULES FOR THE JUMPMASTER

C-3. General rules stress that the jumpmaster must—

- Never sacrifice safety for any reason.
- Rehearse jumpmaster procedures on the ground.
- Face the open jump door when in flight.
- Maintain a firm handhold on the aircraft when working in or close to an open jump door or ramp.
- Never allow anyone in or near an open jump door or ramp who is not wearing a helmet and safety harness connected to the aircraft or who is not wearing a parachute. The helmet requirement may be waived for deliberate water jumps.

CURRENCY AND REQUALIFICATION REQUIREMENTS

C-4. An MFF jumpmaster must be Special Operations Center of Excellence-trained or have formally undergone transitional training in a proponent-recognized school environment from the MC-4 RAPPS to the RA-1 ARAPS. He must have performed primary or assistant jumpmaster duties within the last 6 months in which parachutists actually exited the aircraft while using a jumpmaster-directed release.

C-5. Previously qualified MFF jumpmasters who do not meet proficiency and currency requirements will meet the following requalification requirements:

- Undergo MFF parachutist refresher training and jumpmaster refresher training.
- Receive JMPI training for the primary MFF parachute system used in his parent unit.
- Receive refresher training in wind drift (HARP) calculation for MFF mission profiles.
- Receive oxygen equipment refresher training.
- Perform assistant jumpmaster duties for one MFF jump.
- Execute under-canopy navigation techniques specific to the navigation aids unique to the parent unit.

Note: An MFF jumpmaster who meets the currency criteria will conduct the requalification and refresher training for the appropriate ARAPS.

Note: Being a current double-bag static line jumpmaster does not constitute being a current jumpmaster in MFF. The jumpmaster must meet the currency criteria for the configuration (MFF or double-bag static line) being jumped.

Note: Whenever possible, a jumpmaster-directed release should be used to enhance MFF jumpmaster skills.

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Appendix D

Military Free-Fall Parachutist Qualification and Refresher Training Requirements

MFF parachuting skills are highly perishable. MFF personnel maintain these skills through regularly scheduled training periods to develop the necessary degree of proficiency. Otherwise, mission capability and parachutist safety will be reduced. This appendix provides the MFF qualification and refresher training requirements.

MEDICAL AND PHYSIOLOGICAL TRAINING REQUIREMENTS

D-1. Each MFF parachutist must have met the following minimum requirements to participate in MFF operations:

- Must have a current HALO physical examination in accordance with FM 7-22. Students attending the MFF course must have a HALO physical in accordance with the Special Operations Center of Excellence standard.
- Must have a current physiological training card (Air Force Form 1274 [Physiological Training] or USASOC Form 4080 [Reduced Oxygen Breathing Device Physiological Training]) dated within the last 5 years. A physiological training card is maintained by undergoing physiological training every 5 years.
- Must be a graduate of a USSOCOM-recognized MFF parachutist course.
- Must be a current MFF parachutist.

CURRENCY REQUIREMENTS

D-2. Currency does not equate to proficiency. Parachutists cannot consider MFF airborne operations to meet pay requirements as proficiency jumps unless the mission profile follows a tactical insertion profile. MFF jumpmaster currency standards are outlined in USASOC Regulation 350-2.

D-3. To meet the minimum MFF currency standards, the parachutist must have—

- A current HALO physical (per FM 7-22).
- A current physiological training card (Air Force Form 1274 or USASOC Form 4080).
- Conducted an MFF jump within the last 180 days.

MILITARY FREE-FALL PARACHUTE REQUALIFICATION AND REFRESHER TRAINING

D-4. Previously qualified MFF parachutists who, after meeting medical and U.S. Air Force chamber currency requirements, do not meet the proficiency and currency requirements listed above, will undergo the following training to become requalified:

- Review arm and hand signals, aircraft procedures, and jump commands.
- Review DZ markings.
- Attend vertical wind tunnel training (if available).
- Attend a packing class.
- Attend Military CYPRES 2 class.
- Attend an oxygen class.
- Review exit procedures and body stabilization.

- Attend emergency procedures class, conduct suspended harness drills, and demonstrate emergency procedures.
- Attend a combat equipment rigging (combat pack and weapon) class.
- Attend canopy control class.
- Perform one daylight MFF jump without combat equipment, stressing a stable exit, maintaining a heading, and execute a manual parachute activation at the prescribed pull altitude (±500 feet) while maintaining a heading and landing with the group leader.
- Perform one daylight MFF jump with a weapon and combat equipment, executing a stable exit, making a left and right turn, stopping on heading, and executing a manual parachute activation at the prescribed pull altitude (±500 feet) while maintaining a heading, and landing, with the group leader.
- Perform one night MFF jump with weapon, combat pack (rucksack), and complete oxygen system, and executing a manual parachute activation at the prescribed pull altitude (±500 feet) while maintaining a heading and landing within 50 meters of the group leader.

Note: At any time, the jumpmaster may stop a parachutist from going to the next level if he determines that the parachutist has not satisfactorily performed the task. The jumpmaster will conduct an after action review with all MFF refresher jumpers.

MILITARY FREE-FALL HIGH-ALTITUDE HIGH-OPENING PARACHUTIST REQUALIFICATION AND REFRESHER TRAINING

D-5. Previously qualified MFF parachutists who do not meet proficiency and currency requirements will, after becoming current as an MFF parachutist, undergo the training outlined below. The intent of the following recommendations is to build upon the training progression listed in the previous paragraphs. In addition, the intent is to provide safe training and to increase parachutist skills, ability, and confidence, culminating in an MFF HAHO night combat equipment oxygen jump. The following training can be incorporated into Unit Level 1 or currency jump training at the unit level. Training recommendations include that the parachutists make—

- One daylight MFF RA-1 ARAPS jump with combat equipment from not higher than 13,000 feet AGL with opening not lower than 10,000 feet AGL. They must land with the group leader.
- One daylight MFF RA-1 ARAPS jump with combat equipment and complete oxygen system with opening not higher than 18,000 feet AGL nor lower than 16,000 feet AGL. They must land with the group leader.
- One daylight combat equipment jump at altitudes above 20,000 feet MSL, depending upon the availability of U.S. Air Force physiological technicians. For familiarization purposes, prebreathing can still take place below 20,000 feet MSL.

Note: Parachutists should perform same day jump sequence as above for night MFF refreshers.

Note: Altitude requirements are a recommendation; not all installations have the ability to get to these altitudes for training jumps during requalification and refresher training.

Appendix E

Recommended Training Guidance for Military Free-Fall

Commanders conduct MFF oxygen-training jumps below 20,000 feet MSL to eliminate the need for prebreathing. They conduct MFF proficiency jumps as a part of other training operations, such as field training exercises or Army training and evaluation programs, to take advantage of available training assets.

Proficiency training will be directed by Unit Commanders based on the stated mission requirements in order to maintain minimum safety standards and mission readiness. Unit level training will be tailored to existing resources and focus on known weaknesses and mission requirements. Advancement to more difficult MFF jump profiles will only be conducted when the unit leadership and jumpmasters determine that jumpers are proficient and ready to progress.

This appendix provides the recommended training guidance for MFF operations.

MINIMUM QUARTERLY TRAINING

E-1. Commanders follow a minimum program consisting of nine MFF parachute jumps per quarter as shown in table E-1, pages E-1 and E-2. They do not plan more than four proficiency jumps for any one day.

Table E-1. Minimum quarterly training guide

Jump Number	Type of Jump	Type of Jump Definition
1	**H/A**	**h**igh-altitude low-opening **a**dministrative-nontactical
2	**H/CE/O**	**h**igh-altitude low-opening **c**ombat **e**quipment **o**xygen
3	**H/CE/N**	**h**igh-altitude low-opening **c**ombat **e**quipment **n**ight
4	**H/CE/O/N** (minimum one per month)	**h**igh-altitude low-opening **c**ombat **e**quipment **o**xygen **n**ight
5	**H/CE/O/N/NVG**	**h**igh-altitude low-opening **c**ombat **e**quipment **o**xygen **n**ight **n**ight **v**ision **g**oggles
6	**S/A**	high-altitude high-opening **s**tand-off **a**dministrative-nontactical
7	**S/CE/O/N** (minimum one per quarter)	high-altitude high-opening **s**tand-off **c**ombat **e**quipment **o**xygen **n**ight

Table E-1. Minimum quarterly training guide (continued)

Jump Number	Type of Jump	Type of Jump Definition
8	S/CE/O/N/NVG	high-altitude high-opening **s**tand-off **c**ombat **e**quipment **o**xygen **n**ight **n**ight **v**ision **g**oggles
9	S/CE/O/N/NVG	high-altitude high-opening **s**tand-off **c**ombat **e**quipment **o**xygen **n**ight **n**ight **v**ision **g**oggles

Note: Commanders must remember that for safety and parachutist confidence, MFF parachutists require a jump refresher before executing MFF night combat equipment jumps after prolonged periods of nonjumping. Commanders may not be able to include the nine jumps depicted in table E-1 in the quarterly training plan; however, they follow the intent of the progression when possible. For example, after a 3-month layoff, an element should make a daylight MFF jump before a night combat equipment jump.

Note: Unit level training will be tailored to existing resources and focus on known weaknesses and mission requirements of the individual jumper and MFF detachment.

Note: Units can fulfill oxygen-training requirements at altitudes below 20,000 feet MSL. A mission profile that is consistent with prebreathing requirements can be flown without requiring the coordination with or the presence of U.S. Air Force physiological technicians. Training missions using full oxygen equipment can be flown at altitudes below 13,000 feet MSL. Flights at these altitudes would be consistent with the oxygen use requirements at any altitude. These training mission profiles might occur in areas where airspace restrictions are in force or when there are not enough aircrew personnel.

RECOMMENDED TACTICAL MILITARY FREE-FALL HIGH-ALTITUDE HIGH-OPENING SPECIFIC TRAINING PROGRAM

E-2. MFF HALO proficiency does not equate to MFF HAHO proficiency. Parachutists should only consider MFF jumps with tactical application as proficiency jumps. Nontactical jumps are for currency and not necessarily for proficiency. While MFF HALO is an integral part of MFF operations, MFF HAHO/stand-off operations provide the tactical commander a unique method for infiltration. The tactical commander may infiltrate these elements by parachute without requiring the aircraft to fly over the intended target area. These elements can be released at an offset release point and navigate long distances under canopy.

E-3. The desired end state for a combat-ready MFF team is to have the ability to land at the designated landing point as a detachment, with all required organic weapons systems, individual load-carrying equipment and issued personal protective equipment (body armor), mission-appropriate rucksack or assault pack, and tactical communications, by both MFF HALO and MFF HAHO means. The detachments will use available navigational aids, supplemental oxygen systems, and organic parachute assemblies. The units should use the maximum altitudes available for training with a culminating jump conducted at (or close to) 24,999 feet MSL using onboard consoles, during hours of darkness, onto an austere and poorly lit landing area while using NVG.

E-4. The MFF-coded detachments may fulfill these requirements at lower altitudes, but units will use the full mission profile with the onboard consoles to ensure jumpers are maintaining proficiency of the full spectrum of oxygen equipment. Examples of justification to use lower altitudes for proficiency jumps include the following:

- Lack of U.S. Air Force physiological technicians.
- Training in areas where airspace restrictions are in force.
- Aircrew limitations or restrictions.
- Limiting factors of winds and weather.

Note: Simply using bailout bottles and masking prior to exit would not be considered as meeting the oxygen system requirement for a culminating proficiency jump. Even if jumpers exit at 7,500 feet AGL, jumpers will conduct a culminating proficiency jump using onboard consoles and procedures.

E-5. All current MFF detachments will conduct, at a minimum, one MFF S/CE/O2 jump per month and one MFF S/CE/O2/N jump per quarter based on operations tempo. This is done to maintain a combat-ready status also known as Level I (Advanced Proficiency). USASOC Regulation 350-2 provides additional information on MFF levels 1, 2, 3, and 4 proficiency training.

Note: The detachment leadership can determine the order of the jumps based on detachment experience.

E-6. The goal of the first three days of training should give MFF detachments the opportunity to identify differences in canopy descent rates, to identify weaknesses in canopy control skills, and to give jumpers the chance to make familiarization jumps with new equipment during daylight before progressing to night jumps. For example, a current MFF jumper who has not jumped with a navigational aid will use these 3 days to become familiar with navigational aids. An MFF jumper who has never jumped with NVG will use these first 3 days to become familiar with flying the canopy while wearing NVG in daylight hours before attempting to wear them at night.

E-7. Identifying different descent rates between MFF jumpers will allow the unit's leadership to better plan for cross-loading of equipment and chalk order during exit so the detachment can minimize the amount of time it takes to group under canopy, build the stack, and navigate to the desired landing area. Table E-2, page E-4, provides a template for a 2-week MFF training plan that focuses on stand-off parachute infiltration.

Note: The suggested 10-day combat-ready training program (table E-2, page E-4) is not meant to be a basic train-up plan conducted as a requalification event. It is meant as an advanced proficiency train up for fully trained elements. Anyone executing this recommended schedule should already be a current MFF jumper.

Table E-2. Suggested 10-day combat-ready training program

Jump Number	Type Jump	Maximum Recommended Exit Altitude (Feet AGL)	Minimum Recommended Pull Altitude (Feet AGL)	Notes
1	S/A	8,000	6,000	Jumps focus on fundamental canopy skills.
2	S/CE	8,000	6,000	Proper equipment lowering procedures and new equipment.
3	S/CE/O	8,000	6,000	Operational detachment–alpha can adjust cross load of equipment to even the canopy descent rates.
4	S/CE/O	8,000	6,000	
5	S/A/N	12,500	6,000	A seasoned operational detachment–alpha may exit at 12,500 feet and pull soon after exit where a less experienced level may dictate pulling as low as 6,000 feet.
6	S/CE/N	12,500	6,000	
7	S/O/N	12,500	6,000	
8	S/CE/O/N	12,500	6,000	
9	S/A/NVG	12,500	10,000	Operational detachment–alpha focuses on using navigational aids and night vision aids and maintaining a tight canopy stack.
10	S/CE/NVG	12,500	10,000	
11	S/O/NVG	12,500	10,000	
12	S/A/O	17,500	15,000	Operational detachment–alpha focuses on using navigational aids and maintaining a tight canopy stack.
13	S/CE/O	17,500	15,000	
14	S/CE/O/NVG	17,500	15,000	
15	S/CE/O/NVG	24,999 (MSL)	23,000 (MSL)	Predawn exit.
16	Commander's Time			
17				
18	S/CE/O/NVG	24,999 (MSL)	23,000 (MSL)	Culmination exercise/full mission profile
19	Commander's Time			
20				

Legend:

AGL above ground level　　**MSL** mean sea level

Note: The following codes will be used to indicate the type jump performed. One or more code symbols may be used. (For example, T-S-O-N-J indicates a **T**actical, **S**tand-off jump using **O**xygen performed at **N**ight as **J**umpmaster.)

A	administrative/nontactical	**NVG**	night vision goggle(s)
C	combat	**O**	oxygen
E	combat equipment	**S**	high-altitude high-opening/stand-off
H	high-altitude low-opening	**T**	tactical
J	jumpmaster	**TB**	tandem bundle
N	night	**TP**	tandem personnel

Appendix F
High-Altitude Release Point Calculation

The effects of variable wind directions and speed must be accounted for when determining the HARP for each MFF mission. Accurate wind data is essential to calculate the HARP precisely. Commanders are cautioned against planning pinpoint landings on targets when wind data is questionable due to the source, timeliness of reporting, or other dynamic meteorological conditions (for example, thunderstorms or changing fronts). Wind will affect the parachutist during free-fall and canopy performance after deployment.

This appendix provides information for calculating the HARP.

Note: Jumpmasters should use DA Form 7734 (MFF HAHO Jumpmaster Report) and DA Form 7735 (MFF HALO Jumpmaster Report) for calculating all data.

OBTAINING WIND DATA

F-1. Military airfields, civilian airports, or weather services, artillery meteorological sections, or pilot teams in the operational areas can provide wind data. Aircrew personnel can also determine wind data during flight as the aircraft passes through different flight levels. (It is not advisable to use this technique for actual infiltrations, as the data obtained en route to the objective area may not reflect conditions at the objective area.)

Note: Winds Aloft by Mark Schulze is not an authorized weather source in accordance with AFI 15-157 and AR 115-10.

RECORDING WIND DATA

F-2. The jumpmaster records the reported wind data according to altitude in feet, direction in degrees (true), and speed (velocity) in knots as follows:

- **Canopy Drift Calculations.** Wind data for canopy flight is recorded in increments of 1,000 feet until either the desired pull altitude is reached or greater than 10,000 feet wherein it will be in increments of 2,000 feet.

Note: If the pull altitude is greater than 6,000 feet AGL, the jumpmaster will record the winds for, and calculate for, an MFF HAHO operation.

- **Free-fall Drift Calculations.** Wind data is recorded in increments of 2,000 feet from pull altitude to exit altitude.

CALCULATING AND PLOTTING THE HIGH-ALTITUDE RELEASE POINT

F-3. The jumpmaster calculates and plots the location of the MFF HARP in reverse sequence (figure F-1, page F-2). First, he calculates the distance and direction from the desired impact point to the parachute opening point. Second, he calculates the distance and direction from the parachute opening point to the preliminary release point. Third, he calculates the distance and direction from the preliminary release point (to compensate for forward throw) to the HARP.

F-4. Calculation of the MFF HARP during MFF HAHO operations may or may not require calculation of free-fall drift, depending upon the length of free-fall required. For MFF HAHO missions requiring less than 2,000 feet of free-fall, the jumpmaster disregards free-fall drift.

F-5. When plotting the HARP on a map, the jumpmaster converts the wind direction from True North to a grid azimuth using the declination diagram.

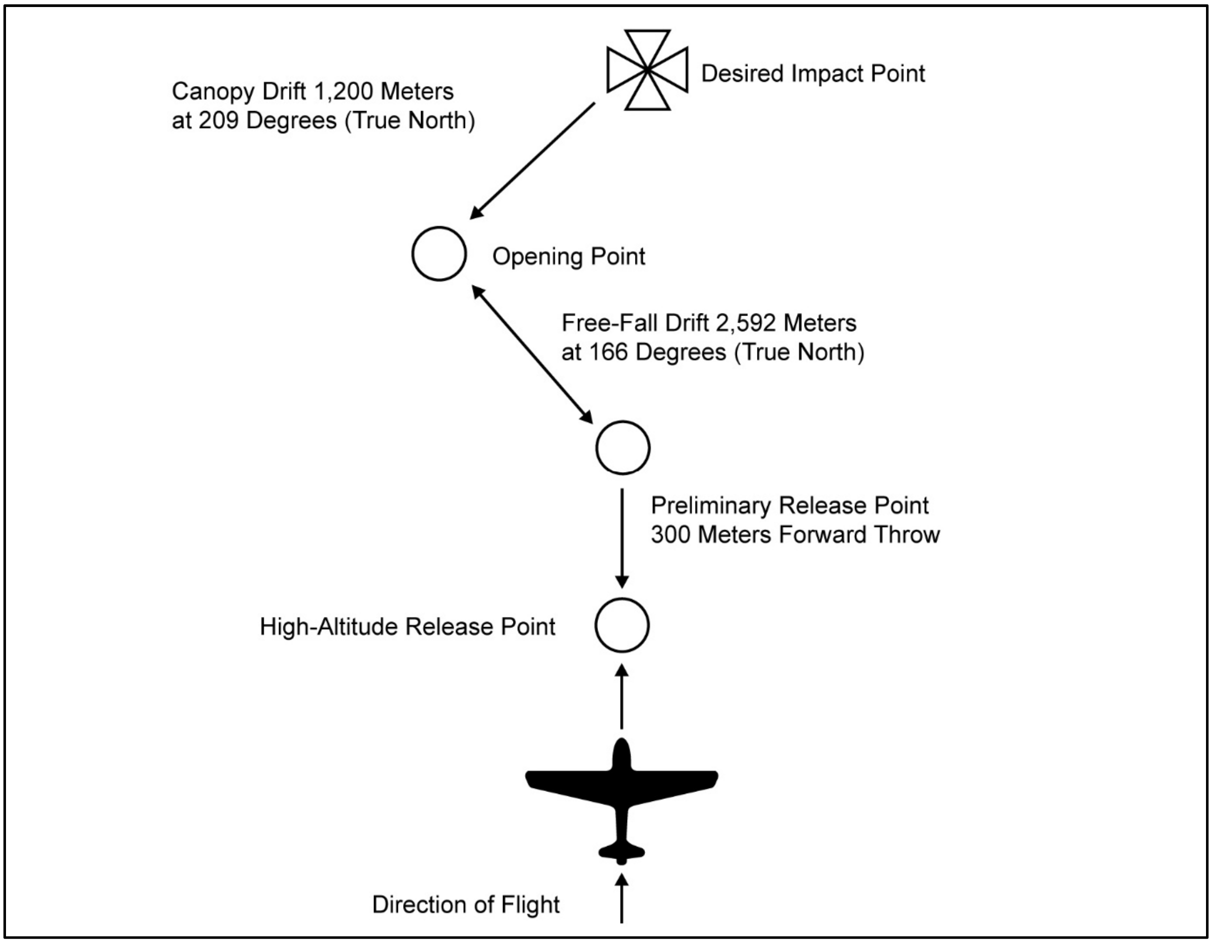

Figure F-1. Plotting the high-altitude release point, free-fall, and canopy drift for a 20,000-foot high-altitude low-opening mission profile

USING THE WIND DRIFT FORMULA AND CONSTANTS

F-6. The jumpmaster uses the wind drift formula D = KAV:

$$D = \frac{(A - SF)\ (V + FS)}{K}$$

- D = gliding distance in nautical miles.
- A = altitude in thousands of feet.
- SF = safety factor in thousands of feet.

Note: For training, use a minimum safety factor of 2.

- V = average wind speed (velocity) in knots.
- FS = forward canopy speed constant for parachute.
- K = canopy drift constant for parachute.

F-7. The jumpmaster calculates the safety factor, which provides a buffer area after exit to permit the parachutists to assemble under canopy and establish the landing pattern over the DZ. For example, the element commander desires 1,000 feet for canopy assembly after exit and 2,000 feet to establish the landing pattern. The safety factor is 3,000 feet; therefore, SF = 3.

F-8. The jumpmaster calculates the total canopy gliding distance in nautical miles. He does not round up or down. Instead, he truncates the result to the tenth of a nautical mile; for example, 12.666 = 12.6 and 18.37486 = 18.3. To convert nautical miles to kilometers, the jumpmaster multiplies by 1.85 and again truncates the result.

F-9. Table F-1 defines the MFF HAHO K factors for the RA-1 and MC-4 RAPPS.

Table F-1. High-altitude high-opening K factors for Department of Defense Ram-Air Personnel Parachute Systems

Parachute System	Free-Fall K Factor	Canopy Drift (High-Altitude Low-Opening) K Factor	Canopy Drift (High-Altitude High-Opening) K Factor
RA-1	3	22.6	36
MC-4/5, MJ, MT2, SOV, APS	3	20.8	48
MMPS-360, TP-400	3	20.8	46
HG-380 (HG Mode)	3	20.8	31
HG-380 (Parachute Mode)	3	20.8	39

Notes:
1. Jumpmasters will use canopy speed constant for high-opening gliding distant formula of V + 22.6 for RA-1 or V + 20.8 for the MC-4. When jumping double-bag static line, the high-altitude high-opening K factor of 36 will be used.
2. The jumpmaster always calculates for the lowest performance parachute (largest K factor) to be used on the military free-fall operation.

Note: The jumpmaster calculating the HAHO wind drift uses the constant of the least performing canopy being jumped; therefore, if a parachutist has to activate his reserve parachute, he will still be able to glide to the DZ. The RA-1 K factor for the main and reserve are the same.

CALCULATING HIGH-ALTITUDE LOW-OPENING FREE-FALL DRIFT AND DIRECTION

F-10. To determine the parachutist's drift in free-fall, the jumpmaster calculates the average wind speed (velocity) and average wind direction from the exit to the opening altitude. Opening altitude (4,000 feet in this example) is not included since that is where the free-fall ends. The wind data from 4,000 feet to 1,000 feet is calculated using the canopy drift constant.

EXAMPLE	**Altitude**	**Velocity**	**Direction**
	20,000	85	160
	18,000	75	160
	16,000	75	165
	14,000	65	165
	12,000	50	155
	10,000	45	150
	8,000	20	185
	6,000	20	190
		Total 435 knots	Total 1,330 degrees

F-11. The jumpmaster determines the averages by—

- Determining the total free-fall distance from the exit (20,000) to the opening (4,000). A = 20,000 – 4,000 = 16,000, or A = 16.
- Dividing the sum of the wind velocities (435) by the number of velocities (8).

  Velocity = 435 ÷ 8 = 54.375, or V = 54 (rounded to nearest whole number) knots average wind speed (velocity).
- Dividing the sum of the wind directions (1330) by the number of directions (8).

  Direction = 1330 ÷ 8 = 166.25, or Direction = 166 degrees (rounded to nearest whole number) average wind direction.

F-12. Jumpmasters use the following rounding guidelines:

- 0.0 to 0.4: Round down to the nearest whole number.
- 0.5 to 0.9: Round up to the nearest whole number.

F-13. The jumpmaster substitutes the numerical values for the letters of the D = KAV formula:

- D = (3) (16) (54).
- D = 2,592 meters at 166 degrees (True North).

CALCULATING CANOPY DRIFT

F-14. To determine the parachutist's drift under canopy, the jumpmaster calculates the average wind speed (velocity) and direction from 1,000 feet to the opening altitude.

EXAMPLE	**Altitude**	**Velocity**	**Direction**
	4,000	15	190
	3,000	14	220
	2,000	11	205
	1,000	8	220
		Total 49 knots	Total 835 degrees

Note: Disregard surface winds for calculation. Winds from 1,000 feet to surface are not used to allow the parachutist to maneuver in the landing pattern.

F-15. The jumpmaster determines the averages by—

- Dividing the sum of the velocities (49) by the number of velocities (4).

  Velocity = 49 ÷ 4 = 12.25, or V = 12 (rounded to nearest whole number) average wind speed (velocity).
- Dividing the sum of the wind directions (835) by the number of directions (4).

  Direction = 835 ÷ 4 = 208.75 degrees, or 209 degrees (rounded to the nearest whole number) average wind direction.

F-16. The jumpmaster substitutes the numerical values for the letters of the D = KAV formula.

$$D = \frac{(A - SF)\,(V + FS)}{K}$$

- D = gliding distance in nautical miles.
- A = altitude in thousands of feet.
- SF = safety factor in thousands of feet.
- V = average wind speed (velocity) in knots.
- FS = forward canopy speed constant for parachute.
- K = canopy drift constant for parachute.

D = (4 – 2) (22.6 + 12) ÷ 36.

D = (2) (34.6) ÷ 36.

D = 69.2 ÷ 36.

D = 1.9 nautical miles x 1.85 = 3.5 kilometers at 83 degrees (True North).

CALCULATING FORWARD THROW AND JUMPER DISPERSION

F-17. Compensation must be made for the distance a parachutist's body initially travels into the direction of flight due to forward speed (velocity). The jumpmaster plots back into the aircraft's line of flight to compensate for forward throw. The forward throw distances used in MFF HALO and MFF HAHO operations are—

- 300 meters for a high-performance aircraft with exit speeds above 120 knots.
- 150 meters for a low-performance aircraft with exit speeds below 120 knots.

F-18. In addition to forward throw, the jumpmaster must compensate for dispersion between the parachutists. He obtains this figure by dividing the total number of parachutists by 2 then, multiplying the result by 50 meters. He plots that calculated distance back into the aircraft's line of flight. This procedure places the middle of the stick on the desired opening point or preliminary release point.

EXAMPLE:
12 jumpers ÷ 2 = 6
6 x 50 meters = 300 meters
300 meters + 300 meters forward throw = 600 meters back in the direction of flight

CALCULATING ERRONEOUS WINDS

F-19. If the jumpmaster uses wind directions from 271 degrees to 089 degrees to calculate the average wind direction, incompatible averages may result. (All rules for erroneous winds and doglegs apply.) To compensate, the jumpmaster adds 360 degrees to directions of 001 to 089 degrees and averages the wind direction. If the resulting average is greater than 360 degrees, the jumpmaster subtracts 360 to obtain the correct average wind direction. Figure F-2, page F-6, shows two examples for calculating winds.

Example 1: Average less than 360 degrees		**Example 2:** Average greater than 360 degrees	
Incorrect	**Correct**	**Incorrect**	**Correct**
345	345	345	345
350	350	355	355
345	345	005	005 (+ 360) = 365
010	010 (+360) = 370	020	020 (+ 360) = 380
015	015 (+360) = 375	025	025 (+ 360) = 385
350	350	035	035 (+ 360) = 395
1415 degrees	2135 degrees	785 degrees	2225 degrees

Direction = 1415 ÷ 6 = 235.83 degrees or D = 236 degrees (incorrect).
Direction = 2135 ÷ 6 = 355.83 degrees or D = 356 degrees (correct).
Direction = 785 ÷ 6 = 131 degrees or D = 131 degrees (incorrect).
Direction = 2225 ÷ 6 = 370.83 degrees or D = 371 (- 360) = 011 degrees (correct).

Figure F-2. Examples for calculating winds

CALCULATING DOGLEGS

F-20. A dogleg is a situation in which the wind direction changes 90 degrees or more for two (or more) consecutive recorded altitudes. Doglegs require separate calculations from the altitude where the wind direction changes.

Note: A single 90-degree or greater change in wind direction is treated as an erroneous wind and will not be included in wind direction or velocity calculations; the altitude will still be included in the D = KAV formula.

CALCULATING THE HIGH-ALTITUDE HIGH-OPENING HIGH-ALTITUDE RELEASE POINT

F-21. To calculate the MFF HAHO HARP, the jumpmaster uses the modified D = KAV formula as the intention is to maximize the linear distance traveled using the gliding capability of the MFF parachute system.

F-22. The jumpmaster uses the following HAHO gliding distance formula:

$$D = \frac{(A - SF)\,(V + FS)}{K}$$

- D = gliding distance in nautical miles.
- A = altitude in thousands of feet.
- SF = safety factor in thousands of feet.
- V = average wind speed (velocity) in knots.
- FS = forward canopy speed constant for parachute.
- K = canopy drift constant for parachute.

F-23. Jumpmasters use the following rounding guidelines:

- 0.0 to 0.4: Round down to the nearest whole number.
- 0.5 to 0.9: Round up to the nearest whole number.

F-24. The jumpmaster calculates the safety factor, which provides a buffer area after exit to permit the parachutists to assemble under canopy and to establish the landing pattern over the DZ. For example, the element commander desires 1,000 feet for canopy assembly after exit and 2,000 feet to establish the landing pattern. The safety factor is 3,000 feet; therefore, SF = 3.

F-25. The jumpmaster calculates the total canopy gliding distance in nautical miles. He does not round up or down. Instead, he truncates the result to the tenth of a nautical mile; for example, 12.666 = 12.6 and 18.37486 = 18.3. To convert nautical miles to kilometers, the jumpmaster multiplies by 1.85 and again truncates the result.

F-26. Figures F-3 and F-4, pages F-7 through F-9, provides two examples of HAHO HARP calculations.

Example 1: MFF HAHO/HARP calculation

Situation. The exit altitude is 14,000 feet. Twelve parachutists will exit the aircraft in stick formation. The element commander desires 1,000 feet for canopy assembly and a 1,000-foot arrival altitude over the DZ. Wind speed and direction at altitude are as follows:

Altitude	Velocity	Direction
14,000	25	090
12,000	22	080
10,000	21	090
9,000	21	090
8,000	20	085
7,000	18	080
6,000	18	080
5,000	17	085
4,000	16	080
3,000	12	075
2,000	12	080
1,000	08	080
	Total 210 knots	Total 995 degrees

Jumpmaster's Calculation. The jumpmaster—

- Determines the average wind speed: V = 210 ÷ 12 = 17.50, or V = 18 (rounded to nearest whole number) average wind speed.
- Determines the average wind direction: D = 995 ÷ 12 = 82.91, or D = 83 (rounded to nearest whole number) degrees (True North) average wind direction.
- Determines the safety factor is 2 (minimum).
- Substitutes the numerical values for the letters of the formula:
  - D = (4 – 2) (22.6 + 12) ÷ 36.
  - D = (2) (34.6) ÷ 36.
  - D = 69.2÷ 36.
  - D = 1.9 nautical miles x 1.85 = 3.5 kilometers at 83 degrees (True North).
- Determines the gliding distance: 13.5 nautical miles x 1.85 = 24.9 kilometers.
- Determines dispersion: (12 ÷ 2) x 50 = 300 meters.
- Determines forward throw: 300 meters.
- Converts the average wind direction from degrees (True North) to a grid azimuth and plots it on the map to determine the canopy opening point.
- Plots the dispersion and forward throw from the preliminary release point to determine the HARP.
- Determines the grid azimuth from the opening point to the desired impact point. Converts the grid azimuth to a magnetic azimuth. The magnetic azimuth is the compass heading followed by the parachutists to the DZ.

> ***Note:*** If there is no free-fall prior to canopy deployment, the opening point is the preliminary release point.

Figure F-3. Example 1: Release point calculation

Example 2: MFF HAHO/HARP calculation with a dogleg

Situation. The exit altitude is 15,000 feet. Twelve parachutists exit the aircraft in stick formation. The element commander desires 1,000 feet for canopy assembly and a 2,000-foot arrival altitude over the DZ. A change of wind direction creates a dogleg at 9,000 feet AGL. Wind speed and direction at altitude are as follows:

	Altitude	Velocity	Direction
Above Dogleg	14,000	33	210
	12,000	30	210
	10,000	29	180
		92 knots	600 degrees
Below Dogleg	9,000	26	075
	8,000	24	080
	7,000	22	085
	6,000	20	090
	5,000	18	090
	4,000	14	085
	3,000	12	090
	2,000	10	085
	1,000	8	080
		Total 154 knots	Total 760 degrees

Jumpmaster's Calculation (above the dogleg from 10,000 to 14,000 feet). The jumpmaster calculates the gliding distance and direction from 10,000 feet to the exit altitude. The jumpmaster—

- Determines that the average wind speed (velocity) from 10,000 feet to 15,000 feet is 30.66 or 31 (rounded to the nearest whole number) knots.
- Determines that the average wind direction from 10,000 feet to 15,000 feet is 200 degrees (True North).
- Determines that the safety factor is 1.
- Establishes that altitude = 5,000 feet, or A = 5.
- Substitutes the numerical value for the letters of the formula:
  - D = (5 – 1) (22.6 + 31) ÷ 36.
  - D = (4) (53.6) ÷ 36.
  - D = 214 ÷ 36 = 5.9 nautical miles x 1.85 = 10.9 kilometers gliding distance at 200 degrees (True North).

The jumpmaster converts the True North azimuths to grid azimuths. He plots the glide path from the desired impact point to the dogleg, and plots the glide path from the dogleg to the opening point. He calculates the dispersion for 12 parachutists (300 meters) and plots the preliminary release point from the opening point. The jumpmaster compensates for forward throw and plots the HARP.

The jumpmaster determines the grid azimuth from the opening point to the desired impact point. He converts the grid azimuth to a magnetic azimuth. The magnetic azimuth is the compass heading followed to the DZ. By holding a single compass heading, the parachutist will maintain direction and follow a curving path from the opening point to the DZ, rather than a path with distinct turns.

Note: The safety factor above the dogleg and below the dogleg, when combined, mathematically incorporates the desired effect over the complete group.

Figure F-4. Example 2: Release point calculation

Jumpmaster's Calculation (below the dogleg from 9,000 to 1,000 feet). The jumpmaster calculates the gliding distance and direction from the desired impact point to the dogleg at 9,000 feet. The jumpmaster—

- Determines that the average wind speed (velocity) from 1,000 feet to 9,000 feet is 17.11 or V = 17 (rounded to the nearest whole number) knots average wind speed.
- Determines that the average wind direction from 1,000 feet to 9,000 feet is 84.44 or 84 (rounded to the nearest whole number) degrees (True North).
- Determines that the safety factor is 3. Jumpmaster must remember that in a formula for a HAHO dogleg, the safety factor is 2 on the base leg and 1 on the dogleg to equal a total safety factor of 3.
- Establishes that altitude = 9,000 feet, or A = 9.
- Substitutes the numerical value for the letters of the formula:
  - D = (9 – 2) (22.6 + 17) ÷ 36.
  - D = (7) (39.6) ÷ 36.
  - D = 277 ÷ 36 = 7.7 nautical miles x 1.85 = 14.2 kilometers gliding distance at 84 degrees (True North).

Figure F-4. Example 2: Release point calculation (continued)

F-27. Jumpmasters should use DA Form 7734 and DA Form 7735 for calculating all data. Figure F-5, page F-10, depicts DA Form 7734 with sample data. Figure F-6, page F-11, depicts DA Form 7735 with sample data.

MFF HAHO JUMPMASTER REPORT

For use of this form, see ATP 3-18.11; the proponent agency is TRADOC.

1 a. DATE *(YYYYMMDD)*:	b. Type of Aircraft:	2. ALCE Line Number/Contact:	3. Course:	4. Class No:
20140222	C130	ABF1287C	NA	NA

5. Mission DATE:

a. Track of AC:	b. DZ:	c. DZ Elevation:
324 degrees (grid)	Phillips	519 feet MSL
d. Drop Altitude:	**e. TOT:**	**f. Load Time:**
6,000 feet AGL	0900	0830

6. Obtain a weather (WX) report:

a. Time of WX Data:	b. Name of WX POC:	c. Ceiling:	d. Visibility/Illumination:
0700	MCAS Yuma	15,000 feet AGL	Unlimited
e. Chance of Precipitation:	**f. Surface/Altitude Temp:**	**g. Aircraft Altimeter Setting:**	**h. Forecasted Wind Conditions:**
0%	60/40	29.92	Calm

Altitude	Direction	Velocity
26		
24		
22		
20		
18		
16		
14		
12		
10		
9		
8		
7		
6	325	12
5	320	15
4	318	15
3	326	13
2	344	9
1	358	6
Surface	086	4

$$D = \frac{(A-SF)\ (V + FS)}{K}$$

K = Constant 3 (canopy)
A = Altitude in thousands of feet
SF = Safety factor in thousands of feet (min 2)
V = Wind velocity (average knots)
FS = Forward speed of canopy being used

$$D = \frac{(\ 6\text{-}2\ )\ (\ 22.6 +\ 12\ )}{36}$$

3.8 NM x 1.85 = 7 KM @ 331 degrees (grid)

Jumper Dispersion: ½ number of jumpers (3) x 50 = 150

Forward Throw: 150 + 300 meters = 450 meters @ 144 degrees (grid) (HP A/C)

____ + 150 meters = ____ meters @ ____ degrees (grid) (STOL A/C)

Azimuth PRP to DIP: 134 degrees mag

Distance PRP to DIP: 7 KM

GM Angle

M to G = +011

G to M = -011

T to G = -001

G to T = +001

7. DATA:

a. CYPRES Setting:	b. DIP:	c. HARP:
0094	11S QG 42754345	11S QG 39434970

d. Risk Assessment Control Measures Are In Place: ☒ Yes ☐ No JM initials: ______ *(If No, JM must notify ABN CDR and CO CDR)*

8. Range Activities That May Affect Airborne Operation: [Phone # (XXX) XXX-XXXX, DSN XXX-XXXX]

Activity	Time/Duration	Activity	Time/Duration

9. Results:

a. Actual Load Time:	b. Actual TOT:	c. Actual Drop Altitude:	d. Number of Lifts:
0830	0900	0600	1

e. Mission Complete: ☒ Yes ☐ No | f. Reason Not Complete: ☐ Winds ☐ Wx ☐ A/C No Show ☐ A/C Maint: Other: ________

10. Remarks:

11 a. Jumpmaster Name:	b. Jumpmaster Signature:	c. DATE *(YYYYMMDD)*:
SFC Jones		
12 a. Verified by Name:	**b. Verified by Signature:**	**c. DATE *(YYYYMMDD)*:**
MSG Smith		

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Figure F-5. Department of the Army Form 7734 with sample data

MFF HALO JUMPMASTER REPORT

For use of this form, see ATP 3-18.11; the proponent agency is TRADOC.

1 a. DATE *(YYYYMMDD)*:	b. Type of Aircraft:	2. ALCE Line Number/Contact:	3. Course:	4. Class No:
20140222	C130	ABF1287C	NA	NA

5. Mission DATE:

a. Track of AC:	b. DZ:	c. DZ Elevation:
281 degrees (grid)	Phillips	519 feet MSL
d. Drop Altitude:	**e. TOT:**	**f. Load Time:**
12,500 feet AGL	0900	0830

6. Obtain a weather (WX) report:

a. Time of WX Data:	b. Name of WX POC:	c. Ceiling:	d. Visibility/Illumination:
0700	MCAS Yuma	15,000 feet AGL	Unlimited
e. Chance of Precipitation:	**f. Surface/Altitude Temp:**	**g. Aircraft Altimeter Setting:**	**h. Forecasted Wind Conditions:**
0%	60/40	29.92	Calm

Altitude	Direction	Velocity
26		
24		
22		
20		
18		
16		
14		
12	282	18
10	294	18
8	313	13
6	309	5
4	210	5
3	180	8
2	163	9
1	146	9
Surface	091	4

Free-fall Drift: D = KAV
K = Constant __3__ (free-fall)
A = Altitude in thousands of feet
V = Wind velocity (average knots)

Canopy Drift: D = KAV
K = Constant ______ (canopy)
A = Altitude in thousands of feet
SF = Safety factor in thousands of feet (min 2)
V = Wind velocity (average knots)
FS = Forward speed of canopy being used

GM Angle
M to G = +011
G to M = -011
T to G = -001
G to T = +001

$$D = \frac{(A-SF)\ (V+FS)}{K}$$

FD = 3 x 8 x 14 = 336 meters @ 299 degrees (grid)

CD = $\frac{(\ 4\text{-}2\ )\ (\ 22.6 + 8\ )}{36}$ = 1.85 NM x 3,100 meters @ 174 degrees (grid)

Jumper Dispersion = 1/2 number of jumpers (3) x 50 = 150

Forward Throw: 150 + 300 meters = 450 meters @ 144 degrees (grid) (HP A/C)

____ + 150 meters = ____ meters @ ____ degrees (grid) (STOL A/C)

Azimuth PRP to DIP: 134 degrees mag.

7. DATA:

a. CYPRES Setting:	b. DIP:	c. HARP:
0994	11S QG 42754345	11S QG 39434970

d. Risk Assessment Control Measures Are In Place: ☒ Yes ☐ No JM initials: ______ *(If No, JM must notify ABN CDR and CO CDR)*

8. Range Activities That May Affect Airborne Operation: [Phone # (XXX) XXX-XXXX, DSN XXX-XXXX]

Activity	Time/Duration	Activity	Time/Duration

9. Results:

a. Actual Load Time:	b. Actual TOT:	c. Actual Drop Altitude:	d. Number of Lifts:
0830	0900	6,000 feet AGL	1

e. Mission Complete: ☒ Yes ☐ No | f. Reason Not Complete: ☐ Winds ☐ Wx ☐ A/C No Show ☐ AC Maint: Other: ______

10. Remarks:

11 a. Jumpmaster Name:	b. Jumpmaster Signature:	c. DATE *(YYYYMMDD)*:
SFC Jones		
12 a. Verified by Name:	**b. Verified by Signature:**	**c. DATE *(YYYYMMDD)*:**
MSG Smith		

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Figure F-6. Department of the Army Form 7735 with sample data

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Appendix G

Limited Visibility and Use of Night Vision Goggles for Military Free-Fall Operations

MFF infiltrations during periods of limited visibility (adverse weather or darkness) have a higher chance of success than strictly daylight operations. Adverse weather requires an Adverse Weather Aerial Delivery System equipped aircraft when unable to identify the HARP (USASOC Regulation 350-2). Limited-visibility infiltrations offer surprise and increased security due to reduced enemy observation capability. Limited-visibility operations require a high degree of skill and individual discipline. A well-rehearsed tactical plan executed by personnel proficient in MFF skills is critical to success.

This appendix provides information for conducting MFF operations during limited visibility.

NIGHT OPERATIONS

G-1. Night MFF parachuting offers the same advantages as parachuting during adverse weather, especially during the first quarter, new moon, and last quarter moon phases. Night MFF parachuting is the most psychologically demanding of parachute operations. Extensive training must take place at night. During this training, the parachutist develops confidence in the equipment and his abilities.

G-2. Commanders must weigh the tactical situation when placing lighting devices on the parachutist and on the parachute canopy for safety and control during free-fall and canopy flight. At a minimum, illumination devices are used for altimeters, navigation equipment, and other instruments.

G-3. The use of oxygen dramatically improves night vision. Wearing the oxygen mask until the landing is a recommended procedure. The commander may consider the use of oxygen for all night free-fall operations, even if the jumping altitude does not require it.

G-4. The lack of depth perception at night may prevent the parachutist from executing a proper landing. The parachutist flies the RA-1 parachute at the half-brake position, and the parachutist flies at full brakes for a parachute landing fall on contact with the ground. Various night illumination techniques exist to identify parachutists, group leaders, or subunit elements while under canopy. Some techniques involve attaching the devices in the aircraft. Some of these techniques include attaching chemlights on the parachutist's body, parachute risers, and strobe lights on the back of the helmet.

Note: Ram Air Parachute Systems, other that the RA-1 ARAPS, may react in a different way when landing the parachute system during night and limited visibility operations. The jumper should land other Ram Air Parachute Systems' canopies at half-brakes due to the canopy design and flight characteristics.

GENERAL CONSIDERATIONS FOR NIGHT VISION GOGGLES

G-5. MFF with NVG can increase situational awareness and safety during reduced lighting operations, but there are several issues jumpers should consider. Proper training and rehearsal will help minimize these issues. The jumper must—

- Know the pros and cons of NVG use, restrictions, and alternatives; for example, exiting with NVG down and powered on, exiting with NVG locked in the up position and turned off, or exiting with the NVG in a pouch and putting them on after the jumper is under a good canopy.
- Have an understanding of all equipment and materials needed to complete rigging procedures of the NVG for MFF operations, to include the approved types of NVG, authorized mounting brackets, and a review of TB 43-0001-80 of authorized helmets available for use during NVG operations.
- Understand that NVG should be focused to infinity to provide the best clarity while under canopy.
- Understand that if the helmet is not properly adjusted, it may shift after exit. The jumper may need to readjust the helmet after postopening procedures are complete.
- Understand that the normal sight picture for checking the altimeter will change when wearing NVG. The jumper should practice checking the altitude on the ground and in the aircraft prior to exit. The jumper can look beneath the NVG to identify and read the altimeter.
- Understand that when beginning the pull sequence, he must be sure to look forward after identifying his main ripcord and before pulling it because the risers may hit the NVG—potentially knocking them off.
- Understand that turning his head to see jumpers behind him while under canopy is difficult. Lack of training and rehearsal of this can increase the potential for canopy collisions. A useful technique to look behind him without turning his head excessively is to grasp and push one side of the risers and kick and twist in the harness to rotate his body in that direction. The jumper should avoid unpredictable turns during canopy manipulation.
- Understand that NVG limit his peripheral vision; therefore, he should fly accurate, predictable, and briefed patterns. Other jumpers are flying with the same limitations, and extra attention must be given to situational awareness throughout the jump.

CAUTION

NVG provide greater situational awareness during night MFF operations; however, jumpers should always be prepared to land with full brakes and to conduct a parachute landing fall.

MILITARY FREE-FALL WITH NIGHT VISION GOGGLES

G-6. Operational areas frequently have little or no cultural lighting to illuminate DZs and objective areas during night parachute operations. Helmet-mounted NVG improve the margin of safety for MFF parachutists when performing night MFF missions by—

- Providing visual cues to the DZ terrain features.
- Providing the ability to clearly see other jumpers and obstacles while under the canopy.

G-7. Better vision translates into increased situational awareness during low-illumination deployments. NVG are worn during MFF operations to reduce the risk of injury and improve the capability of MFF-coded elements by enhancing visual situational awareness during limited visibility. The jumpmaster can use NVG to help him while spotting from the aircraft. The parachutist should also use them during canopy flight as an aid to navigation and formation flying. NVG may be worn for all MFF operations; however, if they are not worn in the down-and-locked position during MFF HALO operations, they should be in the up-and-locked position until after postopening procedures per USASOC Policy Number 20-10.

Note: Airborne commanders and jumpmasters will verify that only jumpers who have completed NVG training participate in NVG-supported MFF operations. The jumpmaster will ensure that only helmets and NVG listed in TB 43-0001-80 are used during all MFF operations. In addition, he will verify that NVG rigging is accomplished in accordance with the approved training material.

G-8. The minimum recommended qualifications prior to conducting MFF operations with NVG are as follows:

- Experienced jumpers and jumpmasters that have performed MFF jumps with NVG within the past 120 days to train and determine if all jumpers are trained to the standards needed for this type of training.
- Four hours of ground training with hanging harness for riser manipulation and emergency procedures with NVG (to include rigging and attachment procedures for NVG).
- Fifteen to 30 minutes of vertical wind tunnel flying with NVG (recommended for MFF parachutist only).
- Three day-familiarization jumps with NVG (turned off).
- Two night jumps (no equipment, weapon, or oxygen) (NVG powered on).
- Minimum 5,500 feet AGL (MFF parachutist only) training altitude with maximum 5-second delay before main canopy deployment.

Note: It is recommended that MFF NVG task-certified personnel perform this task a minimum of once every 120 days for currency.

WARNING

Jumpers must ensure the NVG mount remains in the LOCKED position when NVG are placed in the down or up position. Jumpmasters will verify the lock is engaged and bungee cords are attached to helmet and NVG during jumper inspection and at the 4-minute window before the jump.

JUMPMASTER CONSIDERATIONS WITH NIGHT VISION GOGGLES

G-9. JMPIs remain essentially the same as jumping without NVG. When jumping with NVG, the jumpmaster will first conduct an inspection of the helmet and NVG before the jumper dons his helmet. During the JMPI, the jumper will don his helmet, and the jumpmaster will again ensure the NVG are properly attached and adjusted to the jumper’s helmet. The following additional procedures should be completed on each parachutist:

- Check all NVG components for serviceability.
- Ensure helmet is snug (nape and chinstraps tight).
- Check NVG dovetail mount for proper attachment.
- Check that NVG mount is in LOCKED position.
- Turn ON and lower NVG; verify ON and in proper position on the parachutist (if not, stop the JMPI and correct).
- Turn OFF and raise NVG.
- Ensure straps are secured and taped.
- Ensure battery pack and power cables are secured to the helmet and properly stowed.
- Ensure bungee connector is serviceable and connected to the NVG.

- Check infrared strobe light for serviceability.
- Verify briefed lighting attachments and placement.

Note: Jumpmasters will instruct jumpers to lower NVG and turn them ON at the command of STAND UP (2 minutes). The decision to jump with NVG in the up or down position and turned ON or OFF will be made during rehearsals for the MFF operation being conducted.

Note: While performing outside-the-aircraft spotting duties, the jumpmaster should hold the NVG securely in place with one hand.

AUTHORIZED NIGHT VISION GOGGLES

G-10. NVG authorized for MFF NVG operations are listed in TB 43-0001-80.

Note: All rigging procedures for all NVG are not covered within this publication. There might be slight differences in mount release buttons, and bungee cord attaching points for the type of NVG being used.

MOUNTS

G-11. Mounts should provide a strong attaching point with a low profile from the helmet that is least obtrusive, snag free, and allows for the best ergonomics and adjustment with all goggles and is permanent. The mount should have a break-away feature when exposed to harsh environmental and combat conditions to reduce injuries to the parachutist’s head or neck if risers or parachute lines come into contact with the NVG or mount. Mounts should also have the capability and compatibility to switch from one type of NVG to another by only changing the mount arm.

Note: All manufacturer mounting installation requirements should be followed to reduce injury to the parachutist.

Note: Additional testing should continue to keep up with new NVG and mounts to maintain safety for the MFF parachutist when conducting night MFF operations.

NIGHT VISION GOGGLE PREPARATION

G-12. Before each jump, the parachutist should inspect the entire NVG system to ensure that all components are serviceable and free from any defects caused from prior training, combat, or airborne operations. This inspection includes the following:

- Check components for serviceability.
- Install new batteries.
- Clean lenses.
- Check visual acuity and focus to infinity, preferably using the NVG lane tester.
- Secure the NVG system to the helmet by wrapping a heavyweight retainer band around the NVG mount release button (figure G-1, page G-5). Route the heavyweight retainer band in a way that restricts the release button(s) on the NVG mount from moving. If the NVG mount has two release buttons (as on the Wilcox mount), the retainer band will be wrapped once around the first release button and around and over the mount to the second release button, where it will have another complete wrap and back to the first release button.

Figure G-1. Securing the night vision goggle mount release lever using a heavyweight retainer band

Figure G-2. Latex tubing used to close bungee cord hook fasteners

- Close the open end of the bungee cord hook fasteners (figure G-2), by using masking tape, 100 mph tape, or latex tubing (3/8in OD 1/4in ID).
- Use gutted 550 cord to provide a loop connection point to the NVG for the bungee hooks.
- Route gutted 550 cord looped through the NVG eyelets and secure with a locking knot.

Note: The bungee hooks will be attached to the gutted 550 cord, and the bungee hook ends will be secured with tape.

- Inspect and ensure the bungee strap connector is serviceable and attached to the helmet and NVG (figure G-3, page G-6) and that the NVG are pulled down and fit securely in place at the jumper's eye or eyes.

Figure G-3. Bungee position on night vision goggle mount

Note: The securing lanyard/bungee cord should be short enough so that if NVG become dislodged from the mount, there is minimal slack, thereby reducing the risk of a horseshoe malfunction.

Note: The jumper should still wear clear goggles when jumping NVG. The jumper should test NVG with clear goggles to ensure proper fit before MFF operations.

Note: Bungee retainers will be a minimum of 5/32 inches (4 mm) and not larger than 1/4 inch (6 mm) with a hook not to exceed 2 inches in length. The bungee will be secured to the helmet with appropriate-sized cable clamps or a rail-mounted retention system. Cable clamps or ties will not have a loop larger than 3/8 inches.

Note: If using an attached external battery pack on the rear of the helmet, route the power cable from the battery pack to the NVG, either on the inside of the helmet or secured on the outside of the helmet, in a manner to prevent possible snags during parachute opening.

HELMETS

G-13. Only helmets, mounts, and NVG listed in TB 43-0001-80 will be used during all MFF operations. Regardless of which approved helmet is used, it should fit snuggly to help prevent shifting on exit, while in free-fall, during canopy deployment, under canopy, or during landing. Jumpers should expect the added weight of the NVG to cause shifting, and they must be prepared to correct their helmet position as needed. The combat helmets listed in TB 43-0001-80 have been tested to provide the jumper protection during landing and follow-on operations once on the ground.

Note: Some parachutists have found that the ACH or modular integrated communications headset helmet insert (padding) at high altitudes expands, freezes, gets hard, and causes the helmet to become too tight, which causes pressure on the parachutist's head. Parachutists should not overtighten the helmet when conducting HAHO operations. When wearing the ACH or the modular integrated communications headset with or without oxygen, the chinstrap is routed underneath the chin.

Note: The ACH becomes the modular integrated communications headset when worn with communications equipment.

G-14. For helmet preparation, the parachutist should—

- Check components for serviceability.
- Install the NVG mount as required and ensure proper helmet fit.
- Attach NVG to mount system and LOCK in position.
- Connect the bungee strap to the NVG (use masking tape, 100 mph tape, or latex tubing (3/8in OD 1/4in ID), to close the open ends of the bungee cord hook fasteners).
- Ensure the infrared strobe is operational and attach the chemlight.
- Ensure the chinstrap is set up and routed underneath the chin.

WARNING

Jumpers wearing NVG have an increased chance of horseshoe malfunctions due to the additional helmet fixtures. Jumpers should immediately execute cutaway procedures for all horseshoe malfunctions.

G-15. When jumping oxygen with NVG, it is recommended that the oxygen mask be kept on until landing unless otherwise required by emergency procedures. The oxygen mask helps support the NVG, and releasing or lowering the oxygen mask may cause the NVG to shift and restrict visibility of other jumpers and terrain. Oxygen masks will be fitted and inspected by a qualified jumpmaster with experience in jumping with NVG. Per AFI 11-410, only oxygen masks certified and approved for use may be used.

RECOMMENDED MILITARY FREE-FALL JUMP PROGRESSION FOR NIGHT VISION GOGGLE/MILITARY FREE-FALL TRANSITION PROCESS

G-16. Vertical wind tunnel training is not directed, but it is highly recommended. NVG-qualified jumpmasters should progress their jumpers through the vertical wind tunnel in the same manner as for live jumps (dummy parachute with NVG, dummy parachute and equipment with NVG, and emergency procedures with NVG). Jumpers should concentrate on the pull sequence and emergency procedures during all phases of vertical wind tunnel training with NVG in both the UP and DOWN positions. If vertical wind tunnel training is not feasible, then, at a minimum, table drills will be conducted in an unlit room with NVG, with a parachute and lit altimeter simulating the pull sequence and emergency procedures.

LIVE JUMP NIGHT VISION GOGGLE TRAINING

G-17. Army SOF will conduct the following minimum jump progression to complete the NVG to MFF transition process:

- Perform one daylight administrative jump as a member of a group with NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the new standard pull sequence. Performance will focus on the new standard pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one daylight jump as a member of a group with weapon, combat equipment, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one daylight jump as a member of a group with complete oxygen system and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while

maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.

- Perform one daylight jump as a member of a group with weapon, combat equipment, complete oxygen system, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one night administrative jump as a member of a group with NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one night jump as a member of a group with weapon, combat equipment, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one night jump as a member of a group with complete oxygen system and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the pull sequence. Performance will focus on the pull sequence, pulling the ripcord at the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.
- Perform one night jump as a member of a group with weapon, combat equipment, complete oxygen system, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit, maintain heading, and execute a minimum of three practice ripcord touches while using the prescribed pull altitude (±500 feet) while maintaining heading. Jumper will execute proper canopy control procedures and land with the group leader.

NIGHT VISION GOGGLE CURRENCY GUIDELINES

G-18. MFF-qualified parachutists using NVG during MFF operations will follow the standard currency guidelines set forth in USASOC Regulation 350-2.

AUTHORIZED TRAINERS

G-19. All current MFF jumpmasters who have completed the approved NVG training at the MFF School or unit level NVG training may administer MFF/NVG training to MFF jumpers.

LIGHT SYSTEMS USED DURING MILITARY FREE-FALL OPERATIONS

G-20. During MFF night operations, jumpers should use some sort of light system to identify themselves during free-fall and their direction of flight under canopy to avoid collision with other jumpers. Red lights are placed on the front of the jumper and green on the rear to assist in identifying the direction of travel to other jumpers. Some of the newer light systems have multiple colors, steady colored light, infrared, flashing light, which is easily switched from one mode to another. Below are some of the light systems being used for MFF night operations.

HEL-STAR

G-21. The Hel-Star light is a multifunction helmet-mounted LED light designed for MFF airborne operations, tactical operations, and other military operations. The light comes in virtually any combination and functions can be selected from almost any combination of white, green, blue, red, amber, and infrared. In addition, the light can be set in either steady or flashing modes, and it features identification friend or foe-coded operation and omnidirectional visibility. The light was designed with a curved profile (aerodynamic shape) on all sides for mounting on any helmet, thus minimizing a snag hazard specifically for MFF operations and ground tactical operations. The light comes with integrated tie-downs and Velcro for ease of donning. Detent sliding switches are designed for positive operation by a gloved hand and can be controlled with the helmet donned in the dark. The system uses one standard lithium CR123 photocell battery for long life and extreme temperature operations. The battery can be changed in the field without the use of special tools. The light exceeds the 3 statute miles visibility requirement of the Federal Aviation Administration, and it is shock and vibration resistant, dustproof, and open sea waterproof to 130 feet of salt water.

ADVENTURE LIGHT (MOCKINGBIRD)

G-22. The adventure light (Mockingbird) is another light system that is being used for MFF operations. The light is small (1.6 inches tall x 1.2 inches wide x 1.6 inches long) and may be attached to just about any location on the jumper or equipment with the modular lightweight load-carrying equipment-compatible belt clip. Its body is a matte black constructed of a high-tech polymer, and the lens is constructed of a high-impact polycarbonate. Light lenses come in five different colors or infrared. The light uses a 6v lithium coin cell battery pack. In addition, two each Cr2032 3v lithium cell batteries that last 100 hours if left in the steady on position can be used. To turn the light on or off, the jumper just turns the lens in the desired direction. The jumper may use the light in steady-on mode or in the playback (flashing) mode. The light is user programmable and can be programmed with any white or infrared high output light source. To change modes (steady on to playback), the jumper simply flips the battery over. The light is waterproof to 100 meters. Jumpers use the lights to identify their location and direction of movement to other jumpers when in free-fall and under canopy. Jumpers will place a red light on their chest strap or front-mounted PDB or rucksack and a green light on the back of the parachute container.

CHEMLIGHTS

G-23. Chemlights have been used for years during night and limited visibility MFF operations and as a backup light source when reading the altimeter. Chemlights provide instant 360-degree illumination that can be easily seen up to a mile away. Chemlights come in different colors and sizes that range from extremely small (1 inch) to extremely long (15+ inches). They are durable, waterproof, and float. If chemlights freeze, they will still produce some light but performance will not be as reliable. Humidity and atmospheric conditions will not affect chemlights. During MFF operations, jumpers will usually place a red chemlight on their chest strap or front-mounted PDB or rucksack and a green chemlight on the back of the parachute helmet or container to identify their location and direction of movement to other jumpers when in free-fall and under canopy. Jumpers may also place a backup chemlight on the altimeter wrist strap for reading the altimeter. The chemlight is attached to the altimeter with retainer bands on the altimeter wrist strap. Jumpers can expect the colored chemlights to last for about 6 hours and infrared for about 8 hours.

STROBE LIGHT (MS-2000M)

G-24. The strobe consists of a directional strobe light, a shielded blue light, and an infrared filter for NVG viewing. The infrared filter blocks all visible light, and it is only visible with night vision equipment.

COMMUNICATIONS

G-25. All MFF NVG jumpers should use radio communication to increase situational awareness of the team. The finger push-to-talk device is recommended because it allows jumpers to maintain canopy control and communicate while under canopy and flying in formation. Communications equipment and cables must be attached and configured in a way so there is no interference with canopy opening procedures, cutaway procedures, or emergency procedures. Communications equipment should be attached to the jumper and not to the parachute harness or container to allow the jumper to quickly derig after landing.

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Appendix H

Military Free-Fall Deliberate Water Operations

This appendix outlines the policies, procedures, and restrictions for conducting deliberate MFF operations into water DZs. Units will use their SOPs and applicable supplemented regulations when conducting Service-pure MFF operations into water DZs. The procedures outlined in this appendix are different from the emergency water-landing procedures discussed in Chapter 9.

Note: When conducting joint deliberate water MFF operations, refer to USSOCOM Manual 350-3 to determine if a waiver requirement for minimum altitudes is required.

OPERATIONS REQUIREMENTS

H-1. All basic MFF parachute support operations outlined in this ATP and in USASOC Regulation 350-2 must be used when conducting deliberate water parachute operations. Listed below is the additional support needed for parachute operations using water DZs. Units should refer to SOPs and supplemental regulations for additional restrictions.

PARACHUTIST RECOVERY BOATS

H-2. A minimum of one power-driven parachutist recovery boat is required for every parachutist being dropped on the same pass if parachutists are not combat swimmer, combat diver, USASOC-approved waterborne infiltration course, scout swimmer, or second-class swimmer certified. If the parachutists are combat swimmer, combat diver, USASOC-approved waterborne infiltration course, scout swimmer, or second-class swimmer certified, then the requirement is one parachutist recovery boat for every four parachutists on the same pass. At 2 minutes from TOT, all engines must be running and the recovery boats must be circling the command and control boat before the CLEAR TO DROP signal is relayed to the aircraft. If conducting low-altitude drops and no ground-to-air communication is established, the circle formation indicates a CLEAR TO DROP signal to the aircraft commander. To indicate a visual no-drop situation, all recovery boats will scramble from the command and control boat.

H-3. The number of parachutists exiting the aircraft per pass will be limited to the number of parachutist recovery boats available. Parachutist recovery boats must have an inflatable boat or ladder rigged alongside if they have a freeboard of more than 3 feet or if the boats do not provide an easy platform for recovery of personnel. Boats assigned as parachutist recovery platforms may only be used to assist in the recovery of equipment after all parachutists have been recovered. The boat coxswain cannot act as the DZ safety officer/DZ support team leader, malfunction officer, safety swimmer, or medic.

EQUIPMENT RECOVERY BOATS

H-4. A minimum of one power-driven boat is required for every two equipment platforms dropped on the same pass. Equipment recovery boats are to be used in the recovery of equipment parachutes and platforms.

H-5. Recovery boats assigned to recover personnel do not meet this requirement when parachutists and equipment are on the same pass. Equipment recovery boats must be large enough to recover cargo parachutes and platforms. The boat coxswain cannot act as the DZ safety officer/DZ support team leader, malfunction officer, safety swimmer, or medic.

SAFETY SWIMMERS

H-6. Safety swimmers must be qualified swimmers or divers in accordance with TC 21-21 and USASOC Regulation 350-20. A minimum of one safety swimmer is required to be onboard each recovery boat. The safety swimmer must have fins, a facemask, a knife, a flare, and an inflatable life preserver. For night drops, safety swimmers should have a light that is visible for 1 mile (for example, a chemlight) and an emergency light visible for 3 miles (for example, a strobe light).

H-7. The safety swimmer will be used to recover personnel and equipment and assist parachutists, as needed. The safety swimmer cannot be assigned additional duties, such as the DZ support team leader, malfunction officer, boat coxswain, or medic.

PARACHUTIST REQUIREMENTS

H-8. Currency requirements for conducting deliberate MFF water jumps include the following:

- **Training Before A Jump.** Commanders must ensure individuals meet the qualifications as specified in USASOC Regulation 350-2 and the unit's SOPs and supplemental publications.
- **Parachutist Swimmer Qualification.** Parachutists must be qualified swimmers in accordance with TC 21-21 before making a water parachute drop.
- **First Water Jump.** Personnel must be current parachutists to conduct their first water jump. Their first water jump must be made during the day and without combat equipment.
- **First Night Water Jump.** Parachutist training requirements for conducting night water jumps will be in accordance with USASOC Regulation 350-2 and TC 21-21.
- **Jumper Currency.** Personnel who are not current can use a water jump for refresher provided it is conducted during the day and without combat equipment.

Note: The final decision for MFF deliberate water jump training without equipment or weapon while deployed will be forwarded to the first O-6 in the chain of command for approval. USASOC MFF deliberate water jump training with equipment and weapon must be approved by the USASOC G-3 (assistant chief of staff, operations) or G-7 (assistant chief of staff) Special Skills Branch.

EQUIPMENT REQUIREMENTS

H-9. Equipment requirements for conducting deliberate MFF water jumps include the following:

- **Minimum Equipment.** Each parachutist must have the following minimum equipment for a water jump:
  - Life preserver.
  - Long-sleeved top or wet suit.
  - Booties, coral shoes, jungle boots, or equivalent.
  - Fins (not required but recommended).
  - Helmet (equipment waiver and risk assessment needed if not worn).
  - Knife and approved day or night flare.
  - Chemlight (night or limited visibility operations only).
- **Equipment Waivers.** Helmets can be waived by the commanding officer based on operational requirements and a risk assessment (for example, wet suit hoods or cold weather hoods).
- **Flotation.** Parachutists must ensure they wear enough flotation to enable them and their equipment to be positively buoyant in the water. If an injury occurs to the parachutist, he must be able to float without swimming.
- **Inflatable Life Preserver.** When using an underwater demolition team (UDT) life preserver, parachutists must route the parachute harness chest strap underneath the life preserver to allow proper inflation in an emergency. The life preserver must not interfere with any emergency procedures.

CAUTION

Routing the chest strap over the UDT life preserver will prevent the life preserver from inflating properly and may cause injury to the parachutist.

- **Altimeters.** Altimeters are required for every jump except water jumps with delays less than 10 seconds. Units should coordinate for waivers when conducting deliberate water MFF parachute operations without an altimeter in accordance with USASOC Regulation 350-2.
- **EAADs.** The EAAD is required for all MFF parachute operations. The Military CYPRES 2 can be used during water operations. The Military CYPRES 2 is waterproof to a depth of 15 feet (5 meters) for a duration of 15 minutes. Procedures as outlined in the CYPRES user's guide for water operations must be followed in order to retain serviceability of the Military CYPRES 2. For all Military CYPRES 2s that have been used for water operations, the supporting parachute rigger facility will identify the Military CYPRES 2 by serial number and track by annotating the following information in shop records: date, DZ, salt or fresh water, and estimated depth and duration of submersion. In addition, they will perform post-water-operation procedures as outlined in the user's guide. Commanders shall be advised of the probable cost involved to replace the Military CYPRES 2 in the event that guidelines for water operations are infringed.
- **Safety Lanyards.** Only 80-pound 1⁄4-inch cotton webbing is authorized as the safety lanyard for swim fins. The safety lanyards must be short enough not to catch or snag on anything during exit.
- **RSL.** When making a deliberate water jump with the military RA-1 ARAPS, parachutists must disconnect the RSL once they have a good canopy over their heads. This action will prevent the reserve from being deployed if the main is cutaway while in the water.
- **Placement of Fins.** During an exit for a water parachute drop, the jumper may wear his fins as described in one of the three methods listed below. From each configuration, the parachutist must be able to put the fins on either under canopy or in the water. The fins may be—
  - Worn on the jumper's feet as normal with 80-pound 1⁄4-inch cotton webbing safety lanyards. This method may be used if the parachutist does not have to walk far to exit. Short fins are recommended if the parachutist must walk inside the aircraft to exit.
  - Taped vertically to the jumper's shins with the foot through the strap and 80-pound 1⁄4-inch cotton webbing safety line. Holding the fin vertically with the strap down, the parachutist places his foot through the fin strap. He tapes the top of the fin to the front of his leg, folding the end of the tape over to make a quick-release tab. He then secures the fin to his ankle with a short piece of 80-pound 1⁄4-inch cotton webbing.
  - Attached or fastened to a separate belt. The fins must be worn in front on the jumper's thigh or in the back under the pack tray. Fins must be placed so as not to interfere with parachute deployment or the jumper's ability to remain stable during free-fall.

H-10. Whenever possible, the parachutist should wear his fins on exit. If the parachutist does not have his fins on during exit, then he should wait to put them on until after entering the water. Doing so allows the parachutist to concentrate on canopy grouping at low altitudes. Aircraft configuration and SOP will determine the proper location.

PARACHUTIST PROCEDURES FOR WATER JUMPS

H-11. Parachutist procedures for conducting MFF water jumps include the following:

- **Water Parachute Jump.** Procedures for a deliberate water parachute jump after exiting the aircraft are described below. Parachutists—
  - Check parachute and locate other parachutists. Parachutists turn canopy toward the DZ.
  - Disconnect RSL and release waistband.
  - Continue to steer and group with other parachutists to the target.

  - At no lower than 500 feet above the water, turn into the wind and release the chest strap. Parachutists lower equipment at 200 feet AGL.
  - Confirm leg strap snap hook locations.
  - Flare canopy to land (land with full brakes for night jumps).
  - After entering the water, release leg straps and swim out of the harness.
  - Put fins on, if required.
  - Swim to the center of trailing edge (tail).
  - Hand the center of the trailing edge (tail) and harness to recovery boat.
  - Recover combat equipment and weapon and continue operation.
- **RSL.** When making an MFF water jump with the RA-1 ARAPS, parachutists must ensure they disconnect the RSL once under a good canopy. This action will prevent the reserve from being activated if the main is cutaway while in the water.
- **Life Preserver Use.** If the parachutist is unable to stay above the water, he must either add air using the oral inflation tube or inflate his life preserver with the carbon dioxide.
- **High Winds.** If a parachutist is being dragged in high winds, he must roll over on his back and attempt to collapse the canopy by pulling in on one steering toggle. If this is not possible, he then performs a cutaway on the RA-1 ARAPS. He must ensure the RSL system is disconnected before cutaway of the main.
- **No-Wind Landings.** In a no-wind landing condition, the canopy may possibly land on top of the parachutist. If this occurs, the parachutist must remain calm and avoid getting tangled in the suspension lines. He should create an air pocket by splashing the water and lifting the canopy above the water. He then finds a seam and follows it to the edge of the canopy. In an emergency, the parachutist uses his knife to cut through the canopy.
- **Equipment Flotation.** The reserve parachute will float for a short time; however, if the parachute starts to sink, the parachutist should make no attempt to hang on or recover it. Equipment must be rigged to be positively buoyant in water. (Equipment should be dip tested before the jump.)

FLOTATION DEVICES AND LIFE PRESERVERS

H-12. Parachutists must wear military-approved flotation devices (Tactical Flotation Support System [TFSS]-5326, Life Preserver Unit-10/P [LPU-10/P], or UDT life preserver [figure H-1, page H-5]) whenever the planned flight path is over open bodies of water large enough to be unavoidable with a maneuverable parachute for one third or more of the distance under canopy. They also wear the flotation devices when an open body of water is within 1,000 meters of the planned impact point.

Figure H-1. Flotation devices

TACTICAL FLOTATION SUPPORT SYSTEM-5326

H-13. The TFSS-5326 is an inflatable aid flotation device specifically designed for SOF warfighters, combat swimmers, and/or maritime airborne operations personnel. Each system consists of one each independent left- and right-hand units, which can be mounted on a belt. Each unit includes a welded flotation bladder, an inflation system, a pouch closure system, a pouch, and a firing handle. The bladder is a reusable welded fabric enclosure that deploys from a belt on the waist and can be placed under the arms of the parachutist while floating in the water. It is readily collapsed and stowed for future use. The inflation system uses a manually actuated carbon dioxide cartridge (two Leland 38-gram carbon dioxide cartridges) for bladder, inflation system, and closure system. It includes a waist belt loop and clip loops to secure the pouch to the webbing belt. The firing handle attaches to the outside of the pouch and uses color-coded beads to help distinguish left- and right-hand units. The handle serves to release the closure system and actuate the carbon dioxide inflation system.

Buoyancy

H-14. The TFSS-5326 is designed to provide a minimum of 45 lbs of positive buoyancy in seawater at 33 feet and 80 lbs at the surface, which will provide enough lift to keep the parachutist's head out of the water (table H-1). The overt system comes with reflective tape on the yellow-colored bladder to aid in recovery in sea operations.

Table H-1. Lift capabilities

Depth (Feet)	Lift (Pounds)
50	35
33	45
15	57
3	80

Wearing

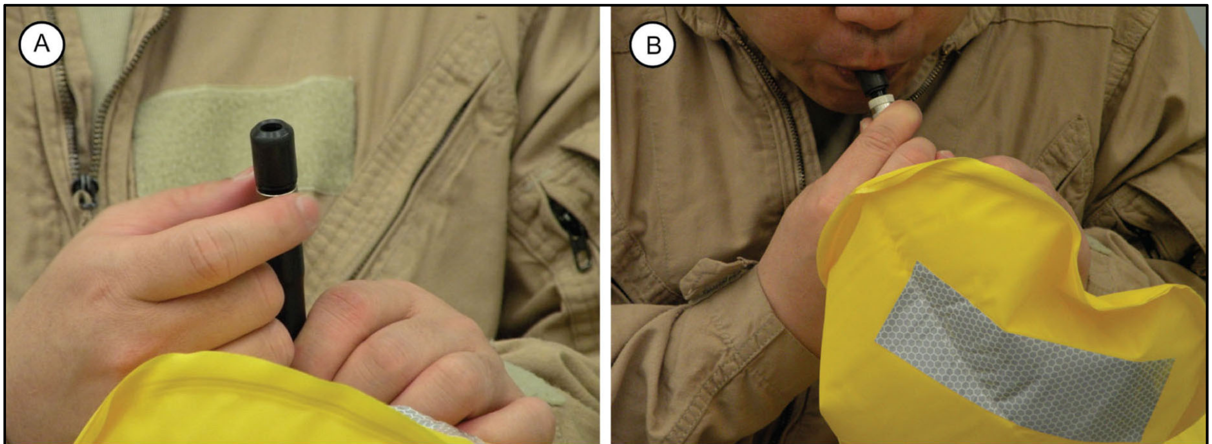
H-15. The TFSS-5326 is a one-size-fits-all system designed to accommodate the personal preference of the user for ease of wearing and for comfort. For MFF operations, the parachutist should wear the TFSS-5326 unit to the front of his body (figure H-1, page H-5) to avoid interference with the parachute or any emergency procedures that could arise that the parachutist might have to correct. The TFSS-5326 is designed for simplicity and ease of wear. However, an improperly mounted flotation device could interfere with MFF operations, causing injury to the parachutist or damage to his equipment. The parachutist must ensure he does not wear the TFSS-5326 flotation packets between the parachute harness and his body.

CAUTION

Serious injury may result if the TFSS-5326 is inflated when worn incorrectly. To mitigate this risk, MFF parachutists should properly mount the TFSS-5326, ensuring the system is not placed under the parachute harness at any location.

H-16. The carbon dioxide cartridge cover does not extend the entire length of the carbon dioxide cartridge cylinder, which poses a potential for a cold burn to unprotected skin (frostbite burn) when the cartridge is activated. To mitigate this risk, parachutists must ensure the TFSS-5326 mounting belt is worn tightly around their waist to limit carbon dioxide cartridge movement and to ensure there is a layer of clothing between the carbon dioxide cartridge and the parachutist's skin. All parachutists should participate in the mounting procedures for the TFSS-5326.

H-17. To manually activate a TFSS-5326 unit, the user pulls upward on the firing handle. This motion initiates two sequential actions. First, the pouch closure pins are released, allowing the pouches to open freely. Second, the manual inflator lever is activated, causing the firing pin to puncture the seal on the carbon dioxide cartridges to release the gas and completely fill the bladder. Should the carbon dioxide inflation system fail to operate, the bladder is filled through an oral inflation tube. This is accomplished by depressing the Oralock valve (figure H-2 [A], page H-7) and then breathing into the tube (figure H-2 [B], page H-7). Gas is released from the TFSS-5326 bladder by pressing downward on the Oralock valve and forcing the air out of the oral inflation tube. Once all of the gas is removed from the bladder, the carbon dioxide cartridges are replaced, maintenance is performed, and the units are repacked for future use.



Depressing Oralock valve. Oral inflation with Oralock valve.

Figure H-2. Oralock valve

> ***Note:*** Wear of the TFSS-5326 poses no greater risk to Soldiers when compared to currently issued flotation devices worn during MFF operations (for example, the LPU-10/P), provided guidance contained in the referenced documentation and the safety releases are adhered to.

Periodic Maintenance

H-18. After each use, the parachutist—

- Rinses the entire unit in fresh water.
- Allows the unit to completely air dry.
- Applies a small amount of a silicon lubricant to all valves.
- Visually inspects all bladders for any damage.
- Replaces the unit if damaged.
- Weighs and ensures the minimum gram weight for replacement of 38-gram carbon dioxide cartridges is 147 grams.
- Repacks the unit in accordance with published procedures.

Inspections

H-19. The parachutist conducts an annual inspection consisting of the following:

- Orally inflating the unit and allowing it to sit for 24 hours.
- Thoroughly inspecting the unit for leaks and replacing it, if damaged.
- Inspecting all valves to ensure they are in good working order.
- Reweighing the unit and ensuring the minimum gram weight for the 38-gram carbon dioxide cartridges is 147 grams.

H-20. Upon initial issue, the user is required to conduct an annual inspection and to report any damage to the unit's parachute rigging facility.

LIFE PRESERVER UNIT-10/P

H-21. The LPU-10/P is a standard U.S. Air Force carbon dioxide cartridge-activated life preserver assembly worn during flights over water or during airdrops when water obstacles are near or on the intended DZ. It has an adjustable harness and underarm inflation bladders. The LPU-10/P is designed to keep the wearer's head above water at weights up to 250 lbs for up to 10 minutes. The life preserver must be maintained and serviced by the unit's parachute rigging facility.

H-22. The LPU-10/P is worn under the parachute harness. The harness is worn so that the inflatable bladders are under the parachutist's arms. The manual inflating valves should be completely closed when donning the LPU-10/P. The shoulder and waistband are then adjusted to ensure the inflation bladder is one hand width beneath the armpit and not constrained by the parachute harness.

WARNING

If the inflation bladders are too snug under the armpit, or if they are between the harness and the parachutist's body, the parachutist may experience severe pain or crushed ribs during inflation.

H-23. The parachutist inflates the flotation bladders by pulling two toggle cords (at the bottom of the life preserver), which activate carbon dioxide cartridges that fill the flotation bladders with gas. An alternate way to inflate the life preserver is by blowing into the manual inflation valve rubber hoses located on the bottom side of the bladders. Manual inflation should only be used if the carbon dioxide inflation valves fail to operate.

Underwater Demolition Team Life Preserver

H-24. The UDT life preserver is put on over the uniform before donning the parachute (figure H-3, page H-9). The UDT life preserver is worn around the neck, with the straps passing under the arms and fastened to the vest. The parachutist fits the UDT life preserver by performing the following steps:

- Adjust the straps until snug to prevent movement of the life preserver during free-fall and interference with the main canopy release handle (red cutaway pillow) or the reserve ripcord handle (yellow pillow).
- Pass the parachute chest strap between the UDT life preserver and the body.
- Secure the UDT life preserver with a lightweight retainer band around the middle to prevent interference with the main canopy release handle (red cutaway pillow) and the reserve ripcord handle (yellow pillow).
- Route the oral inflation tube through its retainer loop.
- Screw the oral inflation tube's knurled nut down in the open position to allow inflation. The UDT life preserver has a manually activated carbon dioxide actuator for immediate inflation or an oral inflation tube that can be used to inflate the life preserver or to manage a slow leak.

WARNING

The parachutist must not wear the UDT life preserver with the flotation chamber worn between the parachute chest strap and his body. Serious injury may result if inflated when worn incorrectly. Parachutists must protect the activation lanyard of UDT preserver. Accidental inflation by the carbon dioxide cartridges may result in obstruction of the main canopy release handle (red pillow) and the reserve ripcord handle (yellow pillow).

Figure H-3. Jumper with underwater demolition team life preserver and RA-1 Advanced Ram-Air Parachute System parachute harness

Note: There are 2 types of the UDT MD 1122 life preservers. The first consists of those manufactured since 2012 which use the carbon dioxide inflator 84121Z (which has a 3/8-inch 24UNF1A thread).The second type consists of those manufactured prior to early 2012 which use the carbon dioxide inflator 25369I17-24 metallic trainer version 17-21 gram carbon dioxide cylinder which has a 3/4-inch 16UNF-2A thread. Both only provide 19 lbs of buoyancy when inflated.

MARITIME SWIMMER VESTS

H-25. The Maritime Swimmer Vest (MSV), (part number 76902) is a commercial off-the-shelf personal floatation device. The MSV is designed for the MFF jumper for surface swimming operations and is intended to replace the UDT life preserver during intentional water landing training with the RA-1 ARAPS.

H-26. The overall risk for wear and use of the MSV rigged for MFF is considered medium, provided the warnings, caution, and procedures addressed below are referenced and implemented.

Note: The MSV is not approved for use in scuba diving.

Maritime Swimmer Vest Specifications

H-27. The MSV has black beaded inflator handles and low profile plastic handle. The vest is a single-bladder configuration fabricated from heavy-duty 420 denier nylon. The design includes two independent 38-gram carbon dioxide inflators, an oral inflation tube, and an overpressure relief/dump valve. The vest is wrapped within a Velcro strap secured by retainer bands when configured for wear with the RA-1 ARAPS. The vest, when inflated, is rated for a buoyancy of 21 lbs. The MSV has no electronic components.

WARNING

Jumpers should not use the Para Swimmers Vest (part number 769041) when jumping in the MFF or DBSL configurations. The PSV and MSV designs are identical with the exception the inflator handles and overinflation valve handles. The PSV has a higher profile red beaded inflator handles that can increase the risk of interference with MFF and DBSL emergency procedures and cause inadvertent activation.

Jumpers should only use the MSV when jumping the RA-1 ARAPS in the MFF or DBSL configuration during deliberate water operations. The MSV has black beaded inflator handles with lower profile plastic handles that will not interfere with the main canopy cutaway pillow and reserve ripcord handle of the RA-1 ARAPS.

Rigging the Maritime Swimmer Vest

H-28. When rigging the MSV with the RA-1 ARAPS in the MFF or DBSL configuration, jumpers must route the parachute harness chest strap underneath the MSV to allow for unhindered inflation of the MSV. Due to the location of the chest strap on the parachute harness, routing the chest strap over the MSV will result in the vest inflating underneath the chest strap causing musculoskeletal trauma to the jumper.

WARNING

Jumpers must route the parachute harness chest strap underneath the MSV to allow for unhindered inflation.

Jumper Accidental Activation of Maritime Swimmer Vest

H-29. Accidental activation of the carbon dioxide cartridges will cause the MSV to inflate. This may impede access to the cutaway pillow and reserve ripcord handle. To control the risk of accidental activation, jumpers must protect the MSV activation handles. If the MSV inadvertently inflates prior to jumper exit from the aircraft, the jumper should replace his MSV or cancel his jump. If the MSV inflates during free-fall or while under canopy, the jumper should not remove the MSV, but push it out of the way if they need to access their reserve ripcord and/or cutaway handles.

Preoperation Inspection of the Maritime Swimmer Vests

H-30. Prior to each use, the vest should be given a thorough visual inspection and function test by the jumper. The jumper should follow the procedures below:

- Fully inflate the vest and set aside for 30 minutes. Loss of firmness indicates leakage, which must be corrected before use.
- Check for wear, rips, tears, holes, water logging, shrinkage, and mildew. Ensure that all components that are stitched together are not separating.
- Check all seams, straps, webbing, and hardware for damage or deterioration.
- Check that the oral inflation tube and valve function properly by depressing the valve and blowing into the tube. Ensure the knurl nut on the oral inflation tube turns freely.

WARNING

The MSV air bladder may contain contaminants from a previous carbon dioxide firing or other source. To eliminate risk of injury or illness from contaminated air, jumpers should never inhale air from the MSV oral inflator.

- Remove the carbon dioxide cartridges and inspect both actuators. Ensure both actuators operate correctly by pulling the knob to operate the actuating lever. Check that the piercing pin travels up and down. Return the actuating lever to the firing position prior to re-threading the carbon dioxide cartridge into the actuator.

Note: Ensure the actuator is free of debris and the carbon dioxide cartridge washer is in place prior to re-installing the carbon dioxide cartridge.

- Perform a function check on the over-pressure relief valve by fully inflating the vest. Then, squeeze the vest to ensure the over-pressure relief valve opens allowing air to escape. Next, pull the knob and cord assembly to ensure the dump valve is working correctly by allowing air to escape.

Note: The over-pressure relief valve will actuate when the pressure inside the vest exceeds 1-2 psi (0.07-0.14 bar) greater than external pressure.

Adjustment Procedures for Maritime Swimmer Vest

H-31. Jumpers should follow the procedures below to ensure the MSV fits properly when inflated:

- Place the MSV over your head. Route both straps underneath your arms, through the D-rings and then tighten straps.
- Fully inflate the MSV by loosening the knurl nut on the oral inflation tube and depressing the oral inflator valve. Exhale into the valve until the vest is full. If the fit is too tight, adjust the straps for comfort.
- Mark the strap with tape for your fit, take the vest off lay flat and deflate it.
- Fold lower edge of MSV up until the bottom edge of the bottle wrap is visible underneath.
- Fold each side in and overlap them until the carbon dioxide cartridges are visible on each side.
- Secure the bottle wrap around the vest by laying the left flap over the right flap and securing the hook and loop tape together tightly.

Donning Procedures for Maritime Swimmer Vest

H-32. Jumpers should follow the procedures below when donning the MSV for MFF or DBSL operations:

- Place the MSV over your head.
- Route both straps underneath your arms, through the D-rings and then tighten straps to your pre-fitted size.
- Place a retaining band over the end to secure the bottom of the MSV.
- Don the parachute ensuring the MSV is over the parachute chest strap.

WARNING

Jumpmasters must ensure that jumpers never rig with any items that cause jumpers to exceed the buoyancy rating for the MSV.

Postoperation Maintenance of Maritime Swimmer Vest

H-33. Proper maintenance of the MSV will provide for years of reliable service. Unnecessary rough handling, prolonged exposure to environmental elements (such as direct sunlight and salt water), and use of harsh cleaning solvents may damage the MSV. To prevent damage to the MSV, Soldiers should not use silicone sprays or chemical solvents to lubricate or clean system components. Jumpers should follow these procedures for postoperation maintenance:

- After each use, soak the exterior of the vest with fresh water.
- If soiled, clean the outside of vest with a mild detergent and rinse with fresh water.
- Open storage pocket and give it a fresh water rinse. Ensure the hook and loop fabric is clean from all debris.
- Unscrew both carbon dioxide cartridges. Remove the carbon dioxide cartridge washer from both actuators prior to fresh water rinse.
- Inflate the vest with air, turn it to an inverted position and drain any water out through the over-pressure relief valve by pulling down on the knob and cord assembly. If water drains from inside the vest, a fresh water rinse should be done as follows:
  - Unscrew the overpressure relief valve, directly fill the vest with water and re-thread the overpressure relief valve to the vest.
  - Swish the water around to remove any mineral deposits. Invert the vest so the overpressure relief valve is the lowest point and drain the water by pulling the knob and cord assembly.
  - Taste the last remaining drops of water for salt. If there is a taste of salt, repeat the cleaning procedure for the internal bladder.
  - To dry the vest after cleaning, inflate the vest until it is half full, hang on a wide hanger to allow the inner bladder to drip dry.

Note: Do not dry the vest in direct sunlight or expose the vest to direct heat.

  - Store the half full, inflated vest in a cool, dry, well ventilated, weatherproof and clean area.

DROP ZONE REQUIREMENTS AND MARKINGS

H-34. DZ requirements and markings for conducting deliberate MFF water jumps include the following:

- **Establishment of the DZ.** The DZ must be established not less than 60 minutes before the TOT to allow time for the DZ safety officer to monitor DZ conditions.
- **Surface Winds.** Surface winds (table H-2, page H-13) shall not exceed 18 knots.
- **Sea State.** Sea state (table H-2, page H-13) shall not exceed 2 feet, in accordance with JP 4-01.6.
- **Water Depth.** The depth of the water must be at least 10 feet.
- **Water Temperature.** Minimum safe water temperature for personnel drops is 50 degrees Fahrenheit (10 degrees Celsius) unless an appropriate exposure suit is worn. Partial or full exposure suits should be considered whenever water temperatures are below 72 degrees Fahrenheit.
- **Air-to-Ground Communications.** Personnel must establish a positive visual or electronic signal for DZ identification before the drop for water parachute operations. Only a positive visual or electronic signal for DZ identification is required; however, radio communications are highly recommended to assist in verifying the DZ. (U.S. Army units require radio communications.) Parachutists must use positive night visual signals (for example, beacons or strobes) for night drops to avoid confusion and to aid in positive identification. Markings should not mimic local maritime navigational aids (buoys, channel markers, and so on).
- **DZ Communications.** All DZ safety craft must be equipped with boat-to-boat radio communications.
- **DZ Configuration.** The DZ is configured in accordance with USASOC Regulation 350-2.

Table H-2. Wind/sea state observation chart

Wind Velocity	International Description	Wind Force (Beaufort)	Average Wave Height (Feet)	Sea Indications	Sea State
<1	Calm	0	0	Like mirror.	0
1–3	Light Air	1	0.05	Ripples with appearance of scales.	0
4–6	Light Breeze	2	0.18	Small wavelets; crests have glassy appearance but do not break.	1
7–10	Gentle Breeze	3	0.6	Large wavelets; crests begin to break; scattered whitecaps.	2
11–16	Moderate	4	2.0	Small waves, becoming longer. Fairly frequent whitecaps.	3
17–21	Fresh	5	4.3	Moderate waves, taking a pronounced long form; many whitecaps.	4
22–27	Strong	6	8.2	Large waves begin to form; white foam crests more extensive; some spray.	5
28–33	Near Gale	7	14	Sea heaps up, white foam from breaking waves blown in streaks along direction of waves.	6
34–40	Gale	8	30	Moderately high waves of greater length; crests break into spindrift; foam blown in well-marked streaks in direction of wind.	7
41–47	Strong Gale	9	36	High waves. Dense streaks of foam; sea begins to roll; spray affects visibility.	8

WATER DROP ZONE PROCEDURES FOR PICKUP OF PARACHUTISTS AND EQUIPMENT

H-35. DZ procedures for pickup of parachutists and equipment include the following:

- **Recovery Boat Assignments.** Recovery boats must have assigned duties by the DZ support team leader to minimize confusion during the recovery procedure. These assignments must be briefed by the DZ support team leader/DZ safety officer before setting up the DZ.
- **Recovery Priority.** Recovery boats will first pick up any parachutist who signals he is in trouble or has deployed his reserve parachute. Parachutists always have priority for pickup over cargo parachutes or equipment.
- **Approaching Parachutists in the Water.** Boat coxswains must approach the parachutist perpendicular to the wind to avoid drifting or being blown over the parachutist or the parachute. Caution must always be taken not to operate the propeller (screws) while the parachutist is alongside in the water. The engine should be placed in neutral. If the parachute gets entangled in the propeller (screws), the boat coxswain turns the motor off while the safety swimmer frees it.
- **Recovery of RA-1 ARAPS.** The parachutist must hand the center of the trailing edge (tail) and then the harness to the boat crewman. The suspension lines should be daisy-chained starting from the harness end. After the lines are daisy-chained, the canopy will be pulled in from the trailing edge (tail) first to allow the water to drain out the leading edge (nose).
- **Recovery of Equipment Parachutes and Platforms.** Recovery of equipment after a water parachute jump is only administrative. Combat conditions will call for the sinking of parachutes and platforms. All swimmers except one should be in the combat rubber raiding craft or move away from it before sinking the platform. Parachutes and platforms may be intentionally sunk on training jumps as long as procedures are used to prevent the equipment from resurfacing and

becoming a navigation hazard. Intentionally sinking of parachutes must be cleared by the first O-6 in the chain of command. Recovery and disposal is required for low cost one time use (expendable) cargo parachutes on training jumps unless intentional sinking is authorized as previously mentioned.

NIGHT WATER PARACHUTE OPERATIONS

H-36. For night water MFF parachute training, parachutists are required to be equipped with a light visible for 1 mile (chemlight), an emergency light visible for 3 miles (strobe), and a flare for emergencies in the water. During free-fall and under canopy, parachutists display a light (for example, a chemlight) visible for 1 mile as a safety measure to prevent mid-air collisions or entanglements. Parachutists are not required to be marked for combat situations. Appendix G provides more information on lights used during MFF operations.

WATER JUMPS WITH COMBAT EQUIPMENT

H-37. Requirements for water jumps with combat equipment include the following:

- **Combat Equipment Limitations.** For safety reasons, parachutists should minimize the amount of equipment they jump with during an MFF deliberate water jump. Individual survival gear may be jumped (life preserver, swim fins, knife, approved day night flare, strobe lights, and chemlights). Weapons will be packed inside a combat pack and secured inside the combat rubber raiding craft. USASOC units having a requirement for MFF deliberate water jumps wearing combat equipment and weapon may request a waiver from USASOC G-3 (assistant chief of staff, operations) or G-7 (assistant chief of staff) Special Skills Branch.
- **Jumper Currency.** USASOC jumpers will reference USASOC Regulation 350-2 on jumper currency for deliberate MFF water jumps. MFF parachutists conducting water parachute operations with combat equipment must have an approved waiver from USASOC's Special Skills Branch, be current, and have previously made at least one noncombat equipment water parachute jump.
- **Equipment Rigging.** Equipment packs jumped on the individual must be rigged to be positively buoyant in water in accordance with TC 21-21. Equipment should be dip-tested for buoyancy before the jump.
- **Parachutist Procedures.** When jumping combat equipment, it is recommended to make the turn on final approach at 500 feet to allow additional time to unfasten the chest strap, disconnect the waistband, and lower the equipment. After the parachutist enters the water, he must disconnect the equipment after getting out of the harness.
- **Life Preserver.** No combat equipment or weapon, at any time, will be rigged to the jumper thus preventing the life preserver from inflating to its full capacity.

WARNING

Airborne Operations and Jumping After Dive Operations:

When conducting a DBSL operation after conducting a military or civilian scuba dive, the most recently published edition of SS521-AG-PRO-010 (the U.S. Navy Diving Manual) must first be consulted. There may be a wait time before the jumper can fly or conduct a DBSL airborne operation or fly to altitude. If questions are not addressed within the U.S. Navy Diving Manual, the jumpmaster should consult with the Naval Sea Systems Command 00C (Naval Sea Director or Deputy Director) for guidance.

Appendix I

Joint Precision Airdrop System and Military Free-Fall Tactics, Techniques, and Procedures

This appendix provides the information necessary to successfully perform JPADS operations and serves as information only. The following information does not supersede formal regulation, policy, and/or training material.

JOINT PRECISION AIRDROP SYSTEM BACKGROUND

I-1. The following paragraphs provide some background information on the JPADS.

SYSTEM OVERVIEW

I-2. JPADS is a family of systems that provides a precision airdrop capability from high altitude and offset (from the desired impact point). The system is capable of deploying at high altitude and offset which allows the aircraft to operate above or outside the surface to air threat and/or facilitate stealthy aerial resupply or insertion of personnel and cargo. JPADS enhances accuracy, standoff delivery, aircraft survivability, and effectiveness of airdrop mission operations.

I-3. Each system primarily consists of a parafoil and an Autonomous Guidance Unit (AGU) (figure I-1). The AGU uses GPS to autonomously and accurately navigate from the release point to the intended target location. The JPADS family primarily consists of the following systems:

- JPADS Ultralight Weight MC-4/5.
- JPADS Ultralight Weight RA-1.
- JPADS 2,000 lbs.
- JPADS 4,000 lbs.
- JPADS 10,000 lbs.

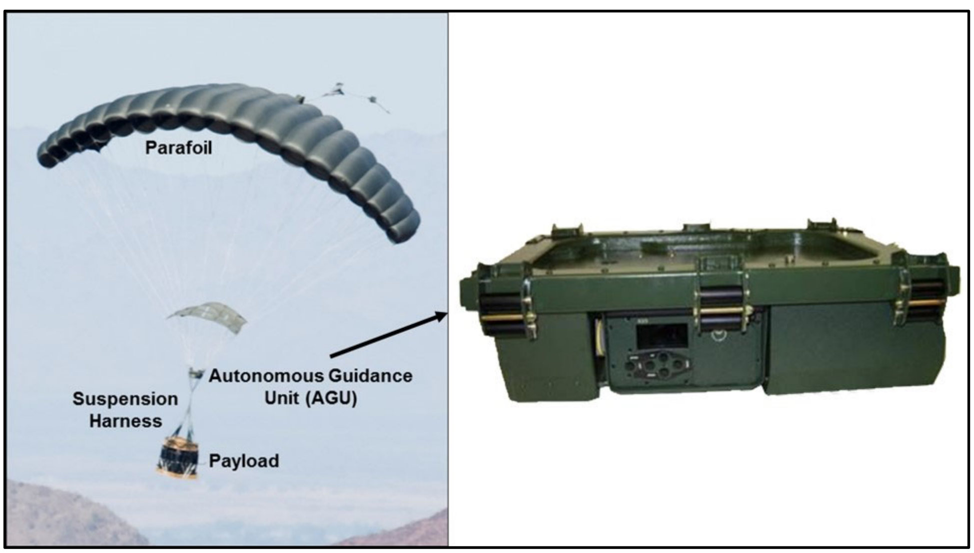


Figure I-1 Joint Precision Airdrop System

Operating Envelope

I-4. Table I-1presents JPADS weight, altitude, and aircraft compatibility.

Table I-1. Joint Precision Airdrop System weight, altitude, and aircraft compatibility

JPADS 2,000 lbs								
C-130 and C-17								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude* (ft AGL)	Max. Altitude (ft MSL)	Exit Method
A-22 and LCC	700	850	2,150	2,280	5,000	3,500	24,500	Gravity
Double A-22 and Double LCC	900	1,050	2,150	2,280	5,000	3,500	24,500	Gravity
Note: *When operating 3,500 – 5,000 ft AGL in training, recommended GRW of 1,380 -1,780 lbs (1,200 – 1,600 lbs suspended) to maximize success.								
JPADS 10,000 lbs								
C-130								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude (ft AGL)	Max. Altitude (ft MSL)	Exit Method
463L	4,500	5,000	8,800	9,300	5,000	5,000	24,500	Gravity/Extraction
CEP	4,500	5,000	8,800	9,300	5,000	5,000	24,500	Gravity/Extraction
Type V	4,500	5,000	9,500	10,000	5,000	3,500*	24,500	Gravity/Extraction
C-17								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude (ft AGL)	Max. Altitude (ft MSL)	Exit Method
463L	4,500	5,000	8,800	9,300	5,000	5,000	17,500	Gravity/Extraction
CEP	4,500	5,000	8,800	9,300	5,000	5,000	17,500	Gravity/Extraction
Type V	4,500	5,000	9,500	10,000	5,000	3,500*	24,500	Extraction only
Note: *Minimum release altitude of 3,500 ft AGL is approved for extraction only.								
JPADS Ultralight Weight								
C-130, C-17, CH-53D, MV-22B								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude (ft AGL)	Max. Altitude (ft MSL)	Exit Method
A-7A Ramp Bundle	165	250	500	585	4,500	3,500	24,500	Gravity
A-7A Door Bundle	165	250	500	585	4,500	3,500	24,500	Gravity
A-22 Ramp Bundle	501	586	615	700	4,500	3,500	24,500	Gravity

Table I-1. Joint Precision Airdrop System weight, altitude, and aircraft compatibility (continued)

JPADS 4,000 lbs								
C-130								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude (ft AGL)	Max. Altitude (ft MSL)	Exit Method
CEP	2,200	2,450	4,250	4,500	6,000	5,000	24,500	Gravity
Type V	2,200	2,450	4,250	4,500	6,000	5,000	24,500	Gravity
C-17								
Platform	Min. Sus. Weight (lbs)	Min. GRW (lbs)	Max. Sus. Weight (lbs)	Max. GRW (lbs)	Min. Altitude (ft AGL)	Min. Training Altitude (ft AGL)	Max. Altitude (ft MSL)	Exit Method
CEP	2,200	2,450	4,250	4,500	6,000	5,000	20,000	Gravity

Legend:

AGL above ground level
CEP combat expendable platform
ft feet
GRW gross rigged weight
JPADS Joint Precision Airdrop System
lbs pounds
LCC low cost container
Max. maximum
Min. minimum
MSL mean sea level
Sus. sustainable weight

THEORY OF OPERATION

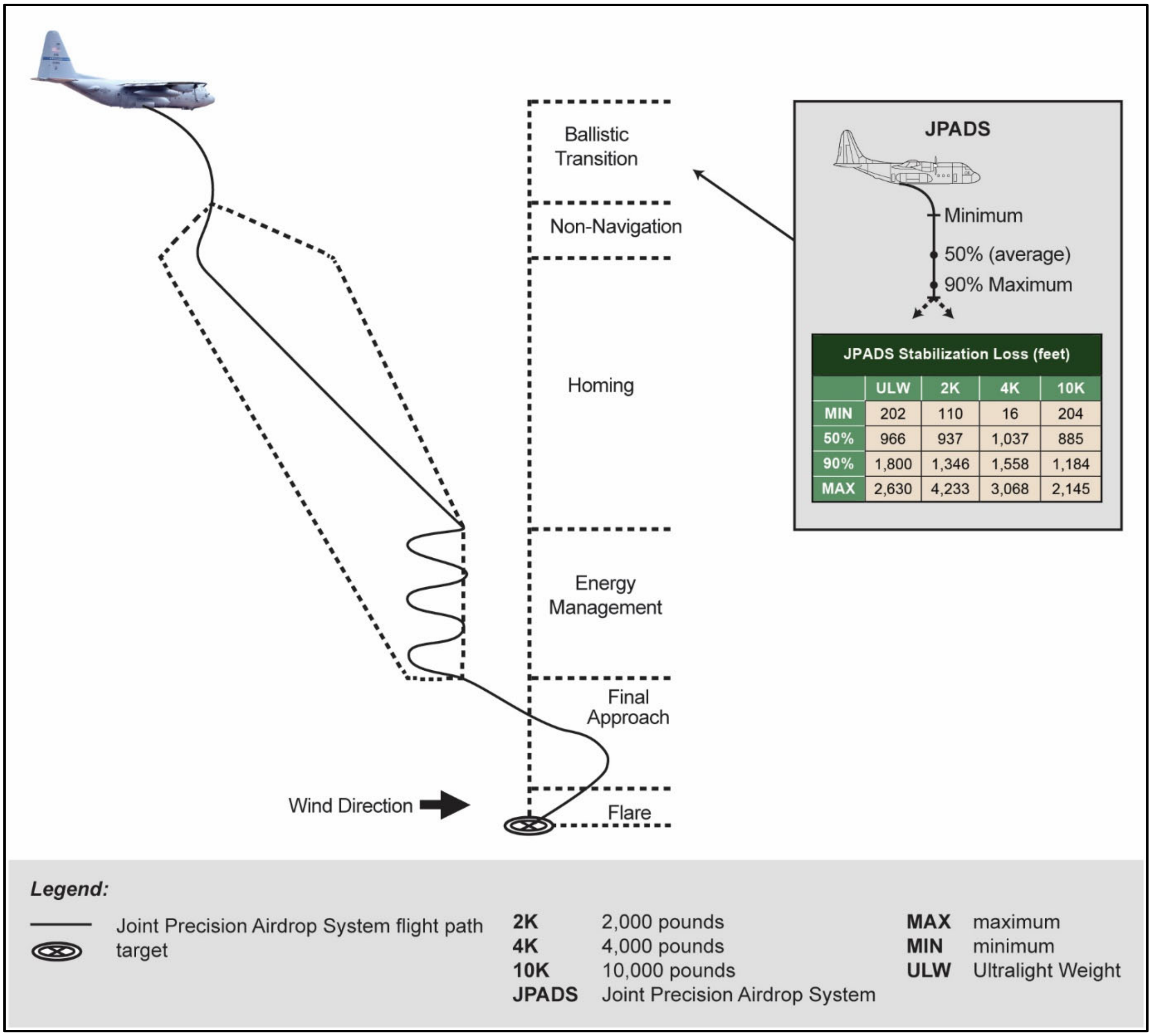
I-5. The JPADS, regardless of weight, adheres to similar flight patterns, which typically include ballistic transition, non-navigation, homing, energy management, final approach, and flare (figure I-2, page I-4). The system exits the aircraft and goes into ballistic transition during which the parafoil starts to open, decelerating from the horizontal aircraft speed to the systems steady state. The amount of time and altitude loss during ballistic transition is different for each JPADS.

I-6. After exiting the aircraft, the AGU activation lanyard is pulled and the flight software goes directly into non-navigation, during which the software is waiting for a set amount of time for the parafoil to fully open. Following this, the system goes into homing, where it flies to the energy management location. Energy management is located a set distance upwind of the target and is used to scrub altitude by performing S-turns. Figure I-3, page I-4, explains non-navigation and energy management in more detail.

I-7. The amount of time in homing and/or energy management, depends on release point selection and winds. The system will skip homing and energy management in certain circumstances. If dropped over the target, the system will likely go straight into energy management. If dropped at max offset, the system will be homing until it goes into final approach.

I-8. At a set elevation above the target the system will enter its final approach phase. This stage may vary depending on the guidance, navigation and control (GN&C) priority setting, but generally it will attack the target while trying to land into the ground winds (figure I-3, page I-4). The standard landing pattern will try to turn into the surface winds; however, in low or variable winds, it may not travel directly into the wind at landing.

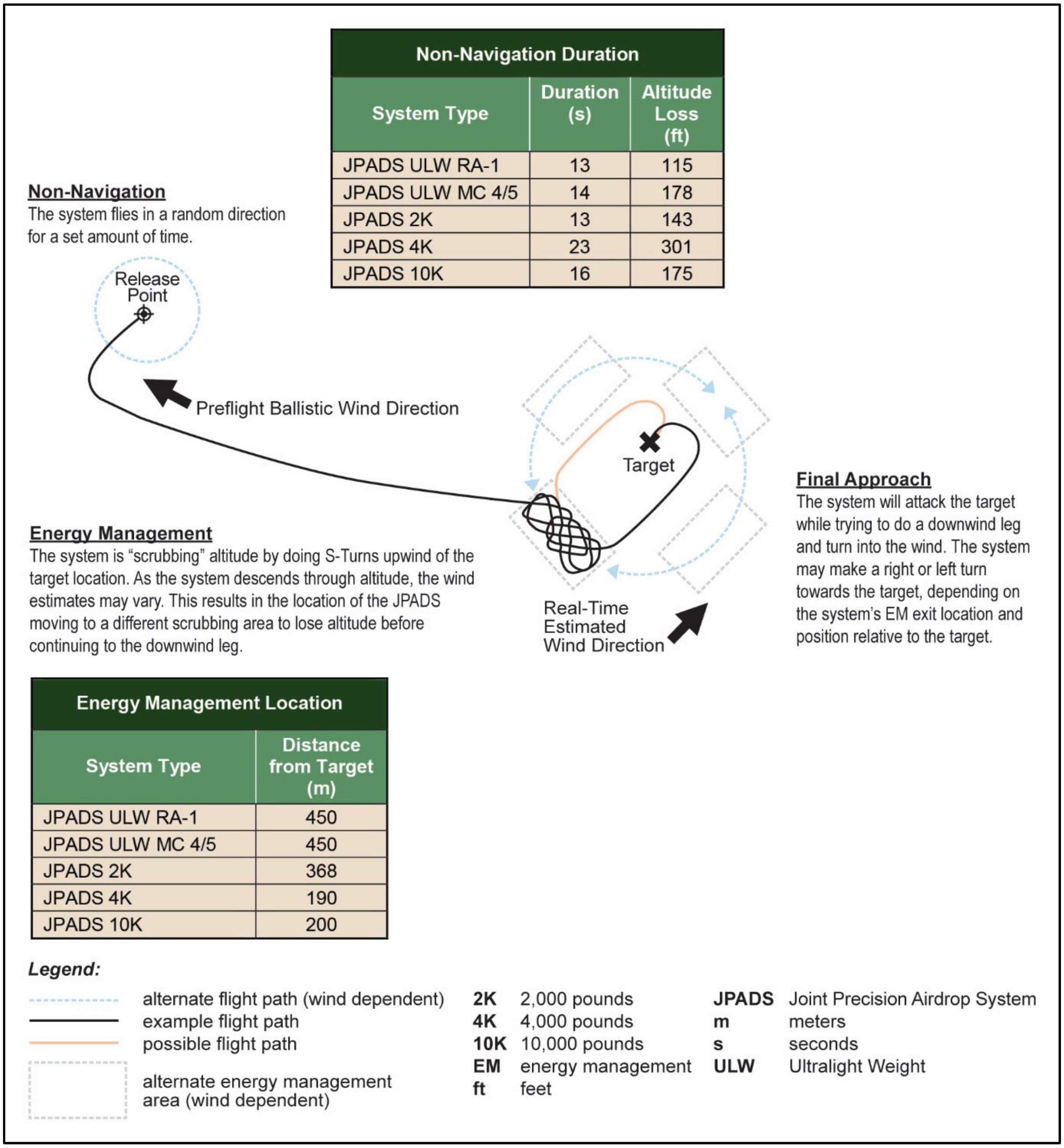
I-9. In addition, the system has two user-selectable final approach strategies, namely roadway landing and predictability. Roadway landing can be set to increase the chances of landing on a road where the system will sacrifice its "long/short" error for a reduced "left/right" error. The predictability setting will sacrifice accuracy for a long, slow landing pattern.



JPADS Stabilization Loss (feet)

	ULW	2K	4K	10K
MIN	202	110	16	204
50%	966	937	1,037	885
90%	1,800	1,346	1,558	1,184
MAX	2,630	4,233	3,068	2,145

Figure I-2. Joint Precision Airdrop System stages of transition



Non-Navigation Duration		
System Type	Duration (s)	Altitude Loss (ft)
JPADS ULW RA-1	13	115
JPADS ULW MC 4/5	14	178
JPADS 2K	13	143
JPADS 4K	23	301
JPADS 10K	16	175

Energy Management Location	
System Type	Distance from Target (m)
JPADS ULW RA-1	450
JPADS ULW MC 4/5	450
JPADS 2K	368
JPADS 4K	190
JPADS 10K	200

Figure I-3. Joint Precision Airdrop System non-navigation, energy management, and final approach

Global Positioning System Lock Guidance

I-10. The JPADS should have GPS lock at some time prior to exiting the aircraft. This requires the use of a GPS Retransmit Kit inside the aircraft. At low altitude releases, it is more important to have GPS inside the aircraft since the JPADS does not have much time to acquire GPS lock after exiting the aircraft. At higher altitudes, the system has more time to acquire GPS after deployment. If the system has an updated GPS ephemeris/almanac (that is to say if it has recently had a GPS lock in the vicinity of the release point), it will reacquire GPS lock between 1–15 seconds after exit. If the system is deployed without an updated

GPS ephemeris/almanac, it could take between 1 second and 12 minutes to reacquire GPS lock. However, on average it takes 30–90 seconds.

JOINT PRECISION AIRDROP SYSTEM MISSION PLANNING

I-11. The following paragraphs describe some of the considerations of JPADS mission planning.

Launch Acceptability Region

I-12. The launch acceptability region (LAR) is an area in the sky that, if released within, should allow the JPADS to navigate to the target. The LAR is normally circular, but can be different shapes influenced by wind conditions, airdrop damage estimate (ADE) thresholds, and/or terrain surrounding the DZ. The location and direction of the LAR are a function of the system's performance capabilities and winds.

Release Point Selection Guidance

I-13. The lowest risk release point is the release point that is furthest from the edge of the LAR. If the LAR is circular, the lowest risk release point the center of the LAR. The highest risk release point is a maximum offset release point, also known as "max LAR." Although all LAR data contributes to risk, the primary risk driver for selecting a release point that results in mission failure is changes in wind conditions.

Weather Data

I-14. A forecast wind profile must be used to generate the LAR and release point. Forecast weather should be updated and evaluated as close to time over target as possible. Dropsondes are not required when dropping JPADS, but can be used if forecast winds are high, there is a non-circular LAR present, and/or the release point is located near edge of the LAR.

> ***Note:*** A dropsonde (hand-sized, parachute-equipped wind indicator) is an expendable weather reconnaissance device, designed to be dropped from an aircraft at altitude to measure high vertical resolution measurements of the temperature, pressure, relative humidity, and wind speed and direction in the atmosphere as the device falls to the surface.

Joint Precision Airdrop System Total Drive Distance

I-15. Total drive distance is the maximum distance the system can travel given the release point selection. The total drive distance is used to assess the area on the ground within which the system will land the event of failure. It is extremely rare to achieve the maximum drive distance and likely could only occur if the system is programmed incorrectly, for example, programming for the wrong hemisphere. The size of the total drive distance varies by system type, release altitude, and release point. The total drive distance will always be centered on the DZ when dropping in the center of the LAR and will not be centered on target if a manual release point is selected. Table I-2, page I-7, depicts the radius of the total drive distance for the type and altitude of the listed JPADS.

Table I-2. Guidance failure footprint size (meters of radius)

Release Altitude (ft AGL)	JPADS ULW	JPADS ULW	JPADS 2,000 lbs	JPADS 4,000 lbs	JPADS 10,000 lbs
	RA-1	MC-4, MC-5			
3,500	3,184	1,877	2,459	--	--
4,000	3,699	2,275	2,939	--	3,135
4,500	4,214	2,673	3,419	3,008	3,644
5,000	4,729	3,071	3,899	3,504	4,153
6,000	5,759	3,867	4,859	4,498	5,171
7,000	6,789	4,664	5,819	5,492	6,189
8,000	7,820	5,460	6,779	6,485	7,207
9,000	8,850	6,256	7,739	7,479	8,225
10,000	9,880	7,052	8,699	8,473	9,243
11,000	10,910	7,848	9,660	9,466	10,261
12,000	11,940	8,645	10,620	10,460	11,279
13,000	12,971	9,441	11,580	11,545	12,297
14,000	14,001	10,237	12,540	12,447	13,315
15,000	15,031	11,033	13,500	13,441	14,333
16,000	16,061	11,829	14,460	14,434	15,351
17,000	17,092	12,626	15,420	15,428	16,369
18,000	18,122	13,422	16,380	16,422	17,387
19,000	19,152	14,218	17,340	17,415	18,405
20,000	20,182	15,014	18,301	18,409	19,423
21,000	21,212	15,810	19,261	19,403	20,441
22,000	22,243	16,607	20,221	20,396	21,459
23,000	23,273	17,403	21,181	21,390	22,477
24,000	24,303	18,199	22,141	22,384	23,495
24,500	24,818	18,597	22,621	22,880	24,004

Legend:
AGL above ground level
ft feet
JPADS Joint Precision Airdrop System
lbs pounds
ULW ultralight weight

Joint Precision Airdrop System Success Footprints

I-16. JPADS footprints present the likelihood of landing within a specific distance from the target. This can be used to quickly determine the likelihood of landing on the DZ or collateral damage estimation. The jumper can plot the footprints (table I-3, page I-8) around the target to evaluate the likelihood of landing within that area. The success footprints are centered on the target and do not vary with release altitude. The remaining percentage is equally distributed from the maximum success distance to the total drive distance boundary. The size and location of the total drive distance can vary.

Table I-3. Joint Precision Airdrop System footprint around target

	JPADS Footprints Around Target (meters)				
Probability	JPADS ULW RA-1	JAPDS ULW MC-4/MC-5	JPADS 2,000 lbs	JPADS 4,000 lbs	JPADS 10,000 lbs
5.0%	13	9	12	30	26
10.0%	18	14	17	34	30
15.0%	21	18	21	46	39
20.0%	24	21	25	49	43
25.0%	27	23	28	53	49
30.0%	30	26	32	58	59
35.0%	35	31	36	71	74
40.0%	37	34	39	79	77
45.0%	41	37	42	86	86
50.0%	44	41	46	92	92
55.00%	48	44	50	105	106
60.0%	52	49	56	118	113
65.0%	56	56	63	134	125
70.0%	65	64	70	154	144
75.0%	75	72	82	163	152
80.0%	84	82	93	211	166
85.0%	98	96	110	254	188
90.0%	125	121	136	291	265
91.0%	134	131	141	316	280
92.0%	145	141	146	348	301
93.0%	157	152	155	383	317
94.0%	170	164	169	397	327
95.0%	187	179	189	417	337
95.6%	209	193	211	438	342
96.0%	219	219	246	--	346
97.0%	254	257	323	--	360
97.7%	312	305	409	--	370
98.0%	371	326	472	--	375
98.1%	389	335	--	--	376
98.5%	--	496	--	--	--
Note:					
Max	98.1%	98.6%	98.1%	95.6%	98.1%
Balance	1.9%	1.4%	1.9%	4.4%	1.9%

Legend:
JPADS Joint Precision Airdrop System **lbs** pounds **ULW** ultralight weight

I-17. In figure I-4, page I-9, the DZ is located on a beach, with water located towards the west and surrounded by a forest. After drawing the footprints on the map, the user can quickly and roughly estimate—

- **How many JPADS will land on the DZ.** Around 95% will land on the DZ while 5% will land off the DZ. Approximately 95% will land within 187 meters from target. The DZ mostly falls within this ring.
- **How many will land in the water, directly around the DZ.** If you assume the water covers 25% of the area between 187 meters–389 meters from target, there is approximately a 0.78% chance of landing in the water. The formula is (98.1% - 95%) x 0.25 = 0.775%.

- **How many will land in the trees, directly around the DZ.** If you assume the trees covers 75% of the area between 187 meters–389 meters from target, there is approximately a 2.33% chance of landing in the trees. The formula is (98.1% - 95%) x 0.75 = 2.325%.
- **How many will land somewhere further than 187 meters.** About 1.9% will land somewhere between 389 meters and the total drive distance. The formula is (100% - 98.1%) = 1.9%.

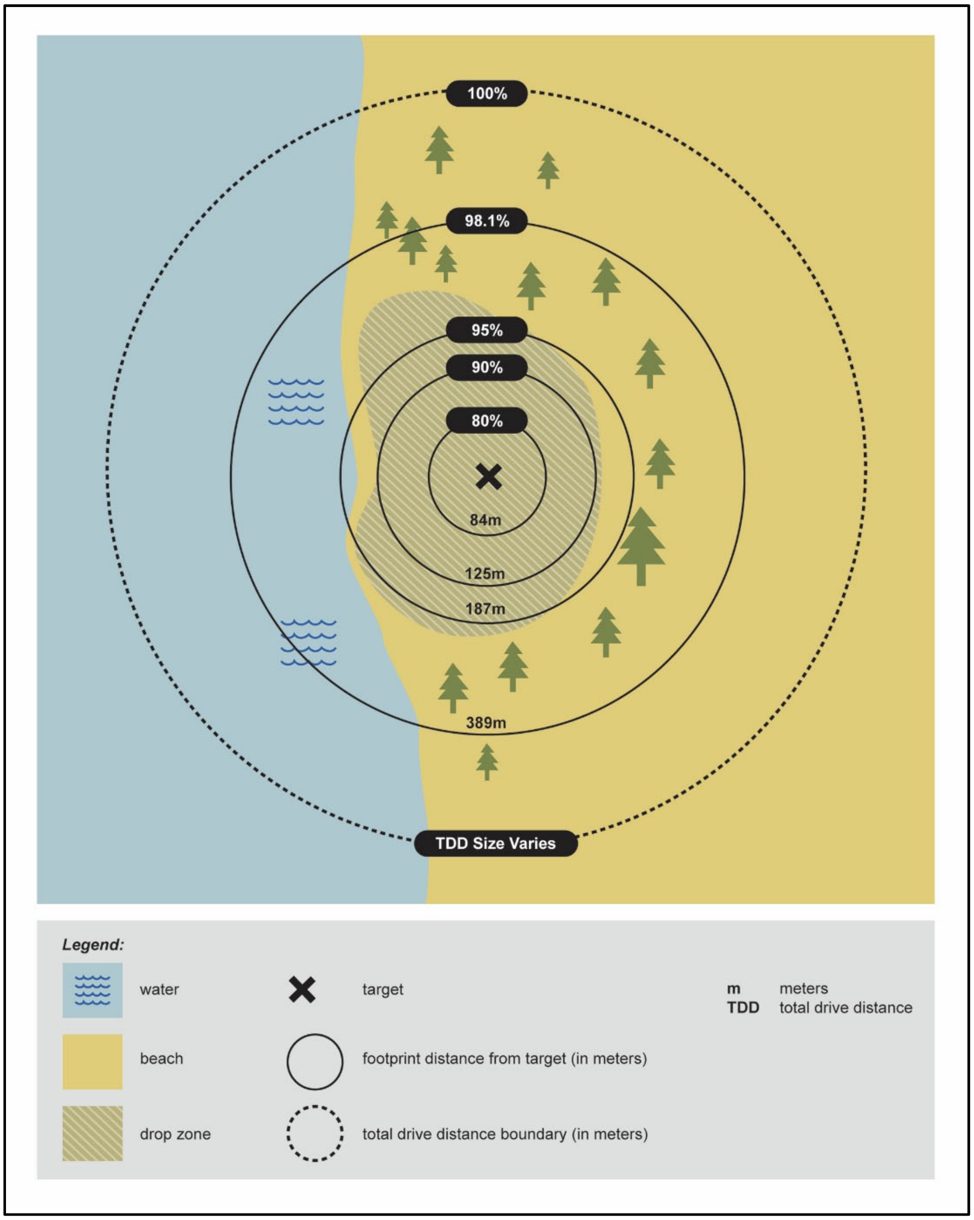


Figure I-4. Drawing footprints on a map

JOINT PRECISION AIRDROP SYSTEM AND PERSONNEL COMBINATION AIRDROP OPERATIONS

I-18. MFF parachutists exiting directly following JPADS bundles are restricted to DBSL or HAHO operations only. DBSL is the preferred method of deployment as it complements the JPADS stabilization phase.

I-19. The minimum pull altitude for jumpers conducting combination MFF/JPADS drops is 1,000 feet from drop altitude.

I-20. Since it is common for MFF personnel to place a sometimes considerable safety factor on release point solution and since jumpers have different flight patterns than JPADS, the perception is that JPADS will outperform the MFF personnel; however, that is not always the case.

I-21. Jumpers must realize that JPADS systems are fully autonomous. Jumpers should remain above or higher than the systems at all times. Jumpers must also maintain awareness of the JPADS and maintain greater distances than that of other jumpers.

I-22. To ensure they do not fall below the JPADS during descent, the jumpers must properly weigh out the JPADS and/or MFF to ensure that the jumpers' rates of fall are equal to or less than the JPADS. This also results in the perception that the JPADS outperforms the jumper, either in forward drive and/or rate of fall. Figure I-5 depicts personnel and JPADS combination airdrop operations.

I-23. The following paragraphs discuss considerations for conducting combination airdrops using JPADS.

Figure I-5. Personnel and Joint Precision Airdrop System combination airdrop operations

RIGGING

I-24. Because of the complexities of rigging the JPADS, joint airdrop inspection is required for each JPADS and is only conducted by qualified personnel.

I-25. As early as possible, personnel should try to identify the type of aircraft and style of rollers that they are using for delivery. It is crucial that the rollers are wide enough to accept the skid plate. If the rollers are too thin, then the load may roll off the rollers during deployment. C-130 rollers are too thin to accept the Tandem Offset Resupply Delivery Systems bundle (which is round), but work well with square loads.

I-26. Square loads are tied down with a minimum of two cargo straps, ensuring the handles are forward of the load so the bundle safety can manipulate them without getting between the ramp and the bundle. A chain bridle with four cargo straps works best for the Tandem Offset Resupply Delivery Systems bundle.

PREJUMP CONSIDERATIONS

I-27. The following are some prejump considerations when using the JPADS:

- Jumpers should ensure there is a GPS Retransmit Kit on the aircraft.
- Jumpers should note the size and weight of the JPADS they will be following. As the weight of the JPADS increases, its forward speed and descent rate also increase.
- Under no circumstances should parachutists intentionally perform maneuvers that place them lower than the JPADS bundle.
- The jumpmaster will brief the JPADS procedures for grouping on the bundle during canopy flight. Units may consider having the low man concentrate primarily on maintaining visual contact with the bundle while other jumpers in the stick monitor the low man's pattern and planned flight routes.
- Riggers and the MFF jumpmaster must ensure the system is programmed correctly. Due to the sensitive nature of the AGU, and the requirement of conducting a Joint Airdrop Inspection, only qualified riggers should be allowed to program the AGU. Jumpmasters should be present to verify the correct impact point coordinates are programmed. If the JPADS is transitioned to the United States Air Force (USAF), personnel should discuss if any interactions from USAF to the AGU, (such as, sending a mission file) will be performed and why it will be needed. If a transfer is needed, it is the responsibility of the last person who touched the AGU to double check correct programming.

WARNING

Incorrectly programming the AGU will result in mission failure.

- Jumpers should evaluate the DZ landing area and determine an alternate desired impact point for jumpers to land if the jumpers fall below the JPADS during flight. If the jumpers fall below the JPADS during flight, jumpers should consider landing away from the JPADS target location. This will reduce the chance of collisions as the JPADS lands.

Note: Jumpers need to perform a JPADS risk assessment using JPADS footprints.

RELEASE POINT SELECTION

I-28. When comparing a MFF release point to a JPADS release point, jumpers need to understand that although the performance characteristics of jumpers and JPADS are similar, the default release point selection is different. This leads to a common misconception about mission planning. When performing combination airdrops, the LAR of the JPADS will have no safety factors placed on it, whereas the jumper's release point will include safety factors.

I-29. Generally, jumpers want maximum offset, but pull the release point closer to the target by placing safety factors on the maximum offset release point in the form of altitude loss during stack up and final approach. The lowest risk release point of the JPADS is at the center of the LAR. For both MFF and JPADS, a maximum offset release point has the highest risk of not making the target.

I-30. For combination drops, a release point can be selected between the MFF desired point and the center of the JPADS LAR (figure I-6, page I-12) that balances the desire for offset versus the risk of not achieving the DZ. Since, in general, high winds are more variable and risky, users should not drop close to the edge of the

LAR in high winds. However, in lower winds, users can consider dropping closer to the edge. Consider dropping between halfway (50% LAR) to three-quarter way (75% LAR) from the center to the edge of the LAR.

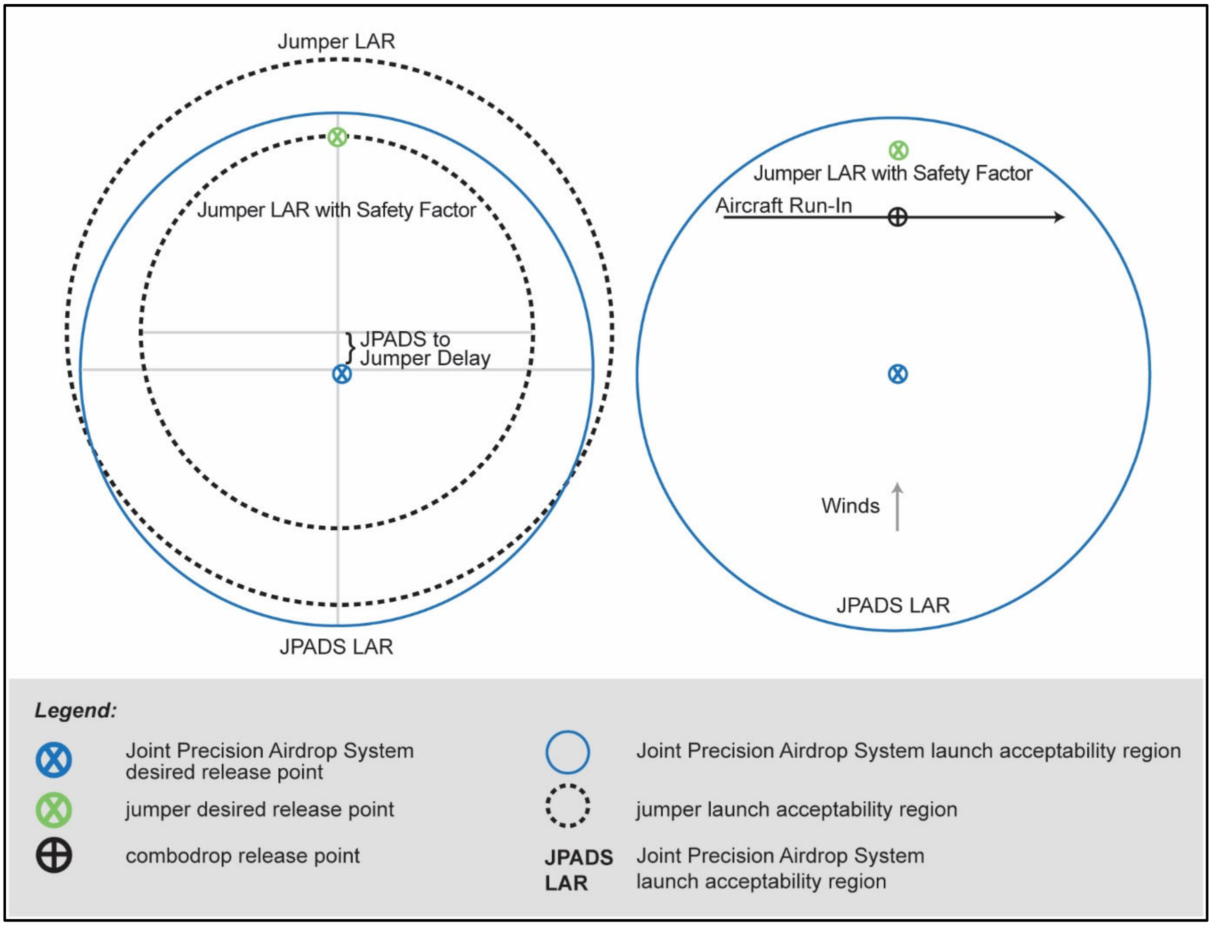


Figure I-6. Jumper and Joint Precision Airdrop System (combination) release point selection

WEIGHT BALLASTING

I-31. Jumpers need to determine the team's (collective group of jumpers) average rate of fall. The team will consist of jumpers with different weights and their associated descent rates. However, the jumpers will actively perform maneuvers during descent to minimize separation within the stack. Examples of maneuvers may include the lightest jumper performing sashaying maneuvers to increase his rate of fall (sacrificing horizontal drive) while the heaviest jumper could perform braking maneuvers to reduce his rate of fall and forward drive.

I-32. Personnel jumping with JPADS should adjust their exit weight and/or the weight of the JPADS bundle to match the team's average rate of fall with that of the JPADS. Adjusting the weights to match rate of fall will help the team maintain the formation with minimal effort. Personnel should ensure the team's average rate of fall does not exceed the descent rate of the JPADS.

CAUTION

Not performing the evaluation to regulate the jumper's rate of fall by adjusting the jumper's weight or the weight of the JPADS may result in mission failure and/or jumper's landing before the JPADS. This may also increase the risk of injury.

I-33. Figure I-7, pages I-13 through I-15, presents the JPADS and jumper (RA-1) rate of fall in full flight. This should be evaluated to compare the team's average rate of fall to JPADS. MFF RA-1 rate of fall information conservatively assumes full flight and no maneuvering to maintain stack.

I-34. The jumper is required to use this chart unless he can otherwise ensure the JPADS lands prior to the jumper through canopy manipulation and/or the use of more thorough calculations or tools that account for all phases of flight. Such tools may include the USAF Consolidated Airdrop Tool and JPADS website mission planner.

Military Free-fall RA-1			JPADS ULW RA-1		
Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)	Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)
160	10.4	41.6	250	9.0	30.4
173	10.5	42.1	270	9.3	31.6
185	10.7	42.6	289	9.7	32.7
198	10.8	43.1	309	10.0	33.8
210	10.9	43.7	328	10.3	34.8
223	11.0	44.2	348	10.6	35.8
236	11.2	44.7	367	10.9	36.8
248	11.3	45.2	387	11.2	37.8
261	11.4	45.8	407	11.5	38.8
273	11.6	46.3	426	11.7	39.7
286	11.7	46.8	446	12.0	40.6
299	11.8	47.3	465	12.3	41.5
311	12.0	47.9	485	12.5	42.3
324	12.1	48.4	504	12.8	43.2
337	12.2	48.9	524	13.0	44.0
349	12.4	49.4	543	13.3	44.8
362	12.5	50.0	563	13.5	45.6
374	12.6	50.5	583	13.7	46.4
387	12.8	51.0	602	14.0	47.2
400	12.9	51.5	622	14.2	47.9
412	13.0	52.1	641	14.4	48.7
425	13.1	52.6	661	14.6	49.4
437	13.3	53.1	680	14.8	50.1
450	13.4	53.6	700	15.0	50.9
Glide Ratio: 4.0			Glide Ratio: 3.4		

Legend:

fps feet per second
GRW gross rigged weight
JPADS Joint Precision Airdrop System
lbs pounds
ULW ultralight weight

Figure I-7. RA-1 and Joint Precision Airdrop System rate of fall table

JPADS ULW MC-4/ MC-5			JPADS 2,000 lbs		
Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)	Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)
250	12.3	32.2	880	11.3	35.5
270	12.8	33.5	941	11.7	36.7
289	13.3	34.6	1,002	12.0	37.9
309	13.7	35.8	1,063	12.4	39.0
328	14.1	36.9	1,123	12.7	40.1
348	14.5	38.0	1,184	13.1	41.2
367	15.0	39.1	1,245	13.4	42.3
387	15.3	40.1	1,306	13.7	43.3
407	15.7	41.1	1,367	14.1	44.3
426	16.1	42.1	1,428	14.4	45.2
446	16.5	43.0	1,489	14.7	46.2
465	16.8	43.9	1,550	15.0	47.1
485	17.2	44.9	1,610	15.3	48.0
504	17.5	45.8	1,671	15.5	48.9
524	17.9	46.6	1,732	15.8	49.8
543	18.2	47.5	1,793	16.1	50.7
563	18.5	48.3	1,854	16.4	51.6
583	18.8	49.2	1,915	16.6	52.4
602	19.1	50.0	1,976	16.9	53.2
622	19.4	50.8	2,037	17.2	54.0
641	19.8	51.6	2,097	17.4	54.8
661	20.1	52.4	2,158	17.7	55.6
680	20.3	53.1	2,219	17.9	56.4
700	20.6	53.9	2,280	18.1	57.2
Glide Ratio: 2.6			Glide Ratio: 3.2		

Legend:
fps feet per second
GRW gross rigged weight
JPADS Joint Precision Airdrop System
lbs pounds
ULW ultralight weight

Figure I-7. RA-1 and Joint Precision Airdrop System rate of fall table (continued)

JPADS 4,000 lbs			JPADS 10,000 lbs		
Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)	Weight (lbs GRW)	Rate of Fall (fps)	Forward Speed (fps)
2,450	13.0	42.5	5,000	11.2	37.2
2,539	13.3	43.3	5,209	11.4	38.0
2,628	13.5	44.0	5,417	11.6	38.8
2,717	13.7	44.8	5,626	11.8	39.5
2,807	14.0	45.5	5,835	12.0	40.2
2,896	14.2	46.2	6,043	12.3	40.9
2,985	14.4	46.9	6,252	12.5	41.6
3,074	14.6	47.6	6,461	12.7	42.3
3,163	14.8	48.3	6,670	12.9	43.0
3,252	15.0	49.0	6,878	13.1	43.7
3,341	15.2	49.6	7,087	13.3	44.3
3,430	15.4	50.3	7,296	13.5	45.0
3,520	15.6	50.9	7,504	13.7	45.6
3,609	15.8	51.6	7,713	13.8	46.3
3,698	16.0	52.2	7,922	14.0	46.9
3,787	16.2	52.8	8,130	14.2	47.5
3,876	16.4	53.5	8,339	14.4	48.1
3,965	16.6	54.1	8,548	14.6	48.7
4,054	16.8	54.7	8,757	14.8	49.3
4,143	17.0	55.3	8,965	14.9	49.9
4,233	17.1	55.9	9,174	15.1	50.4
4,322	17.3	56.4	9,383	15.3	51.0
4,411	17.5	57.0	9,591	15.4	51.6
4,500	17.7	57.6	9,800	15.6	52.1
Glide Ratio: 3.3			Glide Ratio: 3.3		

Legend:
fps feet per second
GRW gross rigged weight
JPADS Joint Precision Airdrop System
lbs pounds
ULW ultralight weight

Figure I-7. RA-1 and Joint Precision Airdrop System rate of fall table (continued)

I-35. Example: A team of jumpers using the RA-1 have a weight range of 173lbs–236lbs, from light to heavy. This means that, in full flight, the light jumper will be falling at 10.5 feet per second while the heavy jumper will be falling at 11.2 feet per second. Through experience, the team has determined that the heavy jumper will ride brakes to maintain stack with the lightest jumper. The JPADS ultralight weight RA-1 should weigh 335lbs gross rigged weight to match the rate of fall of the group.

CAUTION

If the team's experience level is not adequate to determine the team's average rate of fall, the team should consider using the heaviest jumper's full flight rate of fall to determine the JPADS weight.

I-36. Figure I-8, page I-13, presents the weight of the individual jumper in full flight and JPADS that results in the same rate of descent. It is intended as a guide to help jumpers determine optimum exit weights when flying in formation with the JPADS.

I-37. Example: A 170-pound jumper wearing a parachute and equipment that weighs 175 lbs produces an exit weight (gross rigged weight) of 345 lbs. A JPADS ultralight weight RA-1 system is used and has a total weight (gross rigged weight) of 485 lbs. Using the chart, you can see the lines intersect at the Matching Rate of Fall Line. The jumper in full flight with JPADS should have the same rate.

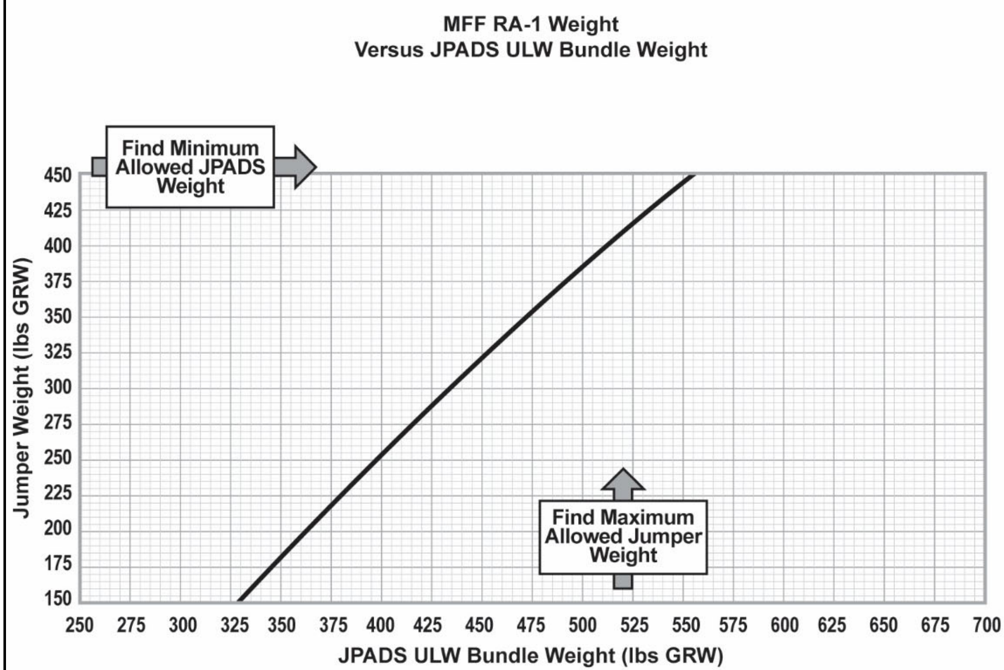
I-38. Using the previous example, if the parachutist's exit weight was increased to 400 lbs while the JPADS system still weighs 485 lbs gross rigged weight, the jumper's full flight rate of fall would exceed that of the JPADS and the jumper may end up below the bundle if he is not performing braking maneuvers. The jumper will have to compensate for this by adding to the bundle and extending jumper exit delay, adding more weight to the JPADS bundle, and/or adjusting his canopy flight much more often to stay in the formation.

WARNING

Figure I-8 presents JPADS ultralight weight RA-1 versus MFF RA-1 and is not applicable to any other parachute variant. Units using other JPADS and/or MFF parachute systems must reference the applicable charts.

CAUTION

When using figure I-8, if the jumper's weight is not adjustable, start with the jumper's weight to find the minimum allowed JPADS weight. If the JPADS weight is not adjustable, start with the JPADS weight to find the maximum allowed jumper weight.



JPADS ULW RA-1 (lbs GRW)	MFF RA-1 (lbs GRW)
250	--
270	--
289	--
309	--
328	--
348	180
367	209
387	236
407	263
426	289
446	315
465	340
485	365
504	389
524	412
543	435
563	--
583	--
602	--
622	--
641	--
661	--
680	--
700	--

Legend:

▬▬	matching rate of fall line	**lbs**	pounds
GRW	gross rigged weight	**MFF**	military free-fall
JPADS	Joint Precision Airdrop System	**ULW**	Ultralight Weight

Figure I-8. Full flight rate of fall matching

I-39. Jumpers should evaluate the DZ landing area and determine an alternate desired impact point for jumpers to land if jumpers fall below the JPADS during flight. If jumpers fall below the JPADS during flight, they should consider landing away from the JPADS target location. This will reduce the chance of collisions as the JPADS lands.

I-40. During night operations, the bundle will be marked in accordance with a published unit SOP. It is recommended that all MFF jumpers conducting combination drops with JPADS utilize available NVG technology to maintain continuous visual contact with the system. For night operations, it is recommended that the bundle be marked as follows:

- 2 blue chemlights on each side of package.
- 2 green chemlights on back of AGU.
- 2 red chemlights on front of AGU.
- 2 strobes on spider harness.

Canopy Flight Considerations

I-41. The JPADS will normally be the lowest canopy in the stack. All parachutists should use prebriefed grouping procedures to get into a stacked formation. Parachutists should also exercise added caution to ensure they maintain separation with the JPADS and other jumpers while joining the stack.

I-42. Jumpers will accomplish standard postopening procedures, build the initial canopy formation behind the bundle, and begin flying the intended flight route.

I-43. Jumpers should become familiar with and consider using trim tabs to stay with the bundle and to alleviate arm fatigue from excessive front riser use. Jumpers must avoid radical canopy maneuvers while following a JPADS.

CAUTION

Any jumper maneuvering that changes the forward speed and/or rate of fall may result in failure to get to the target. However, minor modifications to canopy performance is generally acceptable and compensated for within the MFF jumper safety factors input in the mission planning phase.

I-44. In the event that jumpers lose visual contact with the bundle or cannot acquire the AGU after exit, they should keep scanning and attempt to locate the bundle system. After completing postopening procedures, all jumpers should turn to the briefed heading and continue scanning, keeping a sharp lookout during the entire descent in an attempt to visually reacquire the bundle system.

COLLISION OR ENTANGLEMENT WITH THE BUNDLE

I-45. These procedures are intended to correspond with personnel entanglement emergency procedures so individual jumpers will not have to memorize a different set of emergency procedures if entanglement occurs with a JPADS or bundle:

- If the jumper's canopy is entangled with the JPADS and the JPADS has a good canopy, the jumper should cutaway no lower than 1,000 feet AGL.
- If the jumper has a good canopy but the JPADS canopy is entangled with the jumper, the jumper should clear the canopy entanglement from himself and his equipment.
- If the jumper and JPADS are entangled and neither has a good canopy, the jumper should clear himself from the entanglement and cutaway regardless of position in the entanglement.
- If impact with the ground is imminent, the jumper should deploy the reserve in an attempt to slow descent.

DUTY POSITIONS

I-46. The bundle safety is responsible for ensuring the bundle is programmed, rigged, loaded, and deployed correctly.

I-47. The bundle pusher is responsible for verifying the bundle is programmed, rigged, loaded, and deployed correctly. It is also his primary responsibility to deploy and follow the load out of the aircraft and lead the stack to land in close vicinity of the bundle by using proper canopy control techniques.

BUNDLE OPERATIONS

I-48. The bundle should be placed as close as possible to the ramp hinge, with ratchet portion of the cargo strap facing the ramp, so the safety releasing the cargo strap does not interfere with the jumper controlling the bundle. The bundle should be rigged with the static line on the port side of the aircraft, but the overall rigging will depend on the aircraft.

I-49. Time warnings for bundle operations weighing less than 2K are as follows:

- **10 MINUTES.** All jumpers will put rucksacks on and perform buddy checks of equipment attaching points. The safety turns on the GPS repeater, then turns on the JPADS and ensures it is clear of all fault codes.
- **6 MINUTES.** Aircraft will be flat and level on heading for the jump run.
- **4 MINUTES.** All jumpers stand up and perform pin checks. The safety confirms the JPADS achieved GPS lock at least once during time in aircraft.

- **3 MINUTES.** Lead jumper controls the bundle and the safety disconnects the cargo strap. All jumpers remain ready with eyes on the jumpmaster. The jumpmaster will call for the ramp after the safety's thumbs-up signal. The ramp will not be opened until both jumper and safety have positive control of the bundle.
- **2 MINUTES.** The bundle will be moved to the ramp hinge. The lead jumper and safety will maintain control.
- **1 MINUTE.** With the ramp open, the jump leader (with the assistance of the safety) will move the bundle halfway to the ramp edge.
- **STAND BY.** Lead jumpers will move the bundle to the edge of the ramp. At this time, the safety will control the static line of the bundle and assist the lead jumper in any way necessary.
- **GO.** The lead jumper will push the bundle. After pushing the bundle, the lead jumper will delay 5 to 10 seconds to ensure the bundle has a good canopy and the GPS guidance system has found its heading.

CAUTION

JPADS to jumper delay should be determined in preplanning based on the jumper's experience level, mission, profile, and bundles versus jumper's rate of descent.

I-50. In the event of a mishap with the bundle guidance unit, it is recommended that the stack follow the bundle until the low man decides the bundle is not flying to its intended landing point.

JUMPER ACTIONS ON EXIT, UNDER CANOPY, AND LANDING

I-51. Exit procedures for jumpers are as follows:

- After the lead jumper pushes the bundle, he will delay 5 to 10 seconds to ensure the bundle has a good canopy and the GPS guidance system has found its heading.
- On exit, all jumpers will exit the aircraft immediately, turn toward the DZ, and deploy the main canopy. Jumpers will follow canopy deployment procedures for the RA-1 configuration being jumped.
- After deploying the main canopy, jumpers will orient in the direction of the DZ and check in on the radio in exit number order.

I-52. The low jumper's responsibility is to maintain visual contact with the bundle and set up a safe landing pattern for the remainder of the formation. The second jumper and the last jumper (jumpmaster) should be primary for navigation. In addition, these jumpers should use the GPS tracking system (Parachutist Navigation System [ParaNav]) mounted to the jumpers' equipment.

I-53. The last jumper (jumpmaster) should be the stack commander; his responsibility is to maintain stack integrity and to relay any directions to all jumpers in the stack.

I-54. All jumpers not using the computer navigation aid should use compass boards with a marine compass and a commercial-brand GPS.

I-55. At 2,000 feet AGL, the lead jumper should call the landing pattern, by radio, to the remainder of the stack.

I-56. If the JPADS is in visible range during JPADS final approach, evaluate the JPADS landing pattern and touchdown to assist in estimating the ground wind direction. First, the jumper can estimate if the JPADS predicted its wind estimate correctly, and, if so, can estimate the wind magnitude by evaluating the success of the JPADS flare bucket. If the system achieved a full flare, there will be a visual flare where its speed drops dramatically. After landing, look for the canopy to bundle direction.

WARNING

Stay above and upwind to maximize the safe distance from JPADS landing pattern. It is possible, especially during low/zero wind cases, that the JPADS final approach direction is unpredictable or does not land into the wind. Personnel need to be aware of this and ensure there is vertical separation from them and the JPADS bundle.

I-57. All jumpers will land as normal. Once on the ground, jumpers will turn off strobe lights and assemble on the low man.

Appendix J

Jumpmaster Personnel Inspection Procedures for MC-4, Military Javelin, Multimission, and Nonstandard Parachute Systems

This appendix describes the JMPI sequence that jumpmasters use on some of the additional MFF parachute systems still being used by other Services and by foreign countries.

Notes:

The sequence used to detect and identify deficiencies is as follows: with hands and eyes working together, start at the front of the jumper, move toward the rear, top to bottom, and right to left.

All references to right or left are the jumper's right or left, unless otherwise indicated.

JUMPMASTER PERSONNEL INSPECTION SEQUENCE OF THE MC-4 PARACHUTE SYSTEM WITH THE MILITARY CYPRES, ACH-ARC, AND HEAD-LOC RETENTION SYSTEM

J-1. Figure J-1, pages J-1 through J-7, depicts the inspection sequence of the MC-4 RAPPS with the Military CYPRES, ACH-ARC, and Head-Loc Retention System. Figures J-2 through J-8, pages J-7 through J-20, depict the inspection sequence of the M-4 rifle, PDB, POM, and Twin-53 oxygen system.

(1) **Proper Harness Fit.** Start the inspection sequence by first ensuring the jumper has the harness properly fitted. This is accomplished by placing the index and middle finger of each hand inside the base ring of the three-ring riser release assembly. Visually inspect both base rings to ensure they are in the hollow of the jumper's shoulders. If the harness is improperly fitted, it must be corrected before continuing.

Key Words "PROPER FIT"

(2) **Helmet and Goggles.** Visually inspect the helmet ensuring it fits properly and is serviceable. Place your hands on either side of the helmet and visually inspect the goggles. Ensure the goggles are present, clear in color, and free of damage.

(3) Turn the jumper's head to your left; visually inspect the goggle strap, ensuring the goggles are secured to the helmet. Then, turn the jumper's head to your right; visually inspect the goggle strap ensuring the goggles are secured to the helmet.

(4) **ACH (Front) with Head-Loc Retention System and ARC.** Place both hands on the front right side of the ACH, fingers and thumbs extended and joined pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace across the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH; tilt the jumper's head to the rear. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2 and the ACH-ARC with the Head-Loc Retention System

(5) Place the right index finger on the front left adjustable strap and trace down to the front left Head-Loc tab, checking for twists and overall serviceability. Once at the front left Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left adjustable strap to the low profile chin buckle, ensuring it is serviceable, not cracked, and properly secured. Now, bypass the low profile chin buckle and trace the chinstrap portion under the jumper's chin to where it is sewn into the front right adjustable strap. Ensure both portions of the chinstrap are routed under the jumper's chin and are not twisted, cut, or frayed. Next, trace the front right adjustable strap up to the front right Head-Loc tab, checking for twists and overall serviceability. Once at the front right Head-Loc tab, ensure it is serviceable and not cracked, then continue tracing the right adjustable strap back up to the helmet.

(6) Leaving your right hand on the chinstrap as your reference hand, form your left hand into a C shape and place your fingers under the inboard side of the right main riser. Visually inspect the snap fastener on the protective flap ensuring it is secure. Without masking, trace forward with your hand along the riser, ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(7) Leave your left hand in place and with your right hand, grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated.

(8) Grasp the medium ring; give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the base ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(9) Place your right index finger next to the tacking on the ends of the main canopy release cable housing; visually ensure tacking is present. TRACE the housing up and under the jumper's right riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your left hand, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK the main canopy release cable running end and ensure it is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, CHECK"

(10) With your left hand, trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure tacking is present. Inspect the cable, ensure it is properly routed and there are no broken strands. Make sure the cable runs through the main ripcord handle and terminates with two swage balls.

Key Words: "TWO SWAGE BALLS"

(11) Place your left index and middle finger in the elastic stow pocket. Give your fingers a 1⁄4-turn out and look inside, ensuring the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(12) With your right hand, push the main canopy release handle toward the main ripcord; pin it back with your left thumb. With your right index finger, inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. With your right index finger, trace the hook-pile tape of the main canopy release handle, ensuring it is at least 50-percent mated.

(13) Form a knife-cutting edge with your right hand and place it behind the chest strap. Move from your left to right inspecting the strap and ensuring there are no twists. When you encounter the excess rolled and stowed portion of the chest strap, give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer. With your thumb, sweep the friction adapter to ensure proper routing of the chest strap.

(14) Continue to inspect the chest strap in its entirety to include the chest strap extension, ensuring it is not routed through the reserve ripcord handle. Once you have inspected the chest strap extension, point to the chest strap extension with your left index and middle fingers, then visually check the jumper's left side for a weapon. State what you see.

Key Words: "WEAPON" OR "NO WEAPON"

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2 and the ACH-ARC with the Head-Loc Retention System (continued)

(15) If no weapon is found or after you have inspected the weapon, bring your left index and middle finger underneath the reserve ripcord and place them inside the elastic stow pocket of the reserve ripcord handle. Give your fingers a 1⁄4-turn out and look inside ensuring the ripcord handle is in the proper pocket.

Key Words: “PROPER POCKET”

With your right index finger, ensure two swage balls are present on the end of the reserve ripcord cable.

Key Words: “TWO SWAGE BALLS”

(16) Inspect the cable and ensure it is properly routed and there are no broken strands. Make sure the cable runs through the reserve ripcord handle, and continue tracing the cable to where it enters the housing. Ensure tacking is present and securing the cable housing to the harness.

(17) With your left index finger, elongate the yellow lanyard on the RSL. With your right index finger, place it inside the loop of the main canopy release cable housing and spread it apart from the RSL. Visually inspect the reserve ripcord cable to ensure it is not misrouted around the RSL or the main canopy release cable housing.

Key Words: “FREE AND CLEAR”

(18) Form your right hand into a C shape and place your fingers under the inboard side of the left main riser. Visually inspect the snap fastener on the protective flap ensuring it is secure. Without masking, trace forward with your hand along the riser to ensure there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and there are no broken strands on the stitching.

(19) Leave your right hand in place and with your left hand, grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated.

(20) Grasp the medium ring, give it a 1⁄4-turn, and ensure it rotates freely and is not elongated. Grasp the base ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(21) Move your left index finger to the main canopy release cable housing. TRACE the housing up and under the jumper’s left riser with your index finger. PLACE the main canopy release cable housing eye inside the grommet. With your right hand, grasp the inboard side of the canopy-locking loop and lift it up and toward the jumper’s head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop. CHECK to ensure that the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK to ensure that the main canopy release cable running end is properly stowed in the stowage flute on the underside of the rear riser.

Key Words: “TRACE, PLACE, CHECK, AND CHECK”

(22) With your left index finger, elongate the yellow lanyard of the RSL. At the same time, pinch grip the snap fastener on the red release lanyard of the RSL shackle. Press down with your thumb on the snap fastener to make sure it is properly secured.

Key Word: “SNAP”

(23) Visually inspect the RSL shackle while touching it with your right index finger, ensuring it is assembled correctly and is properly oriented with the pelican hook facing up toward the jumper’s head.

Key Word: “SHACKLE”

(24) Visually inspect for the ring while touching it with your right index finger. Ensure that the pelican hook is routed through the ring and that it separates the yellow nylon of the RSL from the shackle.

Key Word: “RING”

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2 and the ACH-ARC with the Head-Loc Retention System (continued)

(25) With your left index finger, elongate the yellow lanyard on the RSL. With your right index finger, place it inside the loop of the main canopy release cable housing and spread it apart from the RSL. Visually inspect the RSL to ensure it is not misrouted around the reserve ripcord cable or the main canopy release cable housing.

Key Words: "FREE AND CLEAR"

(26) Forming a knife-cutting edge with your right hand, place it behind the jumper's left main lift web just behind the D-ring and friction adapter. Place your right thumb through the D-ring and sweep the friction adapter to ensure proper routing. Your left hand seeks the equipment V-ring wherever it may be. Rotate the main lift web out a 1⁄4-turn to inspect for and ensure that there are no twists. Next, visually inspect for proper stowage of excess webbing (rolled outboard). State where the equipment V-ring is in relation to the waistband, either above or below.

Key Words: "ABOVE OR BELOW"

(27) Switch your hands to the right main lift web of the jumper. Forming a knife-cutting edge with your left hand, place it behind the jumper's right main lift web just behind the D-ring and friction adapter. At the same time, your right hand seeks out the equipment V-ring wherever it may be. Place your left thumb through the D-ring and sweep the friction adapter to ensure proper routing. Rotate the main lift web out a 1⁄4-turn to inspect and ensure that there are no twists. Next, visually inspect for proper stowage of excess webbing (rolled outboard). State where the equipment V-ring is in relation to the waistband, either above or below.

Key Words: "ABOVE OR BELOW, WAISTBAND"

(28) When the jumper is wearing a CMWH, if a weapon IS present, after inspecting the V-ring, rotate the weapon up toward the jumper with your right hand to expose the waistband.

Instruct the jumper: "JUMPER HOLD."

Key Word: "WAISTBAND"

(29) Forming a knife-cutting edge with your left hand and using an overhand motion, move to the top of the wing flap of the right side of the jumper and pull out. With the right hand, palm facing you, reach up under the wing flap to place your fingers on the origin of the waistband as it appears from the container. This is a visual inspection as well as a physical inspection of the origin to ensure the waistband is sewn at least 50-percent to the harness-container assembly.

Key Word: "ORIGIN"

(30) Trace the waistband forward with your right hand, inspecting and ensuring that there are no twists behind the oxygen protector flap. Once you encounter the first friction adapter, sweep it and inspect for proper routing. Move from your left to right continuing the inspection of the waistband. Inspect for proper routing over the right main lift web and inspect the waistband to ensure that there are no twists. When you encounter the excess rolled and stowed portion of the waistband, give it a 1⁄4-turn outward and inspect behind it to ensure that there are no twists. Inspect excess webbing, making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer. With your thumb, sweep the friction adapter to ensure proper routing of the waistband. Inspect to ensure the waistband is routed over the left main lift web. Continue inspecting all the way to the left side wing flap.

(31) Once you have reached the left side wing flap, reach back with your right hand and grasp the kit bag handles. You are inspecting to make sure the kit bag is present and to ensure the waistband runs through both kit bag handles.

Key Words: "TWO KIT BAG HANDLES"

Instruct the jumper: "JUMPER, SQUAT."

(32) Your right hand is now your reference hand. Forming a knife-cutting edge with your left hand, place it under the gate of the jumper's right leg strap snap hook.

(33) If the jumper is equipped with quick-ejector snap hooks, press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2 and the ACH-ARC with the Head-Loc Retention System (continued)

(34) If the jumper is equipped with quick B12 snap hooks, press up on the locking gate with your index finger inspecting for spring tension.

(35) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it to ensure that there are no twists. Inspect the excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(36) With your right hand, hook the leg strap with your thumb or fingers next to your left hand, making skin-to-skin contact to the inside or outside of the jumpers' leg. Trace with your right hand along the leg strap, inspecting to ensure that there are no twists until you reach the saddle or until your hand stops between the jumper's legs.

(37) Keeping your right hand in place, reach around the back of the jumper with your left hand and make skin-to-skin contact with your right hand, hooking the thumb or fingers of your left hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring there are no twists until you reach the BOC or the X box stitching on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on the same side.)

(38) Keep your left hand in place as your reference hand. Forming a knife-cutting edge with your right hand, place it under the gate of the jumper's left leg strap snap hook.

(39) If the jumper is equipped with quick-ejector snap hooks, press up on the locking gate with your index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that it is properly seated over the ball detent and free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate in order to ensure it is closed properly.

(40) If the jumper is equipped with quick B12 snap hooks, press up on the locking gate with your index finger inspecting for spring tension.

(41) With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it to ensure that there are no twists. Inspect the excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(42) With your left hand, hook the leg strap with your thumb or fingers next to your right hand making skin-to-skin contact to the inside or outside of the jumper's leg strap. Trace with your left hand along the leg strap, inspecting and ensuring that there are no twists until you reach the saddle or until your hand stops between the jumper's legs.

(43) Keeping your left hand in place, reach around the back of the jumper with your right hand and make skin-to-skin contact with your left hand, hooking the thumb or fingers of your right hand between the padded portion of the saddle and the jumper's leg. Continue to trace up inspecting and ensuring that there are no twists until you reach the BOC or the X box stitching on the hip portion of the leg strap. This is a visual inspection as well as a physical inspection. (Note: If you start your trace on the inside or outside of the leg strap, you must continue the inspection of the leg strap on the same side.)

Note: If the jumper wears a CMWH, command the jumper: "JUMPER RECOVER." Otherwise, continue your inspection as follows.

(44) With an overhand motion of your left hand, grasp the jumper's left wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face. Attempt to rotate the altimeter around the jumper's wrist. It should be snug and not excessively loose. Look at the face of the altimeter and read aloud where the needle is set; then read aloud the predetermined altimeter setting you have written on your hand. At this point you are inspecting for the proper setting of the altimeter. As you read the altimeter face, you are inspecting for the lens to be clear and free of damage.

Key Words: "+500, +500 CORRECT ALTIMETER SETTING", or "500, +500 INCORRECT ALTIMETER SETTING"

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2, and the ACH-ARC with the Head-Loc Retention System (continued)

(45) With your right finger or thumb, give the altimeter face a gentle tap to ensure it is present. Use your right finger or thumb to tug on the heavyweight retainer band to ensure it is properly attached to the wrist strap.

Instruct the jumper: "JUMPER TURN."

(46) **ACH (Rear) with Head-Loc Retention System and ARC.** Once the jumper has turned 180 degrees, place both hands on the left side of the ACH, fingers and thumbs extended and joined fingers pointing skyward, palms facing the jumper. The left hand is the control hand; the right hand is the working hand. With the working hand, trace the rim of the ACH feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the ACH and tilt the jumper's head forward. Conduct a visual inspection to ensure the three suspension pads are present and flush with the outer rim and that the oval pads are covering the bolt ends.

(47) Place the right index finger on the right rear adjustable strap and trace down to the right rear Head-Loc tab, checking for twists and overall serviceability. Once at the right rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the right rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed.

(48) Leave the right index finger in place. Now, trace down to the left rear Head-Loc tab checking for twists and overall serviceability. Once at the left rear Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the left rear adjustable strap until contact is made with the chinstrap to ensure it is not twisted, cut, or frayed. Conduct a visual inspection of the nape pad to ensure it is present, secure, serviceable, and has not been reversed.

(49) Move your left hand to the bottom of the reserve protector flap. Open the flap with your left hand and pin it up and out of the way.

(50) With your right index finger, find the CYPRES control cable as it protrudes from the reserve container. Trace the cable and inspect the cable for any damage and proper routing. Next, ensure the control cable is properly routed through the binding tape guide. At this time, you are also inspecting to ensure that the binding tape is properly tacked to the reserve top closing flap.

(51) With your right index finger, find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current free-fall operation.

Key Words: "1500 35 A, CORRECT" OR "2500 29 A, INCORRECT"

(52) With your right index finger, find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

(53) Next, move your right index finger over to the CYPRES control unit's digital readout screen. Read aloud the millibar setting on the screen. Read aloud the predetermined millibar setting that you have written on your hand. At this point, you are inspecting for the proper millibar setting of the CYPRES.

Key Words: (OPERATION MODE) "788"…. "788" "CORRECT", or "788" "778" "INCORRECT"

(54) Using your right index finger, flick the control unit plastic sleeve in order to ensure it is housed properly. Grasp the reserve flap with your right hand and rotate it to the right.

(55) With your left hand, find the reserve ripcord cable as is protrudes from its housing on the back of the jumper's left shoulder. Inspect the cable for proper routing and to ensure there are no broken strands. Inspect the routing of the reserve ripcord cable, ensuring it runs through the assist ring (little ring) of the RSL and then through the guide ring (big ring).

Key Words: "LITTLE RING, BIG RING"

(56) Continue to inspect for proper routing and to ensure there are no broken strands on the reserve ripcord cable until you encounter the shoulder of the top locking pin.

(57) Once you are at the top reserve locking pin, ensure the cable is to the left of the grommet. Inspect the pin to make sure it is not shouldered inside the grommet and that the pin is not bent. Inspect the continuous CYPRES closing loop of the reserve (white Dyneema material loop) for frays.

Key Words: "NOT SHOULDERED, BENT OR FRAYED"

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2, and the ACH-ARC with the Head-Loc Retention System (continued)

(58) Continue inspecting down the cable to the bottom locking pin, ensuring it is properly routed and that there are no broken strands.

(59) Once you are at the bottom reserve locking pin, inspect the pin to make sure it is not shouldered inside the grommet and the pin is not bent. Inspect the continuous CYPRES closing loop of the reserve (the white Dyneema material loop) for frays.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, WHITE"

Instruct the jumper: "JUMPER, BEND."

(60) Moving your hands simultaneously, open up and pin the top protector flap of the main parachute with your left hand while opening the FF-2 protector flap with your right hand.

(61) With your right hand, move to the bottom flap of the main parachute container. Ensure that it was the first flap closed in the container-closing sequence. Next, move your hand to the left side of the container, and ensure the left side was closed second. Then, slide your hand across and under the top flap. It should stop at the edge of the right flap; ensure that it was closed third. Bring your hand out and place it on the top closing flap; ensure that it was closed fourth.

Key Words: "BOTTOM, LEFT, RIGHT, TOP"

(62) With your right hand, place your index finger next to the tacking on the main ripcord cable housing and ensure tacking is present. Inspect the cable as it protrudes from the housing for proper routing and that there are no broken strands.

(63) Continue past the locking pin and inspect the 2-inch extension for proper routing and to ensure there are no broken strands. Ensure it terminates with a single steel swage ball.

Key Words: "SWAGE BALL"

(64) With your index finger and thumb of your left hand, pinch the swage ball to ensure the main locking pin does not come loose during your inspection. Inspect the pin to make sure it is not shouldered inside the grommet and the pin is not bent. Inspect the main closing loop (the red nylon) for frays.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, RED"

(65) At this time, slap the BOC. This signifies that JMPI is now complete.

Figure J-1. Jumpmaster personnel inspection sequence of the MC-4 Parachute System with the CYPRES 2, and the ACH-ARC with the Head-Loc Retention System (continued)

(1) Start your inspection as normal and continue until you reach the chest strap extension. Visually check the jumper's left side for a weapon.

Key Word: "WEAPON"

(2) Place your left index and middle fingers on the chest strap extension. Visually ensure the weapon sling is routed over the top of the extension and runs under the left main lift web and over the jumper's shoulder.

(3) Keep your left hand in place as your reference hand. With your right index finger, find the weapon sling as it protrudes from under the main lift web and over the jumper's shoulder. Trace the sling until it is attached to the weapon tie-down loop with 1⁄4-inch cotton webbing tied in a soft knot (bowknot). Give the cotton webbing a tug to make sure it is properly secured.

Note: Depending on the size of the jumper, weapon, weapon sling, and buttstock configuration, the 1⁄4-inch cotton webbing will be girth-hitched on the sling up to 6 inches from the sling swivel or girth-hitched to the buttstock. Jumpmaster discretion should be used in order to determine the best possible attachment configuration. The jumpmaster must ensure the weapon will not move out from behind the wing flap, not protrude high on the jumper's shoulder, or inhibit the jumper's movement.

Figure J-2. Jumpmaster personnel inspection sequence of the M-4 rifle left-side mounted

(4) Continue to trace the weapon's sling to its attachment point on the buttstock. Give the sling a tug to make sure the sling is attached to the weapon.

(5) Bring your right hand down and behind the jumper's arm to find the pistol grip; give it a slap. You are inspecting for proper orientation of the weapon. Ensure the pistol grip is pointing toward the rear of the jumper.

(6) Drop down to the weapon's lower sling attaching point. Give the sling a tug and ensure it is secured to the weapon.

(7) Trace the sling and ensure it runs up and over the handguards. Make sure the sling runs under the waistband and under the main lift web. Bring your right index finger to where the sling protrudes from under the main lift web and trace up to the chest strap.

(8) Continue your inspection as normal starting at the reserve ripcord stow pocket.

Figure J-2. Jumpmaster personnel inspection sequence of the M-4 rifle left-side mounted (continued)

(1) Start your inspection as normal and continue until you reach the excess webbing of the chest strap. Once at the excess webbing of the chest strap, visually check the jumper's left side for a weapon.

Key Word: "WEAPON"

(2) Visually inspect the chest strap routing to ensure it routes over the right side of the weapon sling and under the left side (over/under configuration).

(3) Leave your left hand in place on the red cutaway pillow. With your right index finger, trace the left side of the weapon sling over the chest strap down to the forward sling attachment point, ensuring the sling routes over the handguards. Give it a tug to ensure it is properly secured to the weapon and that the muzzle is facing to the jumper's left.

(4) Next, locate the Fastex or cobra buckle securing the weapon harness strap to the left main lift web-mounting strap. Visually inspect the buckle for damage and overall serviceability and ensure that the main lift web-mounting strap is below the equipment V-ring.

(5) With your right thumb, sweep the friction adapter to check for proper routing, then tug the weapon harness strap excess to ensure the buckle is properly fastened.

(6) Trace with your right index finger from right to left along the weapon until you reach the first hook-pile tape weapon-mounting strap. Visually check the hook-pile tape weapon-mounting strap to ensure it is secured around the handguards. Next, grasp the weapon-mounting strap and attempt to move it left and then right to inspect that it is attached to the weapon harness strap with hook-pile tape.

(7) Continue tracing from right to left until you reach the magazine well. The magazine well should be pointed down and the ejector port should be facing out, away from the jumper.

Key Word: "PORT"

(8) Next, trace to the second hook-pile tape weapon-mounting strap. Visually check the hook-pile tape weapon-mounting strap to ensure it is secured around the handguards. Next, grasp the weapon-mounting strap and attempt to move it left and then right to inspect that it is attached to the weapon harness strap with hook-pile tape.

(9) Locate the Fastex or cobra buckle securing the weapon harness strap to the right main lift web-mounting strap. Visually inspect the buckle for damage and overall serviceability and that the main lift web-mounting strap is below the equipment V-ring.

(10) With your right thumb, sweep the friction adapter to check for proper routing, then tug the weapon harness strap excess to ensure the buckle is properly fastened.

(11) Next, tug the weapon sling at the rear of the weapon buttstock, ensuring it is secured.

(12) Finally, trace the weapon sling from the buttstock back up to and behind the chest strap.

(13) Continue your inspection of the chest strap by giving the excess webbing a 1⁄4-turn out and sweeping the friction adapter.

Figure J-3. Jumpmaster personnel inspection sequence of the M-4 rifle with a center-mounted weapon harness

Due to the nature of the inspection sequence of the MC-4, the following notes have been developed to ensure a complete inspection of the MC-4 parachute and attached equipment, while wearing equipment worn on the front of the jumper.

Note: The inspection sequence of the parachutist wearing the MC-4, weapon, and oxygen system must be completed before attaching the rucksack or PDB to the jumper.

Note: The inspection of the following areas of the front-mounted ruck or PDB must be completed before attaching the front-mounted rucksack or PDB.

Stand in front of the PDB with the shoulder straps away from you.

Key Words: "PDB"

(1) Ensure that the PDB is symmetrical and the weight is balanced as best as possible.

(2) Ensure that the top section is filled out and the loops are centered on the container.

(3) With both hands, grasp the equipment attaching straps below the equipment attaching strap snap hooks and stand the PDB up on end so the top of the PDB is facing up toward you.

(4) Start your inspection with the jumper's left equipment attaching strap snap hook. Ensure the opening gate portion is facing toward the jumper. Take your right index finger and function the opening gate of the D-ring attaching strap for spring tension. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the D-ring attaching strap down to the triangle link.

(5) Next, check for the proper routing of the left attaching loops. Ensure that the black loop is routed through the triangle link on the adjustable D-ring attaching strap. Ensure that the white loop is routed through the black loop. With your right thumb or index finger, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure that the red loop is routed through the grommet on the leg strap release assembly. Ensure that the release handle cable is properly routed through the red loop.

Key Words: "BLACK, WHITE, RED"

(6) Continue down with your right index finger; elongate the release handle lanyard. Inspect to ensure that the release handle lanyard is not misrouted or excessively twisted.

(7) Leaving your right hand in place, pick up your inspection with your left hand on the right D-ring attachment strap. Ensure the opening gate portion is facing toward the jumper. Take your left index finger and function the gate on the right D-ring attaching strap snap hook, ensuring it has spring tension. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the D-ring attaching strap down to the triangle link.

(8) Next, check for the proper routing of the right attaching loops. With your left index finger, ensure that the black loop is routed through the triangle link on the right adjustable D-ring attaching strap. Ensure that the white loop is routed through the black loop. With your left thumb, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure that the red loop is routed through the grommet on the leg strap release assembly.

Key Words: "BLACK, WHITE, RED"

Figure J-4. Jumpmaster personnel inspection sequence of the parachutist drop bag worn front mounted, using the single-point release system

(9) Bring both index fingers down and place them on top of the single-point release handle cross strap. With your thumbs, lift up and forward on the top portion of the cross strap. Inspect the hook-pile tape portion to ensure that it is properly mated to the release handle.

(10) With both index fingers, lift up and back on the top of the single-point release handle cross strap. Inspect the release handle cables and ensure that they are properly routed through the cross strap and not twisted.

(11) With your right index finger, follow the left cable as it passes through the red loop. Continue to inspect the release handle cable and ensure that it is stowed in the stowage flute and that the female portion of the left leg strap release assembly is not upside down. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess is stowed properly with a single heavyweight rubber retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until you reach the padded portion of the leg strap. Tug on the padded portion of the strap to ensure it is attached to the PDB and is not torn at the reinforced box stitching attaching point.

(12) With your left index finger, follow the right cable as it passes through the red loop. Continue to inspect the release handle cable and ensure it is stowed in the stowage flute and that the female portion of the right leg strap release assembly is not upside down. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess is stowed properly with a single heavyweight rubber retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until you reach the padded portion of the leg strap. Tug on the padded portion to ensure it is attached to the PDB and is not torn at the reinforced box stitching attaching point. As you tug on the leg strap, lay the PDB down so the back of the PDB faces up, exposing the lowering line attachment V-ring.

(13) Pick up your inspection grasping the lowering line where it attaches to the PDB with your right hand, while simultaneously grasping the lowering line quick-ejector snap with your left hand. Ensure that the lowering line is girth-hitched around the V-ring. Using your right hand, give the lowering line a tug at the attachment point, ensuring it is secured. Next, with your right index finger, trace up on the lowering line and ensure that it enters the stow-pocket on the left side (as worn by the jumper). Inspect the left side of the pocket to ensure the hook-pile tape is present and properly mated with the hook-pile tape portion of the lowering line and that there is no excess exposed outside of the pocket. Look at the hook-pile tape lowering line pocket. With your right index finger and thumb on either side of the pocket, trace the pocket inspecting the hook-pile tape portion to ensure it is completely mated and serviceable while feeling for the presence of a doubled heavyweight retainer band wrapped around the lowering line S-folds. Inspect the right side of the stow pocket to ensure there is no excess lowering line outside of the stow pocket. Also, inspect to ensure that the quick-ejector portion of the lowering line is coming out of the right side of the pocket.

(14) Continue to inspect the lowering line until you encounter the yellow release lanyard. The end of the lanyard should be secured to the lowering line with two wraps of 1-inch masking tape.

(15) Next, inspect the quick-ejector snap. Rotate it so the gate is visible from the side. With your left index finger, flick the opening gate to ensure it has spring tension and is free of damage. With your thumb, press on the quick-ejector snap activating lever to ensure it is seated properly on the ball detent. Finally, sweep the heavyweight retainer band to ensure it is present.

Begin your inspection of the jumper.

Figure J-4. Jumpmaster personnel inspection sequence of the parachutist drop bag worn front mounted, using the single-point release system (continued)

(1) Continue your inspection as normal until you reach the jumper's left main lift web.

(2) Forming a knife-cutting edge with your right hand, place it behind the jumper's left main lift web just behind the D-ring and friction adapter. Place your right thumb through the D-ring and sweep the friction adapter to ensure proper routing. Your left thumb seeks the equipment V-ring wherever it may be. Rotate the main lift web out a 1⁄4-turn to inspect and ensure that there are no twists. Next, visually inspect for proper stowage of excess webbing (rolled outboard). State where the equipment V-ring is in relation to the waistband, either above or below.

Key Words: "ABOVE OR BELOW" "RUCKSACK"

(3) Leaving your left thumb inside the equipment V-ring, take your right index finger and function the opening gate of the quick-release snap hook, ensuring it has spring tension.

Key Word: "SNAP"

(4) Palm the release lever to ensure the ball detent is properly seated.

Key Word: "SLAP"

(5) Sweep the heavyweight retainer band, ensuring it is in place around the release lever and ball detent.

Key Word: "SWEEP"

(6) Sweep the friction adapter to ensure the equipment attaching strap is properly routed.

Key Word: "SWEEP"

(7) Inspect the equipment attaching strap. Ensure the excess is rolled and stowed inboard and stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the attaching strap has no twists. Inspect the attaching strap where it attaches to the bag by reinforced box stitching. Ensure the attaching strap is not torn and that the bag is not torn at the attaching strap.

Key Word: "TRACE"

(8) Switch your hands to the right main lift web of the jumper. Forming a knife-cutting edge with your left hand, place it behind the jumper's right main lift web just behind the D-ring and friction adapter. Place your left thumb through the D-ring and sweep the friction adapter to ensure proper routing. At the same time, your right thumb seeks the equipment V-ring wherever it may be. Rotate the main lift web out a 1⁄4-turn; visually inspect and ensure that there are no twists in the main lift web. Next, visually inspect for proper stowage of excess webbing (rolled outboard).

(9) State where the equipment V-ring is in relation to the waistband, either above or below.

Key Words: "ABOVE OR BELOW, RUCKSACK"

Instruct the jumper: "JUMPER RAISE YOUR ARM."

(10) Leaving your right thumb inside the equipment V-ring, take your left index finger and function the gate on the quick-release snap hook, ensuring it has spring tension.

Key Word: "SNAP"

(11) Palm the release lever to ensure the ball detent is properly seated.

Key Word: "SLAP"

(12) Sweep the heavyweight rubber retainer band, ensuring it is in place around the release lever and ball detent.

Key Word: "SWEEP"

(13) Sweep the friction adapter to ensure the equipment attaching strap is properly routed.

Key Word: "SWEEP"

Figure J-5. Jumpmaster personnel inspection sequence of the parachutist drop bag worn rear mounted

(14) Inspect the equipment attaching strap. Ensure the excess is rolled and stowed inboard and stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the attaching strap has no twists. Inspect the attaching strap where it attaches to the bag by reinforced box stitching; ensure the attaching strap is not torn and that the bag is not torn at the attaching strap.

Key Word: “TRACE”

(15) With your right hand, grasp the quick-ejector snap of the hook-pile tape lowering line and give it a shake to make sure it is attached to the equipment V-ring. Press up on the locking gate with your index finger inspecting for spring tension. Rotate it so the gate is visible from the side. Visually inspect the gate to make sure it is closed properly.

(16) With your right thumb, press on the quick-ejector snap ejector lever to make sure the ball detent is properly seated. Sweep the heavyweight retainer band to ensure it is present.

(17) Trace down the yellow release lanyard and inspect for a piece of 1-inch masking tape to secure the lanyard to the lowering line.

(18) With your left index finger, trace down the lowering line to ensure it is routed between the jumper’s body and the shoulder strap of the PDB.

(19) Continue inspecting down the lowering line with your left hand until you reach the dual-sided hook-pile tape portion of the stow pocket. Ensure the hook-pile tape is present and is properly mated with the hook-pile tape portion of the lowering line.

(20) Visually inspect the right side of the stow pocket to ensure there is no excess lowering line outside of the stow pocket.

(21) Look between the jumper’s legs at the hook-pile tape lowering line pocket. With your right index finger as a guide, inspecting from left to right, trace the hook-pile tape portion of the pocket to ensure it is completely mated and serviceable.

(22) Once you arrive to the left side of the pocket, inspect to ensure the hook-pile tape is present and is properly mated with the hook-pile tape portion of the lowering line, and that there is no excess exposed outside of the pocket. At this time you are also inspecting to ensure that the quick-ejector portion of the lowering line is coming out of the pocket on the jumper’s right side and the girth-hitched portion of the lowering line is coming out of the jumper’s left side.

(23) Trace the lowering line to its attaching point on the PDB V-ring. Ensure that the lowering line is girth-hitched around the V-ring. With your right hand, give the lowering line a tug at the attachment point, ensuring it is secure.

(24) Grasp both shoulder straps and pull to the outside of the jumper’s legs. Make sure the jumper has a leg through each of the shoulder straps.

Key Words: “SWEEP TO THE WAISTBAND”

(25) As you move to the waistband, grasp the hook-pile tape lowering line and the equipment attaching strap with your right hand and scoop them into your left hand and pull up and away from the jumper.

(26) Your right hand is now your inspecting hand; inspect the origin of the waistband as normal. When inspecting the waistband with the hook-pile tape lowering line attached to the equipment V-ring below the waistband, it may be necessary to remove your hand and move around the lowering line in order to complete your inspection of the waistband.

Continue your inspection as normal.

Figure J-5. Jumpmaster personnel inspection sequence of the parachutist drop bag worn rear mounted (continued)

(1) Position yourself in front of the jumper and state the presentation of the jumper.

Key Word: "O2"

(2) Begin by visually checking that the mask is attached to the left side of the jumper's helmet.

Key Word: "O2"

(3) With your right hand, grasp the mask on the outside portion on the hardshell and rotate the mask out to the right, making the inside visible. Visually inspect the inside to ensure cleanliness. Look for the presence of the pressure demand relief valve cover with (brass ring), microphone element, anti-suffocation valve, and exhalation valve. With your left index finger, point to the exhalation valve and ensure it is present and free of holes and tears and sound off with "VALVE."

Key Word: "VALVE"

(4) Using your left index finger as a guide, place it inside the mask at the top (12 o'clock position) and trace it in a clockwise direction while gently peeling back the lip, exposing the inside of the mask. You are inspecting for tears, dirt, or damage to the inner soft-shell portion. Continue this process until you come back around to the 12 o'clock position.

Key Words: "NO DEBRIS"

(5) Do another sweep on the outer portion of the inner softshell, making sure there is no damage to the mask that would hinder a good seal to the jumper's face.

(6) With your right hand, gently pull out and rotate the mask on the jumper's face. With the left hand, connect the release buckle on the right side of the jumper's helmet, ensuring the male portion is fully seated into the female portion of the buckle with a click. Leave your left hand in place as a reference.

(7) With the right index finger, trace from the Fastex buckle on the left side of the mask up the left oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the left oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Leave your right hand in place as your reference hand.

(8) With your left index finger, trace from the release buckle on the right side of the mask up the right oxygen single strap to the Head-Loc tab, checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Next, continue tracing the remainder of the right oxygen single strap up to the corner buckle. Once you reach the corner buckle, push it into the corner buckle receiver to ensure it is properly seated. Your left hand now becomes your reference hand.

Note: If using the oxygen double straps with the ACH-ARC, you must begin your trace of the front left oxygen strap where the swivel clip attaches to the swivel clip shoe on the left ARC rail. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Next, trace the front right adjustable oxygen strap to the Head-Loc tab checking for twists and overall serviceability. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the front left adjustable oxygen strap until you reach the Fastex buckle; ensure it is properly assembled and serviceable. Then, trace from the Fastex buckle back along the back left adjustable oxygen strap until you reach the Head-Loc tab. Once at the Head-Loc tab, ensure it is serviceable and not cracked. Continue tracing the remainder of the back left adjustable oxygen strap until you reach the swivel clip. Tug on the strap to ensure the swivel clip is seated into the swivel clip shoe and that the swivel clip shoe is locked into the ARC rail. Repeat the process for the right oxygen straps, starting at the front right swivel clip and tracing to the Snapdragon buckle. After inspecting the right oxygen straps, continue the POM inspection as normal.

(9) With your right index finger, start at the nose of the jumper and conduct a 360-degree inspection of the mask on the jumper's face. Ensure the edges of the mask are not pinched or rolled under on the jumper's face. Give the mask a shake ensuring there is a good seal.

Key Words: "PROPER FIT"

Figure J-6. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system

(10) Bring your right index finger to the T-nut at the 2 o'clock position on the mask. Make sure the T-nut is present. In a clockwise motion, inspect the remaining three T-nuts.

Key Words: "1, 2, 3, 4 SCREWS"

(11) At this time, grasp the union elbow and medium-pressure delivery hose with your right hand as a reference.

(12) Visually inspect the hardshell for cracks. With your left hand, ensure the exhalation valve cover is secure by attempting to turn it clockwise. Inspect under the cover for the spring and for overall cleanliness.

Key Words: "TIGHT, NO DEBRIS"

(13) With your left index finger, point to the intercom block on the top of the mask ensuring it has two screws present, then attempt to seat the intercom cord, if used.

Key Words: "TWO SCREWS"

(14) Next, point to the anti-suffocation valve rubber boot ensuring it is present and facing down.

Key Word: "BOOT"

(15) Visually inspect the regulator for damage and overall cleanliness. With your left hand, gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(16) With your left hand, grab the outer portion of the mask and, with your right hand, push the hose toward the mask to ensure the quick disconnect is properly seated. Then, pull on the hose to make sure that the quick disconnect is securely attached to the regulator.

Key Words: "PUSH IN-PULL OUT"

(17) Next, move your left index finger and thumb to the brass nut portion of the quick disconnect and your right index finger and thumb to the silver adapter nut; attempt to turn it inspecting for tightness. Inspect the remaining B-nut for tightness with the silver adapter nut in sequence to the union elbow.

Key Words: "TIGHT, TIGHT"

(18) Leaving your right hand in place on the union elbow, seek out the securing lanyard and give it a tug with your left index finger. Inspect the securing lanyard, ensuring it is attached to the mask on the jumper's left bottom attaching strap and the chinstrap is routed through the securing lanyard.

Key Words: "SECURE"

(19) At this time, Instruct the jumper: "JUMPER TURN YOUR HEAD TO THE RIGHT." Ensure there is a proper amount of slack in the medium-pressure delivery hose. (Note: Any extreme excess can be pushed back between the jumper's back and pack tray.)

(20) From the union elbow, trace the medium-pressure delivery hose with your right hand as it routes over the jumper's left shoulder and toward the back of the jumper's pack tray. The hose should be routed through both a girth-hitched heavyweight retainer band on the carrying handle and the carrying handle itself on the top-center of the jumper's container.

Key Words: "THROUGH AND THROUGH"

Move to the right side of the jumper.

Instruct the jumper: "JUMPER, RAISE YOUR ARM."

(21) With your left hand, trace the medium-pressure delivery hose as it protrudes from behind the jumper's back and ensure the hose is routed through a heavyweight retainer band attached to one of the right-side equipment tie-down loops. Continue tracing the hose from the retainer to the rubber sleeve above the B-nut. Grasp the B-nut and attempt to twist it ensuring it is tight. Grasp the swivel T and turn it, ensuring the connection rotates freely.

Key Words: "TIGHT, TURN"

Figure J-6. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system (continued)

(22) With your right hand, grasp the bottom of the oxygen bottles and push up. With your left hand, pull out on the reducer manifold leaving it in place as a reference. Place your right hand behind the oxygen bottles and visually and physically inspect to ensure the waistband is not twisted behind the oxygen bottles and the waistband is routed through both middle keepers on the oxygen bottle pouch.

Key Word: "ORIGIN"

(23) Continue your inspection of the waistband until you get to the first friction adapter on the wing flap; sweep it for proper routing.

(24) Next, with your right index finger and thumb, turn the filler port cap clockwise ensuring it is tight.

Key Words: "TIGHT"

(25) With your right index finger, point to the oxygen pressure gauge and state where the needle is in reference to the "1800" on the face of the gauge.

Key Words: "ONE OR ABOVE" or "BELOW ONE"

(26) Using the thumb of your left hand, turn the on/off toggle switch to the ON position in preparation for jump operations.

Key Words: "LOCK ON"

(27) Step in front of your jumper. Instruct your jumper: "JUMPER, BREATHE IN, BREATHE OUT." Listen for the flow of oxygen. It should stop when the jumper exhales.

(28) With your left hand, grasp the oxygen strap just above the release buckle. With your right hand, disconnect the POM from the right side of the jumper's helmet. Begin your inspection of the jumper from "Proper Harness Fit" and continue as normal.

Figure J-6. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system (continued)

(1) Position yourself in front of the jumper and state the presentation of the jumper.

Key Word: "O2"

(2) Begin by visually checking that the mask is attached to the left side of the jumper's helmet.

(3) With your right hand, grasp the mask on the outside portion on the hardshell and rotate the mask out to the right, making the inside visible. Visually inspect the inside to ensure cleanliness. Look for the presence of the pressure demand relief valve (brass ring), microphone element, anti-suffocation valve, and exhalation valve. With your left index finger, point to the exhalation valve and ensure it is present, free of holes, or tears and sound off with "VALVE."

Key Word: "VALVE"

(4) Using your left index finger as a guide, place it inside the mask at the top (12 o'clock position), and trace it in a clockwise direction while gently peeling back the lip, exposing the inside of the mask. You are inspecting for tears, dirt, or damage to the inner soft-shell portion. Continue this process until you come back around to the 12 o'clock position.

Key Words: "NO DEBRIS"

(5) Do another sweep on the outer portion of the inner soft-shell portion making sure there is no damage to the mask that would hinder a good seal to the jumper's face.

(6) With your right hand, gently pull out and rotate the mask on the jumper's face. With the left hand, insert the bayonet fitting into the receiver on the right side of the jumper's helmet and seat it with two clicks. Leave your left hand in place as a reference.

(7) With your right index finger, start at the nose of the jumper and conduct a 360-degree inspection of the mask on the jumper's face. Ensure the edges of the mask are not pinched or rolled under on the jumper's face. Give the mask a shake ensuring there is a good seal.

Key Words: "PROPER FIT"

Figure J-7. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system as worn with a helmet fitted with bayonets/bayonet receivers

(8) Bring your right index finger to the T-nut at the 2 o'clock position on the mask. Make sure the T-nut is present and excess webbing of the attaching strap is stowed properly by either tape or tacking. In a clockwise motion, inspect the remaining three T-nuts and attaching straps.

Key Words: "NUT, TAPE" (four times)

(9) At this time, grasp the union elbow and medium-pressure delivery hose with your right hand as a reference.

(10) Visually inspect the hardshell for cracks. With your left hand, ensure the exhalation valve cover is secure by attempting to turn it clockwise. Inspect under the cover for the spring and overall cleanliness.

Key Words: "TIGHT, NO DEBRIS"

(11) With your left index finger, point to the intercom block on top of the mask ensuring it has two screws present. Then, attempt to seat the intercom cord, if used.

Key Words: "TWO SCREWS"

(12) With your left index finger, point to the anti-suffocation valve boot to ensure it is present and that the opening is pointing down.

Key Word: "BOOT"

(13) Visually inspect the regulator for damage and overall cleanliness. With your left hand, gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(14) With your left hand, grab the outer portion of the mask and with your right hand push the hose toward the mask to ensure the quick disconnect is properly seated. Then, pull on the hose to make sure that the quick disconnect is securely attached to the regulator.

Key Words: "PUSH IN-PULL OUT"

(15) Next, move your left index finger and thumb to the brass nut portion of the quick disconnect and your right index finger and thumb to the silver adapter nut; attempt to turn it inspecting for tightness. Inspect the remaining B-nut for tightness with the silver adapter nut in sequence to the union elbow.

Key Words: "TIGHT, TIGHT"

(16) Leaving your right hand in place on the union elbow, seek out the securing lanyard and give it a tug with your left index finger. Inspect the securing lanyard, ensuring it is attached to the mask on the jumper's left bottom attaching strap and the chinstrap is routed through the securing lanyard.

Key Word: "SECURE"

(17) At this time, instruct the jumper: "JUMPER, TURN YOUR HEAD TO THE RIGHT." Ensure there is a proper amount of slack in the medium-pressure delivery hose. (Note: Any extreme excess can be pushed back between the jumper's back and pack tray.)

(18) From the union elbow, trace the medium-pressure delivery hose with your right hand as it routes over the jumper's left shoulder and toward the back of the jumper's pack tray. The hose should be routed through both a girth-hitched heavyweight retainer band on the carrying handle and the carrying handle itself on the top-center of the jumper's container.

Key Words: "THROUGH AND THROUGH"

Move to the right side of the jumper.

Instruct the jumper: "JUMPER, RAISE YOUR ARM."

(19) With your left hand, trace the medium-pressure delivery hose as it protrudes from behind the jumper's back and ensure the hose is routed through a heavyweight retainer band attached to one of the right-side equipment tie-down loops. Continue tracing the hose from the retainer band to the rubber sleeve above the B-nut. Grasp the B-nut and attempt to twist it ensuring it is tight. Grasp the swivel T and turn it, ensuring the connection rotates freely.

Figure J-7. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system as worn with a helmet fitted with bayonets/bayonet receivers (continued)

Key Words: "TIGHT, TURN"

(20) With your right hand, grasp the bottom of the oxygen bottles and push the oxygen bottles up. With your left hand, pull out on the reducer manifold leaving it in place as a reference. Place your right hand behind the oxygen bottles and visually and physically inspect to ensure the waistband is not twisted behind the oxygen bottles and the waistband is routed through both middle keepers on the oxygen bottle pouch.

Key Word: "ORIGIN"

(21) Continue your inspection of the waistband until you reach the first friction adapter on the wing flap; sweep it for proper routing.

(22) Next, leave your LEFT hand on the reducer manifold and using your right index finger and thumb, turn the filler port cap clockwise.

Key Word: "TIGHT"

(23) With your right index finger, point to the oxygen pressure gauge and state where the needle is in reference to the "1800" on the face of the gauge.

Key Words: "ONE OR ABOVE" or "BELOW ONE"

(24) Using the thumb of your left hand, turn the on/off toggle switch to the ON position in preparation for jump operations.

Key Words: "LOCK ON"

(25) Step in front of your jumper. Instruct your jumper: "JUMPER, BREATHE IN, BREATHE OUT."

Key Words: "BREATHE IN, BREATHE OUT"

(26) Listen for oxygen flow. It should stop when the jumper exhales.

(27) With your left hand, secure the oxygen strap just above the release buckle. With your right hand, disconnect the POM from the right side of the jumper's helmet.

Begin your inspection of the jumper from "Proper Harness Fit" and continue as normal.

Figure J-7. Jumpmaster personnel inspection sequence for the parachutist oxygen mask and Twin-53 oxygen system as worn with a helmet fitted with bayonets/bayonet receivers (continued)

(1) As you begin your inspection, visually inspect for the mask to be attached to the right side of the jumper's helmet.

(2) With your left hand, grasp the mask on the outside portion of the hardshell; rotate the mask making the inside visible. Look for the presence of the combination inhalation and exhalation valve.

Key Words: "VALVE"

(3) Using your right index finger as a guide, place it inside the center of the mask and pull out on the soft-shell portion at the 2 o'clock position of the mask. In a clockwise motion, visually inspect for the four self-sealing screws and the presence of debris. Ensure you inspect deep into the corners of the soft-shell portion.

Key Words: "TWO SCREWS, NO DEBRIS" X 2

(4) Look at the 12 o'clock position; working in a clockwise direction, visually inspect the soft-shell portion of the mask for serviceability and the ability to seal the mask on the jumper's face.

(5) Gently pull out and rotate the mask onto the jumper's face. Attach the bayonet fitting into the receiver on the left side of the jumper's helmet at least two clicks.

Figure J-8. Jumpmaster personnel inspection sequence for the MBU-12(P) oxygen mask, AIROX VIII, and the Twin-53 oxygen system

(6) From the nose of the jumper, look in a clockwise direction around the mask while looking for proper fit. Ensure the mask is not pinched or folded over on the jumper's face. Give the mask a shake ensuring there is a good seal.

Key Words: "PROPER FIT"

(7) Bring your right index finger to the T-nut at the 2 o'clock position on the jumper's face. Inspect for it to be present and ensure the excess webbing of the attaching strap is stowed properly by either tape or tacking. In a clockwise motion, inspect the three remaining T-nuts and attaching straps.

Key Words: "NUT, TAPE" (four times)

(8) With a knife-cutting edge of your left hand, tilt the jumper's head to the rear and look into the exhalation port with the exhalation valve. Ensure the valve is present and state the color you see.

Key Words: "I SEE (RED, GREEN, OR WHITE)"

(9) Disconnect the mask from the left side of the jumper's face. With an overhand motion of the right hand, place it on the hard-shell portion of the mask. Take care to not cover up any portion of the low-pressure delivery hose or the clamp connecting it to the mask. Inspect for the presence of a clamp; it may either be a metal clamp or a plastic zip tie.

Key Word: "CLAMP"

(10) Elongate the first third of the low-pressure delivery hose. Look at the front side and inspect the hose for holes or tears, paying close attention to the portion just below the clamp. Rotate the mask and the hose with your hands so you may inspect the backside of the hose; look for holes or tears. Do not move your head around the hose; move the hose in front of your face.

(11) Move your right hand down to your left hand making skin-to-skin contact. Move your left hand down another third and elongate the second third of the hose. Inspect the front side, then rotate the hose to inspect the backside for holes or tears. When you encounter the chest strap keeper, pull it out of the way in order to inspect behind it.

Note: The hose must be inspected completely. This means that the retainer or keeper must be moved to inspect behind it.

(12) Again, move both hands as previous. Elongate the final third of the hose and inspect the front and backside for holes and tears. When you encounter the clamp connecting the quick-disconnect connector to the low pressure delivery hose (it may either be a metal clamp or a plastic zip tie), inspect all the way around the top of the clamp, looking for holes or tears where the metal or plastic meets the hose. You may rotate the connector inside the AIROX VIII while inspecting for holes or tears.

Key Word: "CLAMP"

(13) With your left hand, grasp below the bulbous portion of the AIROX VIII. With your left thumb, pin back the dust cover on the top of the AIROX VIII, while with your right hand grasping the quick-disconnect connector and removing it from the AIROX VIII. Inspect for the chrome-locking ring to be present, and with your thumb, turn the ring to ensure it rotates freely.

Key Word: "RING"

(14) With your thumb, function the anti-suffocation valve by pushing down on the pin, ensuring there is spring tension.

Key Word: "SPRING"

(15) Inspect for the rubber O-ring to be present and ensure the lip is up.

Key Word: "LIP"

(16) Let go of the dust cover with your thumb. It should slap shut under its own spring tension. Then, pin the cover back up again.

(17) Look into the top of the AIROX VIII and ensure the debris screen is present and free of debris.

Key Words: "SCREEN/NO DEBRIS"

Reconnect the quick disconnect into the AIROX VIII.

Figure J-8. Jumpmaster personnel inspection sequence for the MBU-12(P) oxygen mask, AIROX VIII, and the Twin-53 oxygen system (continued)

(18) Pinch grip the oxygen fitting block. Give the AIROX VIII a shake ensuring it is properly attached to the oxygen fitting block. Rotate the oxygen fitting block to inspect for the four screws on the back side.

Key Words: "FOUR SCREWS"

Instruct the jumper: "JUMPER, RAISE YOUR ARM."

(19) Look in the ambient air port on the AIROX VIII and ensure the debris screen is present and free of debris.

Key Words: "SCREEN/NO DEBRIS"

(20) Inspect for the chrome-locking ring to be present, and use your thumb to ensure it rotates freely.

Key Word: "RING"

(21) With both of your thumbs, function the anti-suffocation valve, ensuring there is spring tension.

Key Word: "SPRING"

(22) Inspect for the rubber O-ring to be present and ensure the lip is up.

Key Word: "LIP"

(23) With your left hand, grasp the bulbous portion of the AIROX VIII. The right hand checks for tightness just below the AIROX VIII.

Key Word: "TIGHT"

(24) Look at the flow indicator window. Inspect both sides ensuring it is present and free of damage.

Key Words: "WINDOW, WINDOW"

(25) Grasp the blue B nut connecting the medium-pressure delivery hose to the bottom of the AIROX VIII and inspect for tightness.

Key Word: "TIGHT"

(26) With a knife-cutting edge of your right hand, trace the medium-pressure delivery hose up and under the waistband. With a knife-cutting edge of your left hand, trace the medium-pressure delivery hose down and under the main lift web, inspecting for proper routing.

(27) Place your right hand on the bottom of the oxygen bottles. At the same time, place your left hand on the manifold at the top of the oxygen bottles and lift up and out.

(28) While pulling out on the oxygen bottles, look behind them to visually inspect the origin. Place your right hand behind the oxygen bottles and sweep the waistband to ensure there are no twists and that the waistband routes through both middle keepers on the oxygen system pouch. Finally, sweep the friction adapter on the right wing flap strap.

Key Word: "ORIGIN"

(29) With either hand, attempt to turn the blue B nut where the medium-pressure delivery hose connects to the union elbow, ensuring it is tight.

Key Word: "TIGHT"

(30) Attempt to twist the union elbow ensuring it is tight within the manifold.

Key Word: "TIGHT"

(31) Rotate the bottles forward and check that the filler port cap is present and tight.

Key Word: "TIGHT"

(32) Look at the oxygen pressure gauge and state where the needle is in reference to the "1800" on the face of the gauge.

Key Words: "ONE OR ABOVE" OR "BELOW ONE"

Figure J-8. Jumpmaster personnel inspection sequence for the MBU-12(P) oxygen mask, AIROX VIII, and the Twin-53 oxygen system (continued)

(33) With your right or left index finger and thumb, rotate the on/off switch to the ON position, ensuring it locks all the way on. You should hear the oxygen flow into the mask and you should not feel any air flowing from the high-pressure relief port.

Key Word: "LOCK ON"

(34) Then, rotate the switch to the OFF position, ensuring it is locked all the way off.

Key Word: "LOCK OFF"

(35) At this time, start your inspection of the jumper from "Proper Harness Fit" and continue as normal.

Note: If conducting an actual jump, a flow check needs to be performed before continuing with your inspection.

a. Tell the jumper to mask; he needs to be able to mask by himself without any complications.

b. Turn the on/off switch to the ON position.

c. Look at the flow indicator window; tell the jumper to breathe. The indicator should move up. Then tell the jumper to exhale. The flow indicator should move back down.

d. If for some reason the flow indicator shows a continual flow of oxygen when the jumper exhales, there is typically a problem with the connection of the quick disconnect of the medium-pressure delivery hose to the AIROX VIII. Disconnect and reconnect the fitting, then look at the flow indicator again. If this does not fix the problem, call the oxygen technician for assistance.

e. Once you have completed the flow check, do not compromise the integrity of the oxygen system by disconnecting the quick disconnect of the medium-pressure delivery hose and the AIROX VIII.

Points of interest while inspecting the rest of the jumper while wearing the MBU-12 oxygen system:

- Once you reach the chest strap, ensure you move the oxygen hose out of the way in order to inspect the entire chest strap.
- When you inspect the right main lift web, you must inspect the oxygen fitting block for the four screws a second time.
- When you reach the waistband, there is no need to re-inspect the origin of the waistband, just move to the friction adapter on the oxygen wing flap adjustment strap. Sweep it and continue your inspection of the waistband.
- When you reach the jumper's right leg strap, you may need to flatten your left hand to trace the saddle up and under the oxygen system pouch, ensuring there are no twists.

If the jumper is wearing a front-mounted rucksack or belly roll, ensure the medium-pressure delivery hose is routed over the top of the quick ejector and that the flow of oxygen to the jumper will not be obstructed in any way.

Figure J-8. Jumpmaster personnel inspection sequence for the MBU-12(P) oxygen mask, AIROX VIII, and the Twin-53 oxygen system (continued)

J-2. Table J-1 provides JMPI key words for the MC-4, CMWH, PDB, and POM.

Table J-1. Key words for MC-4, center-mounted weapon harness, parachutist drop bag, and parachutist oxygen mask

Hollywood	Combat Equipment	Oxygen
Proper Fit	Parachutist Drop Bag	Oxygen
Trace, Place, Check, Check	Black, White, Red	* Valve
Two Swage Balls	Black, White, Red	No Debris
Proper Pocket		Proper Fit
Weapon or No Weapon	Weapon	1, 2, 3, 4, Screws
Proper Pocket	Port (For Center-Mounted Weapon Harness Only)	Tight, No Debris
Two Swage Balls		Two Screws
Free and Clear		Boot
Trace, Place, Check, Check		Tight
Snap, Shackle, Ring		Push In, Pull Out
Free and Clear		Tight, Tight
Above or Below		Secure
Above or Below, Waistband		* Turn Your Head to the Right
Hold (For Center-Mounted Weapon Harness Only)		Through and Through
Jumper Raise Your Arm		Jumper Raise Your Arm
Waistband		Tight, Turn
Origin		Origin
Two Kitbag Handles		Tight
Jumper Squat		* One or Above/Below One
Recover (For Center-Mounted Weapon Harness Only)		Lock On
* "Altimeter Setting" Correct or Incorrect		* Breathe In, Breathe Out
Jumper Turn		
* "Default Setting" Correct or Incorrect		
No LED		
* "CYPRES Setting" Correct or Incorrect		
Little Ring, Big Ring		
Not Shouldered, Bent, or Frayed, White		
Not Shouldered, Bent, or Frayed, White		
Jumper Bend		
Bottom, Left, Right, Top		
Not Shouldered, Bent, or Frayed, Red		
Note: The asterisk (*) indicates verbal key words the jumpmaster uses during the JMPI.		

JUMPMASTER PERSONNEL INSPECTION SEQUENCE OF THE MILITARY JAVELIN PARACHUTE SYSTEM WITH THE CYPRES AND ATC HELMET

J-3. Figure J-9, pages J-22 through J-26, depicts the inspection sequence of the Military Javelin Parachute System with the CYPRES and ATC helmet.

Note: The sequence used to detect and identify deficiencies is as follows: with hands and eyes working together, start at the front of the jumper, move toward the rear, top to bottom, and right to left. All references to right or left are the jumper's right or left, unless otherwise indicated.

(1) Start the inspection sequence by placing the index and middle fingers of each hand inside the base ring of the three-ring assembly to ensure the base rings are in the hollow of the jumper's shoulders.

Key Words: "PROPER FIT"

(2) Visually inspect the helmet to ensure it fits properly and is serviceable. Place your hands on both sides of the helmet and visually inspect the goggles for damage and clear lenses.

(3) Place both hands on the front left side of the helmet with your palms facing the jumper and fingers facing skyward. Trace your right hand across the rim of the helmet, feeling for any sharp or protruding edges. Once the hands are parallel, tilt the jumper's head to the rear to ensure the suspension pad is present and flush with the outer rim.

(4) Place your right index finger on the right front adjustable strap and trace down to the Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked and is serviceable. Continue to trace the strap to the low profile chin buckle to ensure it has no cracks and is properly secured.

(5) Trace the chinstrap portion under the jumper's chin to where it becomes the front left adjustable strap to ensure that both portions of the chinstrap are routed under the jumper's chin and are not twisted, cut, or frayed.

(6) Trace the front left adjustable strap up to the Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked and is serviceable. Continue to trace the strap back up to the helmet to ensure there are no twists.

(7) Leave your right hand on the chinstrap as your reference hand. Open the right main riser protective flap with your left hand. Form your left hand into a C shape and place your fingers under the inboard side of the right main riser. Trace forward to ensure that here are no twists. Sweep the confluence wrap with your thumb to ensure it is present and there are no broken strands on the stitching.

(8) Leave your left hand in place and grasp the small ring of the three-ring assembly with your right hand. Give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Next, give the medium ring a 1⁄4-turn to ensure it rotates freely and is not elongated. Shake the base ring to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration. (It should look like a snowman.)

(9) Place your right index finger next to the clamp on the ends of the main canopy release cable housings to ensure the clamp is present. Trace the housing up and under the jumper's right riser.

Key Word: "TRACE"

(10) Place the main canopy release cable-housing eye inside the grommet.

Key Word: "PLACE"

(11) With your left hand, grasp the inboard side of the canopy-locking loop and lift it up toward the jumper's head. Look inside the grommet to make sure the main canopy release cable runs through the canopy-locking loop and that the locking loop is not twisted over the top of the cable.

Key Word: "CHECK"

Figure J-9. Jumpmaster personnel inspection sequence for the Military Javelin Parachute System with CYPRES and ATC helmet

(12) With your thumbs, lift the outside edge of the riser and inspect for the main canopy release cable entering the stowage flute.

Key Word: "CHECK"

(13) Insert your right index finger behind the RSL quick release lanyard. The shackle is attached to the right riser by the metal ring and routed from rear to front. Elongate the RSL and ensure that it is free and clear of the base ring.

Key Words: "SNAP, SHACKLE, RING, FREE AND CLEAR"

(14) Push the main canopy cutaway pillow toward the mud flap and pin it back with your left thumb. With your right index finger, trace the hook-pile tape of the main canopy cutaway pillow to ensure it is at least 50-percent mated.

(15) Form a knife-cutting edge with your right hand and place it behind the chest strap extension. Move from your left to right inspecting the extension strap for twists. Sweep the friction adapter with your thumb to ensure the chest strap is properly routed. Turn the excess rolled and stowed portion of the chest strap a 1⁄4-turn outward to inspect behind it for twists and ensure it is rolled outboard and stowed with a slack retainer. Continue to inspect the chest strap in its entirety and visually check the jumper's left side for a weapon. State what you see.

Key Words: "WEAPON" or "NO WEAPON"

(16) If no weapon is found, bring your left index and middle finger underneath the reserve ripcord handle and place them inside the reserve ripcord pocket. Twist your fingers and look inside to ensure the ripcord handle is seated in the ripcord pocket.

(17) With your right index finger, ensure two swage balls are present on the end of the reserve ripcord cable.

Key Words: "TWO SWAGE BALLS"

(18) Ensure that the cable is properly routed with no broken strands. Make sure the cable runs through the reserve ripcord handle. Continue to trace the cable to where it enters the housing and inspect that the clamp is present and securing the cable housing to the harness. Visually inspect the reserve ripcord cable to ensure it is not misrouted around the main canopy release cable housing.

Key Words: "FREE AND CLEAR"

(19) Open the right main riser protective flap with your right hand. Form your right hand into a C shape and place your fingers under the inboard side of the left main riser. Trace forward to ensure there are no twists. Sweep the confluence wrap with your thumb to ensure it is present and there are no broken strands on the stitching.

(20) Leave your right hand in place and grasp the small ring of the three-ring assembly with your left hand. Give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Give the medium ring a 1⁄4-turn to ensure it rotates freely and is not elongated. Shake the base ring to ensure it is properly attached to the main lift web. Visually inspect the three-ring assembly for proper configuration. (It should look like a snowman.)

(21) Move your left index finger to the main canopy release cable housing and trace it up under the jumper's left riser.

Key Word: "TRACE"

(22) Place the main canopy release cable-housing eye inside the grommet.

Key Word: "PLACE"

(23) With your right hand, grasp the inboard side of the canopy-locking loop and lift it up toward the jumper's head. Look inside the grommet to ensure the main canopy release cable runs through the canopy-locking loop and that the locking loop is not twisted over the top of the cable.

Key Word: "CHECK"

Figure J-9. Jumpmaster personnel inspection sequence for the Military Javelin Parachute System with CYPRES and ATC helmet (continued)

(24) With your thumbs, lift the outside edge of the riser and inspect the main canopy release cable entering the stowage flute.

Key Word: "CHECK"

(25) Form a knife-cutting edge with your right hand and place it behind the jumper's left main lift web, just behind the D-ring, with your right thumb through the D-ring. Open the main lift web stow pocket with your left hand and expose the excess of the main lift web. Inspect the main lift web from top to bottom for twists. Ensure the excess is rolled outboard and stowed with a slack retainer. Sweep the friction adaptor to ensure proper routing of the main lift web and inspect the sizing color of the main lift web. State the color.

Key Words: "I SEE (COLOR). SWITCH"

(26) Switch your hands to the right main lift web of the jumper. Form a knife-cutting edge with your left hand and place it behind the jumper's right main lift web just behind the D-ring with your left thumb through the D-ring. Open the main lift web stow pocket with your right hand to expose the excess of the main lift web. Inspect the main lift web from top to bottom for twists. Ensure the excess is rolled outboard and stowed with a slack retainer. Sweep the friction adaptor to ensure proper routing of the main lift web, and inspect the sizing color of the main lift web. State the color.

Key Words: "I SEE (COLOR). CORRECT OR INCORRECT. WAISTBAND"

(27) Form a knife-cutting edge with your right hand and reach under the waistband to place your fingers on the origin of the waistband as it appears from the container. Visually inspect that the oxygen pouch is stowed.

Key Words: "ORIGIN AND STOWED"

Note: The oxygen pouch must be stowed out of the way when there is not an oxygen bottle in it.

(28) Trace the waistband forward with your right hand to ensure that the waistband is routed through the oxygen pouch waistband retainer. Ensure the waistband is over the right main lift web, and continue to inspect for twists. Turn the excess rolled and stowed portion of the waistband a 1⁄4-turn outward to inspect behind it for twists and ensure it is rolled outboard and stowed with a slack retainer. Sweep the friction adapter with your thumb to ensure the waistband is properly routed. Ensure the waistband is routed over the left main lift web and through the equipment pouch retainer. Continue to inspect until the waistband terminates at the container.

(29) Move up to the top of the equipment pouch and grab the equipment pouch zipper with your right index finger and thumb. Inspect that it is fully zipped and that the pull-the-dot fastener is seated.

Key Words: "ZIP, SNAP"

Instruct the jumper: "JUMPER, SQUAT."

Key Words: "JUMPER SQUAT"

(30) Your right hand is now your reference hand. Form a knife-cutting edge with your left hand and place it under the gate of the jumper's right leg snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Sweep the friction adapter with your thumb to ensure proper routing of the leg strap. Verify that the excess webbing is stowed properly with a slack retainer.

(31) Place your right thumb next to your left fingers on the inside of the leg strap; trace along the leg strap to inspect for twists until you reach the saddle or your hand stops between the jumper's legs.

(32) Keep your right hand in place and reach around the back of the jumper, hooking your left hand fingers to the inside of the saddle making contact with your right thumb. Trace up to inspect for twists until you reach the quick-fit hip ring. This is a visual inspection as well as a physical inspection.

(33) Keep your left hand in place as your reference hand. Form a knife-cutting edge with your right hand and place it under the gate of the jumper's left leg snap hook. Press up on the locking gate with your index finger inspecting for spring tension. Sweep the friction adapter with your thumb to ensure proper routing of the leg strap. Verify that the excess webbing is stowed properly with a slack retainer.

Figure J-9. Jumpmaster personnel inspection sequence for the Military Javelin Parachute System with CYPRES and ATC helmet (continued)

(34) Place your left thumb next to your right fingers on the inside of the leg strap; trace along the leg strap to inspect for twists until you reach the saddle or your hand stops between the jumper's legs.

(35) Keep your left hand in place and reach around the back of the jumper, hooking your left hand fingers to the inside of the saddle making contact with your right thumb. Trace up to inspect for twists until you reach the quick-fit hip ring. This is a visual as well as a physical inspection.

(36) Keep your right hand in place as your reference hand. Grab the jumper's left wrist just above the altimeter with your left hand. Without looking at the altimeter, place your right hand on the altimeter's face and attempt to rotate the altimeter around the jumper's wrist. It should be snug. Look at the face of the altimeter and read aloud where the needle is set; then read aloud the predetermined altimeter setting you have written on your hand. At this point you are inspecting the proper altimeter setting. Inspect the lens for damage and give the altimeter face a gentle tap with your right thumb to ensure it is present.

Key Words: "+500, +500 CORRECT", OR "-500, +500 INCORRECT"

Instruct the jumper: "JUMPER, TURN."

Key Words: "JUMPER TURN"

(37) Once the jumper has turned 180 degrees to his right, verify the goggles are secured to the helmet by pointing to the goggle strap.

(38) Place both hands on the left side of the helmet with your palms facing the jumper and your fingers pointed skyward. Trace the rim of the helmet with your right hand, feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the helmet and tilt the jumper's head forward. Point to the adjustment dial to ensure it is present.

(39) Place the right index finger on the right rear adjustable strap and trace down to the Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked. Continue to trace the strap until it connects with the chinstrap to ensure it is not twisted, cut, or frayed.

(40) Place your left index finger on the rear left adjustable strap and trace down to the rear left Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked. Continue to trace the rear left adjustable strap until it connects with the chinstrap to ensure it is not twisted, cut, or frayed.

(41) Open the reserve protective flap with your right hand and pin it up out of the way. With your left index finger, open the RSL loop and ensure that the cutaway cable is routed through the loop. With your left index finger, locate the red skyhook lanyard and ensure it is girth-hitched to the RSL loop. Continue the inspection and note the presence of the white ripcord lanyard girth-hitched to the RSL loop.

Key Words: "WHITE UP, RED DOWN, THROUGH"

(42) Inspect down the white ripcord lanyard until you encounter the Velcro. Ensure that the Velcro is attaching the white ripcord lanyard to the top reserve closing flap.

Key Word: "ATTACHED"

(43) Continue your inspection until you reach the reserve closing pin. Inspect the pin to ensure that it is properly seated, not bent, and the white Dyneema closing loop is not frayed.

Key Words: "NOT BENT OR FRAYED"

(44) Ensure the CYPRES control unit is secure in the clear pocket protector.

Key Words: "1500 35 A CORRECT"

(45) Point at the CYPRES control unit's button and ensure it is the proper CYPRES default for your current free-fall operation.

(46) Point at the CYPRES control unit's LED indicator light and verify it is not lit.

Key Words: "NO LIGHT"

(47) Press the CYPRES control unit's button once to verify that the light turns on.

Figure J-9. Jumpmaster personnel inspection sequence for the Military Javelin Parachute System with CYPRES and ATC helmet (continued)

Key Word: "LIGHT"

(48) Watch for the light to turn off again.

Key Words: "NO LIGHT"

(49) Move your left index finger to the CYPRES control unit's digital readout screen and read the millibar setting. Read aloud the predetermined millibar setting that you have written on your hand. At this point you are inspecting for the proper millibar setting of the CYPRES.

Key Words: "0998 0998 CORRECT", OR "0989 0998 INCORRECT"

(50) With your left hand, find the reserve ripcord cable as it protrudes from its housing on the back of the jumper's left shoulder. Ensure the clamp is present on the reserve ripcord cable housing.

(51) Continue to inspect for broken strands on the reserve ripcord cable until you encounter the reserve locking pin. Ensure the locking pin goes through the reserve ripcord eyelet.

Instruct the jumper: "JUMPER, BEND."

Key Words: "JUMPER, BEND"

(52) Open the main protector flap with your left hand and pin it out of the way. Ensure the bottom flap was closed first in the container closing sequence by pointing at it with your right index finger.

Key Word: "BOTTOM"

(53) Move your finger to the next flap to ensure that the top flap was the second flap closed.

Key Word: "TOP"

(54) Move your finger to the left flap to ensure that it was the third flap closed.

Key Word: "LEFT"

(55) Move your finger to the right flap to ensure that it was the fourth flap closed.

Key Word: "RIGHT"

(56) Place your right index finger where the bridle exits from behind the right closing flap. Verify that the bridle is secured to the Velcro and that there is a half twist in the bridle below the Velcro.

(57) Continue to trace the bridle to where the main locking pin is located. Move the bridle out of the way and verify that the main locking pin is oriented from right to left, pointed upward, the main closing loop is not frayed, and that the bridle is not trapped behind the main locking pin.

Key Words: "CLEAR AND NOT FRAYED"

(58) Continue to trace the bridle down and verify that it is secured between the top and left flap (the second and third flap).

(59) Inspect the routing of the bridle to ensure that there is no excess bridle exposed.

(60) Verify that the pilot chute handle is accessible and that there is no excess pilot chute exposed.

(61) At this time, slap the BOC. This signifies that your JMPI is now complete.

Figure J-9. Jumpmaster personnel inspection sequence for the Military Javelin Parachute System with CYPRES and ATC helmet (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE OF THE MILITARY JAVELIN PARACHUTE SYSTEM WITH THE M-4 RIFLE

J-4. Figure J-10, pages J-27 through J-28, depicts the inspection sequence of the Military Javelin Parachute System with the M-4 rifle.

Inspection of the Weapon	
(1)	Start your inspection as normal and continue until you reach the chest strap. Visually check the jumper's left side for a weapon.
Key Word: "WEAPON"	
(2)	Place your left index finger on the chest strap to ensure the weapon sling is routed over the top of the chest strap, runs under the left main lift web, and runs over the jumper's shoulder.
(3)	Keep your left hand in place as your reference hand. With your right index finger, find the weapon sling from under the main lift web and over the jumper's shoulder. Trace the sling until it is attached to the weapon tie-down loop with 1⁄4-inch cotton webbing tied in a soft knot (bowknot). Tug on the tie-down loop to make sure it is properly secured.
Key Word: "SECURE"	
(4)	Continue to trace the weapon's sling to its attachment point on the buttstock and tug the sling to ensure it is attached to the weapon.
Key Word: "SECURE"	
(5)	Bring your right hand down behind the jumper's arm to find the pistol grip and inspect for proper orientation of the weapon, with the pistol grip pointed toward the rear of the jumper.
(6)	Drop down to the weapon's lower sling attaching point and tug on the sling to ensure it is secured to the weapon.
Key Word: "SECURE"	
(7)	Trace the sling to ensure it runs over the handguards, under the waistband, under the main lift web, and over the chest strap.
(8)	Continue your inspection as normal starting at the reserve ripcord stow pocket.
Inspection of the Rucksack	
(1)	Stand in front of the rucksack with the shoulder straps facing you.
Key Word: "RUCKSACK"	
(2)	Grab the right quick-release assembly (QRA) with your left hand.
(3)	Function the opening gate of the quick-release snap hook with your right index finger to ensure it has spring tension.
(4)	Grab the lanyard with your right hand and pull on it to ensure it is secured to the release lever of the QRA.
(5)	Slap down on the release lever to ensure it is properly seated.
(6)	Sweep the retainer band to ensure it is double wrapped in place around the release lever and ball detent.
(7)	Sweep the friction adapter to ensure the equipment-attaching strap is properly routed. You should see "This side out" on the friction adapter.

Figure J-10. Jumpmaster personnel inspection sequence of the Military Javelin Parachute System with the M-4 rifle

Inspection of the Rucksack (Continued)	
(8)	Ensure the excess of the equipment-attaching strap is stowed properly with a single retainer band.
(9)	Grab the left QRA with your left hand.
(10)	Function the opening gate of the quick-release snap hook with your right index finger to ensure it has spring tension.
(11)	Grab the lanyard with your right hand and pull on it to ensure it is secured to the release lever of the QRA.
(12)	Slap down on the release lever to ensure it is properly seated.
(13)	Sweep the retainer band to ensure it is double wrapped in place around the release lever and ball detent.
(14)	Sweep the friction adapter to ensure the equipment-attaching strap is properly routed. You should see "This side out" on the friction adapter.
(15)	Ensure the excess of the equipment-attaching strap is stowed properly with a single retainer band.
(16)	Ensure the six Fastex buckles are secure and the excess has been secured.
(17)	Grasp both shoulder straps and pull to the outside to ensure the shoulder straps are secure to the rucksack frame.
Key Word: "SECURE"	
(18)	Tug on the hook-pile tape lowering line where it is girth-hitched to the rucksack harness to ensure it is secured to the harness.
Key Word: "SECURE"	
(19)	Continue to trace the hook-pile tape lowering line to the Velcro keeper to ensure it is properly secured and that there is no excess lowering line sticking out.
(20)	Ensure the hook-pile tape lowering line runs right to left and is secured to the rucksack with two retainer bands.
(21)	Ensure the hook-pile tape lowering line is secured with a double-wrapped retainer band in the middle of the rolled and stowed portion.
(22)	Ensure the Velcro keeper is present, properly secured, and that there is no excess lowering line sticking out.
(23)	Continue to inspect the hook-pile tape lowering line until you encounter the yellow release lanyard and ensure it is cut to 6 inches. (If it is not cut, it must be secured with 1-inch masking tape.)
(24)	Ensure the closing gate of the snap hook on the hook-pile tape lowering line is present and has spring tension with no gap between the snap hook and the closing gate.
(25)	Look at the quick-ejector snap release lever to ensure the ball detent is properly seated, and then press on the release lever with your thumb.
(26)	Sweep the retainer band to ensure it is present and double wrapped.
(27)	Start your inspection sequence at proper fit or the oxygen system.
Key Words: "PROPER FIT" OR "O2"	

Figure J-10. Jumpmaster personnel inspection sequence of the Military Javelin Parachute System with the M-4 rifle (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE OF THE PARACHUTIST OXYGEN MASK 120-CUBIC INCH OXYGEN BOTTLE

J-5. Figure J-11, pages J-29 through J-31, depicts the inspection sequence of the POM 120-cubic-inch oxygen bottle.

(1) While standing in front of the jumper, state the presentation of the jumper.

Key Word: "O2"

(2) Begin by visually checking that the mask is attached to the left side of the jumper's helmet.

(3) Grab the mask on the outside portion with your right hand and rotate the mask out to make the inside visible. Inspect the inside for cleanliness.

(4) Point to the pressure demand relief valve brass ring with your left index finger.

Key Word: "RING"

(5) Point to the microphone element with the noise reduction sleeve.

Key Word: "SLEEVE"

(6) Point to the anti-suffocation valve.

Key Word: "VALVE"

(7) Point to the exhalation valve and inspect it for holes or tears.

Key Word: "VALVE"

(8) Place your left index finger inside the mask at the top and trace the inside portion of the mask in a clockwise direction, gently peeling back the lip, exposing the inside of the mask. Inspect all the way around for tears, dirt, debris, and damage to the inner soft-shell portion.

Key Words: "NO DEBRIS"

(9) Do another sweep on the outer portion of the inner soft-shell portion to make sure there is no damage to the mask that would hinder a good seal to the jumper's face.

(10) Gently pull out and rotate the mask on the jumper's face. With your left hand, connect the release buckle on the right side of the jumper's helmet and ensure the male portion is fully seated into the female portion of the buckle. Leave your left hand in place as a reference hand.

(11) With the right index finger, trace from the Fastex buckle on the right side of the mask up the right oxygen single strap to the Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked.

(12) Trace the remainder of the right oxygen single strap to the corner buckle; push the buckle into the corner buckle receiver to ensure it is properly seated. Leave your right hand in place as your reference hand.

(13) With the left index finger, trace from the release buckle on the left side of the mask up the left oxygen single strap to the Head-Loc tab to check for twists. Ensure the Head-Loc tab is not cracked.

(14) Trace the remainder of the left oxygen single strap to the corner buckle and push the buckle into the corner buckle receiver to ensure it is properly seated. Your left hand now becomes your reference hand.

(15) With your right index finger, start at the nose of the jumper and conduct a 360-degree inspection of the mask on the jumper's face. Ensure the edges of the mask are not pinched or rolled under. Give the mask a shake to ensure there is a good seal.

Key Words: "PROPER FIT

(16) Bring your right index finger to the screw at the 2 o'clock position on the mask and ensure it is present. In a clockwise motion, inspect the remaining three screws.

Key Words: "1, 2, 3, 4 SCREWS"

Figure J-11. Jumpmaster personnel inspection sequence of the parachutist oxygen mask 120-cubic-inch oxygen bottle

(17) With your right hand as a reference, grab the union elbow of the medium-pressure delivery hose. Visually inspect the hardshell for cracks.

(18) With your left hand, ensure the exhalation valve cover is secure by attempting to rotate it.

Key Word: "TIGHT"

(19) With your left index finger, point to the intercom block on top of the mask and ensure it has two screws present.

Key Words: "TWO SCREWS"

(20) Seat the intercom cord.

Key Word: "SEATED"

(21) Point to the rubber boot of the anti-suffocation valve to ensure the boot is present and the opening is pointing down.

Key Word: "BOOT"

(22) Visually inspect the regulator for damage and overall cleanliness. Gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(23) Grab the outer portion of the mask with your left hand and, with your right hand, push the hose toward the mask to ensure the quick disconnect is properly seated. Then, pull on the hose to make sure that the quick disconnect is securely attached to the regulator.

Key Words: "PUSH IN, PULL OUT"

(24) Grab the brass nut portion of the quick disconnect with your left hand and the silver adapter nut with your right hand. Attempt to turn the nut to inspect for tightness.

Key Word: "TIGHT"

(25) Grab the B-nut with your right hand and the silver adapter nut with your left hand. Attempt to turn the nuts to inspect for tightness.

Key Word: "TIGHT"

(26) Command the jumper to turn his head to the right and ensure a proper amount of slack in the medium-pressure delivery hose is present.

Key Words: "TURN YOUR HEAD TO THE RIGHT"

(27) With your right hand, trace the medium-pressure delivery hose over the jumper's left shoulder and toward the back of the jumper's pack tray. Form an upside down peace sign with your right index and middle finger and place it between the container carrying handle and the pack tray. Keep the medium-pressure delivery hose in front of your fingers to inspect that the hose is routed through a girth-hitched heavyweight retainer band and the carrying handle.

Key Words: "THROUGH AND THROUGH"

(28) Move to the jumper's right side. Instruct the jumper: "JUMPER RAISE YOUR ARM."

Key Words: "JUMPER RAISE YOUR ARM"

(29) Continue to inspect the medium-pressure delivery hose as it comes out from the jumper's lower back until it terminates at the manifold of the oxygen bottle.

(30) Visually inspect the oxygen pressure gauge and state where the needle is in reference to the letter p in psi on the face of the gauge.

Key Words "ABOVE P" OR "BELOW P"

(31) Inspect that the filler port cap to ensure that it is tight.

Key Word: "TIGHT"

(32) Place your left index and middle fingers on the oxygen system pouch securing straps to ensure that they cross the neck of the oxygen bottle and are secured to the oxygen system pouch.

Figure J-11. Jumpmaster personnel inspection sequence of the parachutist oxygen mask 120-cubic-inch oxygen bottle (continued)

Key Word: "SECURED"

(33) With your right hand, lock the On/Off oxygen lever to the ON position and attempt to rotate it to the OFF position. It should be locked in the ON position.

Key Words: "LOCK ON"

Instruct the jumper: "JUMPER, BREATHE IN, BREATHE OUT."

(34) Listen for the ability of the jumper to receive oxygen on demand.

(35) Use your left hand to disconnect the POM from the right side of the jumper's helmet.

(36) Start your inspection sequence at "Proper Fit".

Figure J-11. Jumpmaster personnel inspection sequence of the parachutist oxygen mask 120-cubic-inch oxygen bottle (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE OF THE MULTIMISSION PARACHUTE SYSTEM WITH THE CYPRES AND PROTEC HELMET

J-6. Figure J-12, pages J-31 through J-40, depicts the inspection sequence of the Multimission Parachute System with the CYPRES and Protec helmet.

Note: The sequence used to detect and identify deficiencies is as follows: with hands and eyes working together, start at the front of the jumper, move toward the rear, top to bottom, and right to left. This inspection sequence was used in the Military Free-Fall Jumpmaster Course for testing purposes. This is also a good sequence for all MFF jumpmasters to adopt and use while conducting JMPIs. All references to the right or left are the jumpmaster's right or left, unless otherwise indicated.

(1) Stand in front of the PDB with the shoulder straps away from you.

(2) Ensure that the PDB is symmetrical and the weight is balanced as best as possible.

(3) Ensure that the top section is filled out and the loops are centered on the container.

(4) Take your right index finger and function the opening gate of the D-ring attaching strap for spring tension and ensure the opening gate is facing the jumper. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the attaching strap down to the triangle link.

(5) Next, check for the proper routing of the left attaching loops. Ensure that the black loop is routed through the triangle link on the adjustable D-ring attaching strap. Ensure that the white loop is routed through the black loop. With your right thumb, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure that the red loop is routed through the grommet on the leg strap release assembly. Ensure the release handle cable is properly routed through the red loop.

(6) Continue down with your right index finger and elongate the release handle lanyard. Inspect to ensure that the release handle lanyard is not misrouted or excessively twisted.

(7) Leaving your right hand in place, pick up your inspection with your left hand on the right attachment strap snap hook. Ensure the opening gate portion is facing toward the jumper. With your left index finger, function the gate on the right attaching strap snap hook, ensuring it has spring tension. Sweep the friction adapter for proper routing. Flip the stowed excess out of the way with your thumb and inspect the strap for tears or major frays. Trace the attaching strap down to the triangle link.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet

(8) Next, check for the proper routing of the right attaching loops. With your left index finger, ensure that the black loop is routed through the triangle link on the right adjustable D-ring attaching strap. Ensure that the white loop is routed through the black loop. With your left thumb, lift up on the female portion of the left leg strap release assembly, just below the grommet, and inspect to ensure the red loop is routed through the white loop. Next, ensure that the red loop is routed through the grommet on the leg strap release assembly.

(9) Bring both index fingers down and place them on top of the single-point release handle cross strap. With your thumbs, lift up on the single-point release handle. Inspect the hook-pile tape portion to ensure it is properly mated to the release handle cross strap.

(10) Keeping your left index finger in place and using your right index finger as a guide, trace up the release handle and ensure it is properly routed under the cross strap. Inspect the release handle cables and ensure that they are properly routed underneath the cross strap and that they are not twisted.

(11) With your right index finger, follow the left cable as it passes through the red loop. Ensure that the female portion of the left leg strap release assembly is not upside down. Continue to inspect the release handle cables and ensure that they are stowed in the stowage flute. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess is stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until it terminates at its attaching point on the PDB. Ensure that the leg strap is not torn at the reinforced box stitching attaching point.

(12) With your left index finger, follow the right cable as it passes through the red loop. Ensure that the female portion of the right leg strap release assembly is not upside down. Continue to inspect the release handle cables and ensure they are stowed in the stowage flute. Continue inspecting the leg strap release assembly until you encounter the Fastex buckle. Inspect the Fastex buckle to ensure it is properly assembled and that it is not damaged. Sweep the friction adapter to ensure proper routing of the leg strap. Ensure the excess is stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing. Make sure the leg strap release assembly has no twists. Continue inspecting the leg strap release assembly until it terminates at its attaching point on the PDB. Ensure that the leg strap is not torn at the reinforced box stitching attaching point.

(13) Pick up your inspection where the lowering line attaches to the PDB. Ensure that the lowering line is girth-hitched around the V-ring. Using your right hand, give the lowering line a tug at the attachment point, ensuring it is secured. Trace up on the lowering line and ensure it enters the stow pocket on the left side (as worn by the jumper). Inspect the left side of the pocket to ensure the hook-pile tape is present and is properly mated with the hook-pile tape portion of the lowering line and that there is no excess exposed outside of the pocket. Look at the hook-pile tape lowering line pocket. Inspect the hook-pile tape portion of the pocket to ensure it is completely mated and serviceable. Feel for the presence of a doubled-over lightweight retainer band wrapped around the S-folds. Inspect the right side of the stow pocket to ensure the hook-pile tape is present and properly mated and that there is no excess lowering line outside of the stow pocket. Also, inspect to ensure that the quick-ejector portion of the lowering line is coming out of the right side of the pocket.

(14) Continue to inspect the lowering line until you encounter the yellow release lanyard. The end of the lanyard should be secured to the lowering line with two wraps of 1-inch masking tape.

(15) Next, inspect the quick-ejector snap. Rotate it so the gate is visible from the side. Flick the opening gate to ensure it has spring tension and that it is free of damage. With your right thumb, press on the quick-ejector snap ejector lever to make sure the ball detent is properly seated. Sweep the heavyweight retainer band to ensure it is present.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(16) Begin your inspection of the jumper.

(17) While standing in front of the jumper, state the presentation of the jumper.

Key Word: "O2"

(18) Begin with your left hand reaching to the front of the oxygen system, lift the heavyweight retainer band off of the on/off lever and lock the oxygen lever to the ON position.

Key Words: "LOCK ON"

Return the heavyweight retainer band back on the valve.

Key Word: "O2"

Key Words: "LOCK ON"

(19) Move back around to the front of the jumper and visually check that the mask is attached to the left side of the jumper's head.

(20) With your right hand, grasp the mask on the outside portion of the hardshell; rotate the mask out to the right making the inside visible. Inspect for the presence of the black inner shield, then peel it back and visually inspect for the housing diaphragm. Inspect the anti-suffocation seal (blue, orange, green, or red in color) on the housing diaphragm. Inspect the microphone to the right side of the mask for its presence and serviceability. Look for the presence of the pressure demand valve on the left side of the mask through the hole of the inner protector flap. Depress it to make sure it is operational and that you can hear the release of oxygen when depressed.

(21) Using your left index finger, place it inside the center of the mask and pull out on the soft-shell portion at the 2 o'clock position of the mask. In a clockwise motion, visually inspect for the four self-sealing screws. You are also peeling back the soft-shell portion and inspecting for the presence of debris or tears.

Key Words: "TWO SCREWS. NO DEBRIS" (two times)

(22) Using your left index finger, continue your inspection for 360 degrees, reaching your initial point of inspection. Now, starting back at the 2 o'clock position, conduct a visual inspection of the overall serviceability of the softshell for tears.

(23) Rotate the PHAOS mask onto the jumper's face with your right hand and use your left index finger to grab the right bayonet. Insert it into the right bayonet fitting and connect it, locking it in with at least two clicks. Inspect the bayonet for the presence of the 550 quick-release lanyard.

(24) Leaving your right hand in place and using your left index finger as your working hand, conduct a 360-degree inspection of the mask on the jumper's face. Ensure the mask is not pinched or folded over on the jumper's face. Give the mask a shake ensuring there is a good seal.

Key Words: "PROPER FIT"

(25) Bring your right index finger to the T-nut at the 2 o'clock position on the jumper's face. Inspect for it to be present and ensure the excess webbing of the attaching strap is stowed properly by either tape or tacking. In a clockwise motion, inspect the three remaining T-nuts and attaching straps.

Key Words: "NUT, TAPE" (four times)

(26) With your right hand, grab the angled brass connector behind the quick disconnect and, with your left hand, hold the hard-shell portion of the PHAOS mask. Push it toward the front of the mask, inspecting for the correct seating of the quick disconnect to the male portion of the housing assembly.

Key Words: "PUSH IN, PULL OUT"

(27) Command the jumper: "JUMPER, BREATHE IN, BREATHE OUT," and inspect/listen for the ability of the jumper to receive oxygen on demand. The flow should stop as the jumper exhales.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(28) With your left index finger and thumb, now grab the hex locking bar between the quick disconnect and the angled brass connector. Give the angled brass connector a 1⁄4-turn to ensure it is tight. With your left index finger and thumb, grab the angled brass connector. With your right index finger and thumb, grasp the medium-pressure delivery hose. Give it a 1⁄4-turn to ensure that it is tight.

Key Words: "TIGHT, TIGHT"

(29) With your right index finger, seek out the securing lanyard and give it a tug. Inspect that the chinstrap is routed through the securing loop and nothing else.

(30) With your right hand, trace the medium-pressure delivery hose routing over the jumper's left shoulder and toward the back of the jumper's pack tray. With your left index and middle finger, make an upside down peace sign and place it between the container carrying handle and the pack tray, while keeping the medium-pressure delivery hose in front of your fingers. The hose should be routed through both a girth-hitched heavyweight retainer band on the carrying handle and the carrying handle itself. Move toward the jumper's right side.

Key Words: "JUMPER RAISE YOUR ARM"

(31) Continue the inspection of the medium-pressure delivery hose to ensure it is coming out from the jumper's back and that the hose is secured by a heavyweight retainer band and attached to one of the right weapon tie-down loops. Continue to inspect until it terminates at the manifold of the oxygen bottle. Whether the medium-pressure delivery hose has a housing protector or not, give the hose a turn to ensure it is secured to the manifold.

Key Word: "TIGHT"

(32) Inspect the filler port cap to ensure it is tight.

Key Word: "TIGHT"

(33) Tilt the oxygen bottle forward and visually inspect the oxygen pressure gauge; state where the needle is in reference to the "1800" on the face of the gauge.

Key Words: "ONE OR ABOVE" OR "BELOW ONE"

(34) With the same hand, inspect that the oxygen system pouch zipper is zipped up completely and secured with a heavyweight retainer band to the tab on the outside of the oxygen system pouch.

Key Word: "ZIP"

(35) With your right hand, pull on the oxygen system pouch drawstring to ensure it is secured around the neck of the oxygen bottle.

Key Word: "SECURED"

(36) With your right hand, reach to the front of the manifold and rotate the on/off switch to the OFF position, replacing the heavyweight retainer band as well.

Key Word: "LOCK OFF"

(37) Give the jumper the command of breathe out and inspect the functioning of the anti-suffocation valve.

Key Words: "BREATHE OUT"

(38) Use your left hand to disconnect the PHAOS mask from the right side of the jumper's helmet. At this time, move back in front of the jumper and start your inspection sequence at "Proper Fit."

(39) **Proper Harness Fit.** Start the inspection sequence by first ensuring the jumper has the harness properly fitted. This is accomplished by placing the index and middle finger of each hand inside the base ring of the three-ring riser release assembly. Visually inspect both base rings and ensure they are in the hollow of the jumper's shoulders. If the harness is improperly fitted, it must be corrected before continuing.

Key Words: "PROPER FIT"

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(40) **Helmet and Goggles.** Visually inspect the helmet to ensure it fits properly and is serviceable. Place your hands on either side of the helmet and visually inspect the goggles. Ensure the goggles are present, clear in color, and free of damage.

(41) Turn the jumper's head to your right; visually inspect the goggle strap ensuring the goggles are secured to the helmet. Then, turn the jumper's head to your left; visually inspect the goggle strap ensuring the goggles are secured to the helmet.

(42) Ensure the helmet's left bayonet receiver is properly attached by giving it a shake with your right hand. Inspect for two screws on the outside of the bayonet fitting by placing your index and middle finger on the two screws.

Key Words: "TWO SCREWS"

(43) With the index finger and thumb of your right hand, grasp the chinstrap where it connects to the left side of the helmet. Give the strap a tug; ensure it is firmly attached to the helmet. Hook your right index finger inside the chinstrap. Without masking, trace the chinstrap to the Fastex buckle inspecting and ensuring that there are no twists and proper fit of the chinstrap.

(44) Inspect the Fastex buckle for proper assembly and sweep the friction adapter with your thumb to ensure proper routing. Continue along the strap and inspect the excess nylon to ensure it is rolled and stowed to the inboard. Inspect the remaining chinstrap ensuring that there are no twists until it terminates into the right side of the helmet. Give the strap a tug and ensure it is firmly attached to the helmet.

(45) Ensure the helmet's right bayonet receiver is properly attached by giving it a shake with your left hand. Inspect for two screws on the outside of the bayonet fitting by placing your index and middle finger on the two screws.

Key Words: "TWO SCREWS"

(46) Opening up the right riser cover with your left hand and leaving your right hand on the chinstrap as your reference hand, form your left hand into a C shape and place your fingers under the inboard side of the right main riser. Without masking, trace forward with your hand along the riser ensuring that there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and that there are no broken strands on the stitching.

(47) Leave your left hand in place and with your right hand, grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the medium ring; give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the base ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(48) Place your left index finger next to the tacking on the ends of the main canopy release cable housings; visually ensure tacking is present. Trace the housing up and under the jumper's right riser with your index finger. Place the main canopy release cable housing eye inside the grommet. With your right hand, grasp the top (green) cord of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop, and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. Visually inspect for the main canopy release cable running end to enter into the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, AND CHECK"

(49) Insert your right index finger behind the RSL quick release lanyard. The shackle is attached to the right riser by the metal ring and is routed from rear to front. Elongate the RSL and ensure that it is free and clear of the base ring.

Key Words: "RING, SHACKLE, FREE AND CLEAR"

(50) Leave your right hand in place and, using your left index finger, trace down the cutaway cable housing and ensure the cables are not twisted. Continue down to the green cutaway handle and ensure the handle is seated properly and the Velcro is properly mated.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(51) Form a knife-cutting edge with your right hand and place it behind the chest strap extension. Move your hand from your left to right inspecting the strap for no twists. When you encounter the friction adapter, use your thumb and sweep the friction adapter to ensure proper routing of the chest strap. Next, check the excess rolled and stowed portion of the chest strap. Give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect the excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retaining band or slack retainer. Continue to inspect the chest strap in its entirety. Once you have inspected the chest strap, visually check the jumper's left side for a weapon. State what you see.

Key Words: "WEAPON" OR "NO WEAPON"

(52) Place your left index finger on the chest strap. With your right index finger, visually and physically ensure the weapon sling is routed over the top of the chest strap and runs under the left main lift web and over the jumper's shoulder.

(53) Keep your left hand in place as your reference hand. With your right index finger, find the weapon sling as it protrudes from under the main lift web and over the jumper's shoulder. Trace the sling until it is attached to the weapon tie-down loop with 1⁄4-inch cotton webbing tied in a soft knot (bowknot). Give the knot a tug to make sure it is properly secured.

Note: Depending on the size of the jumper, weapon, weapon sling and buttstock configuration, the 1⁄4-inch cotton webbing will be girth-hitched on the sling up to 6 inches from the sling swivel or girth-hitched to the buttstock. Jumpmaster discretion should be used in order to determine the best possible attachment configuration. He must ensure the weapon will not move out from behind the wing flap, not protrude high on the jumper's shoulder, or inhibit the jumper's movement.

(54) Continue to trace the weapon's sling to its attachment point on the buttstock. Give the sling a tug to make sure the sling is attached to the weapon.

(55) Bring your right hand down and behind the jumper's arm to find the pistol grip; give it a slap with an open palm. You are inspecting for proper orientation of the weapon. Ensure the pistol grip is pointing toward the rear of the jumper.

Note: If the waistband will route through the carrying handle, use it. If it is not possible to run the waistband through the carrying handle, secure the weapon behind the waistband. Once the weapon is rigged, ensure it will not come loose while moving inside the aircraft or in free-fall. If a scope is being used, ensure the waistband is below the scope in order to prevent damage.

(56) Drop down to the weapon's lower sling attaching point. Give the sling a tug up and ensure it is secured to the weapon.

(57) Trace the sling and ensure it runs up and over the handguards. Make sure the sling runs under the waistband and the main lift web. Bring your right index finger to where the sling protrudes from under the main lift web and trace up to the chest strap.

(58) Using your right index finger, peel back the reserve ripcord handle and contain it with your left thumb. Using your right index finger, trace the reserve ripcord up and ensure the reserve ripcord handle is properly seated and the Velcro is properly mated. Continue with your right index finger, tracing the reserve ripcord cable up until it goes into the reserve ripcord cable housing; ensure there is tacking present. Your left index finger will hook the cutaway cable housing and elongate it. Ensure that the reserve ripcord cable is free and clear of the cutaway cable housing.

Key Words: "FREE AND CLEAR"

(59) Leave your left hand in place and open up the left riser cover with your right hand. Form a C shape and place your fingers under the inboard side of the left main riser. Without masking, trace forward with your hand along the riser ensuring there are no twists. Once you reach the confluence wrap, sweep it with your thumb. Ensure it is present and that there are no broken strands on the stitching.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(60) Leave your right hand in place and with your left hand, grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the medium ring; give it a 1⁄4-turn and ensure it rotates freely and is not elongated. Grasp the base ring; give it a shake to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (looks like a snowman).

(61) Using your right index finger, trace the housing up and under the jumper's left riser with your index finger. Place the main canopy release cable housing eye inside the grommet. With your left hand, grasp the top (green) cord of the canopy-locking loop and lift it up and toward the jumper's head. Look inside the grommet; make sure the main canopy release cable runs through the canopy-locking loop, and ensure the locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser.

(62) Visually inspect for the main canopy release cable running end to enter into the stowage flute on the underside of the rear riser.

Key Words: "TRACE, PLACE, CHECK, AND CHECK"

(63) Forming a knife-cutting edge with your right hand, place it behind the jumper's left main lift web just behind the equipment ring and friction adapter. Place your right thumb through the equipment ring. Rotate the main lift web out a 1⁄4-turn to inspect and ensure that there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(64) Switch your focus to the right main lift web of the jumper. Forming a knife-cutting edge with your left hand, place it behind the jumper's right main lift web just behind the equipment ring and friction adapter. Place your left thumb through the equipment ring. Rotate the main lift web out a 1⁄4-turn to inspect and ensure that there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

Instruct the Jumper: "JUMPER, RAISE YOUR ARM."

(65) Forming a knife-cutting edge with your left hand and using an overhand motion, move to the origin of the waistband as it protrudes from the pack tray. Trace the waistband forward from the origin until you encounter the right main lift web; ensure there are no twists in the waistband and it is routed under the right main lift web. With the right hand palm facing you, form a knife-cutting edge, making skin-to-skin contact with your left hand; continue to inspect the waistband for twists until you encounter the rolled and stowed portion. Give the waistband a 1⁄4-turn outward and inspect behind it ensuring there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer. With your thumb, sweep the friction adapter to ensure proper routing of the waistband. Moving on, inspect to ensure the waistband is routed over the left main lift web. Continue inspecting the waistband in its entirety until it terminates in the pack tray.

Key Word: "ORIGIN"

Instruct the Jumper: "JUMPER SQUAT."

(66) Look down at the jumper's left lower equipment ring and state what you see.

Key Words: "STRAP OR NO STRAP"

(67) If the G-strap is present, ensure that the B-12 snap hook connector is attached to the jumper's left side. Grasp the B-12 snap hook with the right hand and rotate it so it is visible from the side. Take your right index finger and function the opening gate to ensure it has spring tension and is free of damage.

(68) With your right thumb, sweep the friction adapter to ensure the equipment attaching strap is properly routed.

(69) Next, inspect the attaching strap. Give it a 1⁄4-turn outward and inspect for twists behind the excess webbing. Inspect excess webbing making sure it is rolled inboard and stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(70) Continue inspecting the strap, ensuring it has no twists until you encounter the equipment V-ring. Inspect the V-ring, ensuring it is centered on the jumper and it hangs slightly below crotch level.

(71) Inspect the left side of the strap for twists until you encounter the excess rolled and stowed portion of the webbing. Give it a 1⁄4-turn outward and inspect for twists behind the excess webbing and ensure the excess is stowed properly with a single heavyweight retainer band or webbing retainer not more than 4 inches from the end of the excess webbing.

(72) With your left hand, grasp the quick release system and give it a 1⁄4-turn outboard. Sweep the friction adapter with your thumb. Use your left index finger to function the opening gate inspecting for spring tension. Press on the quick-ejector snap release lever to make sure the ball detent is properly seated.

Key Word: "LEG STRAP"

(73) Form a knife-cutting edge with your left hand and place it under the gate of the jumper's right leg strap quick-release snap hook. Rotate it out and use your left index finger to function the opening gate inspecting it for spring tension. With your thumb, press on the quick-ejector snap ejector lever to make sure the ball detent is properly seated. With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring there are no twists. Inspect the excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(74) With your right hand, place your thumb next to your left hand, making skin-to-skin contact on the leg strap to the inside of the jumper's leg. Trace with your right hand along the leg strap inspecting and ensuring that there are no twists until you reach the saddle or your hand stops between the jumper's legs.

(75) Keeping your right hand in place, reach around the back of the jumper with your left hand and make skin-to-skin contact with your right hand. Hooking the fingers of your left hand between the padded portion of the saddle and the jumper's leg, continue to trace up inspecting and ensuring that there are no twists until you reach the BOC. This is a visual inspection as well as a physical inspection.

(76) Keep your left hand in place as your reference hand. Forming a knife-cutting edge with your right hand, place it under the gate of the jumper's left quick release system. Give it a 1⁄4-turn and with your right index finger, function the opening gate inspecting for spring tension. With your thumb, press on the quick-ejector snap ejector lever to make sure the ball detent is properly seated. With your thumb, sweep the friction adapter and inspect for proper routing of the leg strap. When you encounter the excess rolled and stowed portion of the leg strap, give it a 1⁄4-turn outward and inspect behind it ensuring that there are no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(77) With your left hand, place your thumb next to your right hand, making skin-to-skin contact on the leg strap to the inside of the jumper's leg. Trace with your left hand along the leg strap inspecting and ensuring that there are no twists until you reach the saddle or your hand stops between the jumper's legs.

(78) Keeping your left hand in place, reach around the back of the jumper with your right hand and make skin-to-skin contact with your left hand. Hooking the fingers of your right hand between the padded portion of the saddle and the jumper's leg, continue to trace up inspecting and ensuring that there are no twists until you reach the BOC. This is a visual as well as a physical inspection.

(79) Keep your right hand in place as your reference hand. With an overhand motion of your left hand, grasp the jumper's left wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face. Attempt to rotate the altimeter around the jumper's wrist. It should be snug and not excessively loose. Look at the face of the altimeter and read aloud where the needle is set. Then, read aloud the predetermined altimeter setting you have written on your hand. At this point you are inspecting for the proper altimeter setting. As you read the altimeter face, you are inspecting for the lens to be clear and free of damage.

Key Words: "+500, +500 CORRECT ALTIMETER SETTING", or " 500, +500 INCORRECT ALTIMETER SETTING"

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(80) With your right thumb, give the altimeter face a gentle tap to ensure it is present. Use your right finger or thumb to tug the heavyweight retainer band ensuring it is properly attached to the wrist strap.

Key Words: "+500, +500 CORRECT ALTIMETER SETTING", or "500, +500 INCORRECT ALTIMETER SETTING"

Instruct the jumper: "JUMPER, TURN."

(81) Once the jumper has turned 180 degrees to the right, move your left hand to the bottom of the reserve protective flap. Open the flap with your left hand and pin it up and out of the way.

(82) With your right index finger, open the RSL loop and ensure that the cutaway cable is routed through the loop. With your right index finger, locate the red skyhook lanyard and ensure it is girth-hitched to the RSL loop. Continue the inspection to the left and note the presence of the white ripcord lanyard girth-hitched to the RSL loop.

Key Words: "WHITE UP, RED DOWN, THROUGH"

(83) Inspect down the white ripcord lanyard until you encounter the Velcro. Ensure that the Velcro is attaching the white ripcord lanyard to the top reserve closing flap.

Key Word: "ATTACHED"

(84) Continue your inspection until you reach the reserve closing pin. Inspect the pin to ensure it is properly seated, not bent, and the white Dyneema closing loop is not frayed.

Key Words: "NOT BENT OR FRAYED"

(85) Next, move your right index finger over to the CYPRES control unit's digital readout screen. Read aloud the predetermined millibar setting on the screen. Read aloud the setting that you have written on your hand. At this point, you are inspecting for the proper setting of the CYPRES.

Key Words: "0788" "0788" "CORRECT", OR "0788" "0778" "INCORRECT"

(86) With your right index finger, find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

(87) With your right index finger, pick up your inspection of the control unit button. Ensure it is the proper CYPRES default for your current free-fall operation. Example: 1500/35 A "correct default".

(88) With your right index finger, flick the clear protective sleeve to ensure it is present and the CYPRES is properly stowed.

(89) Trace the cable and inspect the cable for any damage and for proper routing. The cable should run between the reserve ripcord cable housing and the jumper's left cutaway cable housing. Continue your inspection until it terminates into the reserve pack tray.

(90) Next, pick up your inspection at the reserve ripcord cable housing. Ensure there is tacking present. With your left hand, find the reserve ripcord cable as it protrudes from its housing on the back of the jumper's left shoulder. Inspect for the swage ball by giving the cable a slow pull with your right hand until you feel the cable stop. Continue inspecting the cable for proper routing and no broken strands until you reach the ripcord eyelet.

(91) Inspect the reserve ripcord cable eyelet and ensure that the closing pin is properly routed through the ripcord eyelet, it is not positioned in the metal grommet, and the bevel is facing up.

Key Words: "BEVEL UP NOT SHOULDERED"

Instruct the jumper: "JUMPER, BEND."

(92) With your left hand, open the main canopy protective flap. Pick up your inspection with your right index finger and move to the Sigma disk. Ensure that the Sigma disk arrow is oriented to the 12 o'clock position.

Key Words: "ARROW UP"

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

(93) Next, check the closing sequence. Beginning at the 3 o'clock position of the Sigma disk in a counterclockwise direction, ensure that the closing loop is routed *under* the first closing D-ring, *under* the second closing D-ring (12 o'clock), and *over* the last closing D-ring (9 o'clock).

Key Words: "UNDER, UNDER, OVER"

(94) Pick up your inspection at the drogue locking pin. Ensure that the drogue locking pin is through the main closing pin, through the flap 4 grommet, and seated. Ensure that the main locking pin is pointing to the 10 o'clock position.

Key Words: "THROUGH, 10 O'CLOCK"

(95) Moving down, ensure that the drogue release lines are not twisted or misrouted. The drogue release lines should be routed from the right, under the main closing pin eyelet, then exit over to the left.

Key Words: "UNDER, OVER"

(96) Next, inspect the drogue release handles by first pulling the left drogue release handle and ensuring that the drogue release line tightens. Pull the right drogue release handle and ensure that the drogue release line tightens.

Key Words: "PULL LEFT TIGHT, PULL RIGHT TIGHT"

(97) Pick up your inspection at the bridal window. Ensure that the drogue kill line is cocked by showing green.

Key Words: "I SEE GREEN"

(98) With your right index finger, trace the drogue bridle to the right, ensuring that it is properly stowed under flap one. Continue to inspect the bridle until it terminates in the drogue pocket ensuring that the bridle is running between the parachute container and the drogue chute.

(99) Inspect that the drogue is exposed approximately 2½ to 3½ inches. Inspect that the drogue handle is properly oriented by ensuring that it is in the horizontal position.

Tap out your jumper.

Figure J-12. Jumpmaster personnel inspection sequence of the Multimission Parachute System with the CYPRES and Protec Helmet (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR COMMERCIAL, OFF-THE-SHELF NONSTANDARD PARACHUTE SYSTEMS

J-7. Figure J-13, pages J-41 through J-44, depicts the inspection sequence of commercial, off-the-shelf nonstandard parachute systems.

Note: This inspection process covers the basic sequence for detecting and identifying deficiencies after a jumper dons a Service/USSOCOM Component approved commercial, off-the-shelf nonstandard parachute system. Due to manufacturer variations of container assemblies, each qualified jumpmaster MUST take special note of these variations with unit specific commercial, off-the-shelf nonstandard parachute systems.

Note: All references are the jumpmasters facing either the front or the rear of the jumper; with hands and eyes working together, start at the front of the jumper, moving toward the rear, from top to bottom, left to right.

JMPI sequence of a commercial, off-the-shelf nonstandard parachute system includes the CYPRES 2 and an approved helmet.

Start the inspection sequence as follows:

(1) Place the index and middle fingers of each hand inside the base ring of the three-ring riser assembly and ensure the base rings are in the hollow of the jumper's shoulders.

Key Words: "PROPER FIT"

(2) **Helmet.** Visually inspect the helmet to ensure it fits properly and is serviceable. Place both hands on the sides of the helmet and visually inspect the face shield or goggles for serviceability. For nighttime operations, check for clear lenses. Place both hands on the front left side of the helmet with your palms facing the jumper and fingers facing skyward. Trace your right hand across the rim of the helmet feeling for any sharp or protruding edges. Once the hands are parallel, tilt the jumper's head to the rear. Place your right index finger on the adjustable strap attaching point (left or right side) and trace down checking for twists. Ensure the chinstrap is properly routed through and connected to the buckle to ensure it is serviceable and properly secured. Ensure the chinstrap is under the jumper's chin and not twisted, cut, or frayed.

(3) **Left Three-Ring Riser Release Assembly.** Grasp the left small ring of the three-ring assembly with your left hand. Give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Next, give the medium ring a 1⁄4-turn to ensure it rotates freely and is not elongated. Shake the base ring to ensure it is properly attached to the main lift web. Visually inspect the three-ring riser release assembly for proper configuration (it looks like a snowman). Place your left index finger next to the clamp on the ends of the main canopy release cable housings to ensure the clamp is present. Trace the housing up and under the jumper's right riser.

Key Word: "TRACE"

(4) Place the main canopy release cable-housing eye inside the grommet.

Key Word: "PLACE"

(5) With your left hand, grasp the inboard side of the canopy-locking loop and lift it up toward the jumper's head. Look inside the grommet to make sure the main canopy release cable runs through the canopy-locking loop and the locking loop is not twisted over the top of the cable.

Key Word: "CHECK"

(6) Insert your right index finger behind the RSL quick release lanyard. The shackle is attached to the jumper's right riser by the metal ring and is routed from rear to front. Elongate the RSL and ensure it is free and clear of the base ring.

Key Words: "SHACKLE, RING, FREE AND CLEAR"

Note: For harness or containers with the RSL attached to the jumper's left riser, repeat step (3) above using the left index finger and elongate the RSL, ensuring it is free and clear of the base ring.

Key Words: "SHACKLE, RING, FREE AND CLEAR"

(7) With your right index finger, trace the hook-pile tape of the main canopy cutaway pillow to ensure it is at least 50-percent mated.

Key Words: "CHECK CUTAWAY HANDLE"

Figure J-13. Jumpmaster personnel inspection sequence of commercial, off-the-shelf nonstandard parachute systems

(8) **Chest Strap.** Form a knife-cutting edge with your right hand and place it behind the chest strap extension. Moving from your left to right, inspect the chest strap extension for twists. Sweep the friction adapter with your thumb to ensure the chest strap is properly routed. Turn the excess rolled and stowed portion of the chest strap 1⁄4-turn outward to inspect behind it for twists and ensure it is rolled outboard and stowed with a slack retainer. Continue to inspect the chest strap in its entirety.

Key Words: "CHECK CHEST STRAP"

(9) **Reserve Ripcord Handle.** Ensure the reserve ripcord handle is more than 50-percent mated.

Key Words: "CHECK RESERVE RIPCORD HANDLE"

(10) **Right Three-Ring Riser Release Assembly.** Grasp the right small ring of the three-ring assembly with your left hand. Give it a 1⁄4-turn to ensure it rotates freely and is not elongated. Next, give the medium ring a 1⁄4-turn to ensure it rotates freely and is not elongated. Shake the base ring to ensure it is properly attached to the main lift web. Visually inspect the three-ring assembly for proper configuration (it looks like a snowman).

Key Words: "INSPECT RIGHT THREE RING RISER RELEASE ASSEMBLY"

(11) Move your left index finger to the main canopy release cable housing and trace it up under the jumper's left riser.

Key Word: "TRACE"

(12) Place the main canopy release cable-housing eye inside the grommet.

Key Word: "PLACE"

(13) With your right hand, grasp the inboard side of the canopy-locking loop and lift it up toward the jumper's head. Look inside the grommet to ensure the main canopy release cable runs through the canopy-locking loop and the locking loop is not twisted over the top of the cable.

Key Word: "CHECK"

Instruct the jumper: "JUMPER, SQUAT."

Key Words: "JUMPER SQUAT"

(14) **Leg Straps.** Your right hand is now your reference hand. Form a knife-cutting edge with your left hand and place it under the jumper's right leg strap. If the B12 snap hooks are present, operate the opening gate checking for spring tension. Sweep the friction adapter with your thumb to ensure proper routing of the leg strap. Verify the excess webbing is properly stowed.

(15) Place your right hand next to your left hand and trace along the leg strap to inspect for twists until you reach the saddle or your hand stops between the jumper's legs.

(16) Keep your right hand in place; reach around the back of the jumper with your left hand hooking your fingers to the inside of the saddle, making contact with your right thumb. Trace up with your left hand to inspect for twists until you reach the quick-fit hip ring. This is a visual inspection as well as a physical inspection.

(17) Keep your left hand in place; your left hand is now your reference hand. Form a knife-cutting edge with your right hand and place it under the jumper's left leg strap. If the B12 snap hooks are present, operate the opening gate checking for spring tension. Sweep the friction adapter with your thumb to ensure proper routing of the leg strap. Verify the excess webbing is properly stowed.

(18) Place your left hand with left thumb next to your right hand and trace along the leg strap to inspect for twists until you reach the saddle or your hand stops between the jumper's legs.

(19) Keep your left hand in place; reach around the back of the jumper with your right hand hooking your fingers to the inside of the saddle, making contact with your left thumb. Trace up with your right hand to inspect for twists until you reach the quick-fit hip ring. This is a visual inspection as well as a physical inspection.

Key Words: "INSPECT LEG STRAPS"

Figure J-13. Jumpmaster personnel inspection sequence of commercial, off-the-shelf nonstandard parachute systems (continued)

(20) **Altimeter.** Keep your right hand in place as your reference hand. With your left hand, grab the jumper's **left** wrist just above the altimeter. Without looking at the altimeter, place your right hand on the altimeter's face and attempt to rotate the altimeter around the jumper's wrist. It should be snug. Look at the face of the altimeter and read aloud where the needle is set; then read aloud the predetermined altimeter setting you have written down on your hand. At this point you are inspecting the proper altimeter setting. Inspect the lens for damage and give the altimeter face a gentle tap with your right thumb to ensure it is present.

Key Words: "CHECK ALTIMETER" ("+500, +500 CORRECT", or "-500, +500 INCORRECT")

Rear of the Jumper.

Instruct the jumper: "JUMPER, TURN."

Key Words: "JUMPER TURN"

(21) **Helmet.** Once the jumper has turned 180 degrees to his right, verify the goggles (if no face shield) are secured to the helmet by pointing to the goggle strap. Place both hands on the left side of the helmet with your palms facing the jumper and your fingers pointed skyward. Trace the rim of the helmet with your right hand feeling for any sharp or protruding edges. Once the hands are parallel, place the thumbs on the rim of the helmet and tilt the jumper's head forward and check the serviceability of the padding.

Key Words: "CHECK REAR OF THE HELMET"

(22) **Reserve Ripcord Flap.** Open the reserve protective flap with your right hand and pin it up out of the way. With your left index finger, open the RSL loop and ensure the cutaway cable, if present, is routed through the loop.

(23) **Skyhook (if installed).** With your left index finger, locate the red skyhook lanyard and ensure it is girth-hitched to the RSL loop. Continue the inspection and note the presence of the white ripcord lanyard girth-hitched to the RSL loop. Inspect down the white ripcord lanyard until you encounter the Velcro. Ensure the Velcro is attaching the white ripcord lanyard to the top reserve closing flap. Continue the inspection until you reach the reserve closing pin.

Key Words: "WHITE UP, RED DOWN, THROUGH/ATTACHED"

(24) **Reserve Closing Pin.** Inspect the reserve closing pin to ensure it is properly seated, not bent, and the white Dyneema closing loop is not frayed.

Key Words: "NOT BENT OR FRAYED"

(25) **Check CYPRES 2.** Ensure the CYPRES 2 control unit is secure in the clear pocket protector. Point at the CYPRES 2 control unit button and ensure it is set to the proper default activation altitude for the current planned free-fall operation. If using the Expert CYPRES 2, ensure the default activation altitude of 750 feet is raised 300 to 1,050 feet above the intended DZ.

Key Words: "1000 35 A CORRECT"/"EXPERT CYPRES CORRECT"

(26) Point at the CYPRES 2 control unit's LED indicator light and verify it is NOT lit.

Key Words: "NO LED"

(27) Move your left index finger to the CYPRES 2 control unit's digital readout screen and read the millibar setting. Read the millibar setting that you have written down (on your hand) to inspect for the proper setting of the CYPRES 2.

Key Words: "0998,.0998 CORRECT", OR "0989,.0989 INCORRECT"

(28) **Reserve Ripcord Cable/Pin.** With your left hand, find the reserve ripcord cable as it protrudes from its housing on the back of the jumper's left shoulder and inspect for broken strands on the reserve ripcord cable until you encounter the reserve locking pin. Ensure the reserve locking pin goes through the reserve ripcord eyelet with the bevel facing up.

Key Words: "BEVEL UP"

Instruct the jumper: "JUMPER, BEND."

Key Words: "JUMPER, BEND"

Figure J-13. Jumpmaster personnel inspection sequence of commercial, off-the-shelf nonstandard parachute systems (continued)

(29) **Main Container.** Open the main container protector flap with your left hand and pin it out of the way. With your right index finger, touch (inspect) the left flap to ensure it was the third flap closed.

Key Word: "LEFT"

(30) Move your right finger to the right flap to ensure it was the fourth flap closed.

Key Word: "RIGHT"

(31) Place your right index finger where the bridle exits from behind the right closing flap. Verify the bridle is secured to the Velcro and there is a half twist in the bridle below the Velcro. Continue to trace the bridle to where the main locking pin is located. Move the bridle out of the way and verify the main locking pin is oriented from right to left, pointed upward, the main closing loop is not frayed, and the bridle is not trapped behind the main locking pin.

Key Words: "CLEAR AND NOT FRAYED"

Note: For commercial, off-the-shelf nonstandard parachute systems rigged with a collapsible pilot chute, the jumpmaster must ensure the pilot chute has been properly cocked by checking the visible portion of the spectra line, commonly referred to as the "kill line" and that it is either green or blue. The kill line can be observed just below the main locking pin through the viewing window in the bridle. Noncollapsible pilot chutes will not have a viewing window in the bridle.

(32) Continue to trace the bridle down and verify it is secured between the top and left flap (the second and third flap). Inspect the routing of the bridle to ensure there is no excess bridle exposed. Verify that the pilot chute handle is accessible and there is no excess pilot chute exposed. At this time, slap the BOC. This signifies the JMPI is now complete.

Figure J-13. Jumpmaster personnel inspection sequence of commercial, off-the-shelf nonstandard parachute systems (continued)

Appendix K

RA-1 Military Free-Fall Sustained Airborne Training

All U.S. Army MFF jumpers will receive SAT within the 24-hour period immediately prior to station time of an MFF operation.

Prior to SAT, MFF jumpmasters will ensure all jumpers are in the designated uniform, have appropriate equipment, and have their equipment properly rigged. This appendix describes the four major areas of SAT for MFF RA-1 jumps.

RA-1 Sustained Airborne Training

Note: *Except for the jumpmaster briefing, SAT will be performance oriented.*

At a minimum, MFF SAT will consist of the following:

- **Jumpmaster Briefing.** The jumpmaster briefing will include a manifest call, check of identification card and tags, and inspection of the jumper's uniform and their rigged individual equipment.
- **Aircraft Procedures.** Aircraft procedures will include mock door rehearsals and emergency procedures. Field expedient mockups can be used. The rehearsal will be performance oriented and conducted in the same manner as the actual operation. The actual jumpmaster will conduct the rehearsal.
- **Exit Procedures.** Exit procedures will include aircraft emergency procedures, oxygen procedures (if used), exit procedures, actions during free-fall, and other emergency procedures. The rehearsal will be conducted where all jumpers can observe and hear the jumpmaster.
- **Canopy Control and Landing Procedures.** This portion of SAT will include performance oriented training.

JUMPMASTER BRIEFING

K-1. Jumpmasters will brief the outline below (figure K-1, page K-2) to ensure all jumpers understand who the key personnel are and also understand the MFF operation, DZ, type of aircraft being jumped, emergency procedures, and the weather conditions.

Roll Call	
Identification card.	Identification tags.
Key Personnel	
Airborne commander officer in charge/ noncommissioned officer in charge. Jumpmaster. Assistant jumpmaster. Oxygen safety. Physiological technician. Equipment noncommissioned officer. Drop zone safety officer. Parachute rigger.	Malfunction noncommissioned officer. Drop zone medic. Drop zone communicator. Safety boat driver. Safety boat diver. Safety vehicle driver.
Operational Data	
Type jump: NT/day/night/water admin/tactical oxygen/CE/weapon. Drop altitude. Pull altitude.	Magnetic heading/distance to desired impact point. Drop zone location on exit.
Time Schedule	
Time and location of manifest. Issue/draw equipment. Departure time. Rehearsals. Communications check. Suit up. Jumpmaster personnel inspections.	Aircrew brief. Load time. Pre-breathe time. Takeoff time. Time on target. Other.
Individual Equipment	
Actions at the departure airfield.	In-flight rigging.
Drop Zone	
Length. Width. Drop zone elevation (mean sea level). Altimeter/Cybernetic Parachute Release System setting. Desired impact point. Landing pattern. Assembly area.	Method of marking. Terrain description. Obstacles on/around the drop zone. Track of aircraft. Alternate landing areas.
Aircraft	
Type. Aircraft heading. High-altitude release point. Type of exit. Exit dispersion. Exit altitude.	Number of passes. Exit order. Aircraft configuration/seating. Location of key personnel.
Weather	
Source of weather data. Time/location of weather data. Forecasted winds. Direction. Velocity.	Temperature at exit altitude. Temperature at surface altitude. Ceiling/cloud coverage. Visibility. Other.

Figure K-1. Jumpmaster briefing outline

AIRCRAFT PROCEDURES

K-2. Jumpmasters will cover all emergency procedures in figure K-2, pages K-3 through K-5.

Note: Chapter 9 of this ATP provides additional information on MFF emergency procedures.

Aircraft Emergencies on the Ground and Prior to Takeoff

The following procedures will be used for an emergency prior to takeoff:

- Jumpers take all commands from the primary jumpmaster.
- Jumpers exit the aircraft and assemble 300 meters in a safe direction, as directed by the primary jumpmaster. Once assembled, jumpers report to the primary jumpmaster.

Crash Landing (Takeoff to 1,000 Feet AGL)

The following procedures will be used for an emergency during takeoff to 1,000 feet AGL:

- Prepare for a crash landing. The signal will be six short rings of alarm bell or verbal warning to alert jumpers to prepare for a crash landing. One long continuous bell from the aircrew will indicate that a crash is imminent.
- Jumpers prepare for the crash by remaining seated, fastening their seat belts, and assuming the emergency landing position (cover head with arms and brace for impact).
- Wait for the aircraft to come to a complete stop; unbuckle.
- Exit and assemble upwind 300 meters off the nose of the aircraft or upwind of the aircraft in a safe distance and direction indicated by the jumpmaster.
- Conduct a head count, administer first aid, and signal for help.

Emergency Bailout (1,001 To 3,000 Feet AGL)

The jumpmaster will give the emergency bailout signal by extending his arm straight up and moving it in a circular motion with index finger pointed. The following procedures will be used:

- Prepare for an emergency bailout. The signal will be three short rings of alarm bell or a verbal warning will alert jumpers to prepare for an emergency bailout.
- The jumpmaster will give the emergency bailout signal by extending his arm over his head with the index finger pointed and moving it in a circular motion.
- The jumpmaster will then place a clenched fist over his reserve ripcord handle and thrust it out to the side, indicating that the jumper will exit on their reserve.
- The jumpmaster may issue abbreviated jump commands if time permits.
- On the jumpmaster's command, the jumper will conduct a dive exit opposite of the jumper in front of him.
- All jumpers will clear the aircraft and deploy the reserve canopy.
- All jumpers will complete the canopy controllability check, attempt to land with other jumpers, and assemble for a head count.

Emergency Bailout (3,001 Feet AGL and Above)

The jumpmaster will give the emergency bailout signal by extending his arm straight up and moving it in a circular motion with index finger pointed. The following procedures will be used:

- Prepare for an emergency bailout. The signal will be three short rings of alarm bell or a verbal warning will alert jumpers to prepare for an emergency bailout.
- The jumpmaster may issue abbreviated jump commands if time permits.
- The jumpmaster will give the emergency bailout signal by extending his arm over his head with the index finger pointed and moving it in a circular motion.

Figure K-2. Aircraft procedures briefing

Emergency Bailout (3,001 Feet AGL and Above) (Continued)
• The jumpmaster will then place a clenched fist over his main OTS ripcord handle and thrust it out to the side or point to the BOC, indicating that jumpers will exit on their main canopy. • On the jumpmaster's command, the jumper will execute a dive exit opposite of the jumper in front of him. • All jumpers will clear the aircraft and deploy the main canopy with no more than a 5-second delay. • All jumpers will complete the canopy controllability check, attempt to land with other jumpers, and assemble for a head count.
Premature Activation of Pilot Chute Inside the Aircraft
With the ramp or doors OPENED or CLOSED, procedures for a premature activation of the pilot chute inside the aircraft are as follows: • With the ramp or doors CLOSED: Shout "PILOT CHUTE," contain it, and notify the jumpmaster (to ensure the ramp or doors do not open). If the pilot chute activates or the container comes open, the container will be closed and the jumper will be seated, will fasten his seat belt, and will not jump. • With the ramp or doors OPEN: Shout "PILOT CHUTE," attempt to contain it, and notify the jumpmaster. • Once the parachute is contained, the jumper will move away from the open exit to a safe area forward in the aircraft. • If the reserve pilot chute is deployed, the jumper will be moved to the front of the aircraft. He will remove his equipment and place the parachute system inside the kit bag. He will fasten his seat belt and land with the aircraft. • If the pilot chute or parachute is pulled outside the aircraft, the jumper and jumpers in front of the jumper must exit immediately.
Nonoxygen Emergency Procedures
Note: For the purpose of this segment, commands and procedures are written in capital letters. The following aircraft procedures and jump commands will be used for nonoxygen jumps: • **LOAD AIRCRAFT.** Load the aircraft on the jumpmaster's signal in reverse stick order. • **DON HELMETS.** Don helmets and fasten seat belts. • **UNFASTEN SEAT BELTS.** At 1,001 feet AGL, unfasten seat belts at the jumpmaster's command. Helmets may be removed at the jumpmaster's discretion. • **20-MINUTES.** At the 20-minute warning, everyone awake and keep eyes on the jumpmaster. • **10-MINUTES.** At the 10-minute warning, keep eyes on the jumpmaster and don helmets if removed. • **Obtain update on winds.** Updated winds from the DZ, expressed in knots. • **CYPRES/PIN CHECK.** Jumpers receive a CYPRES and pin check. • **STAND UP.** Given 2 minutes from release point. Stand up, face rear of the aircraft, check CYPRES and pins on jumper in front of you and give him a thumbs-up, then conduct a check of all your handles and equipment. • **MOVE TO THE REAR.** Given approximately 1 minute from TOT. Pass signal back, then first jumper moves to hinge of ramp or 1 meter from jump door. • **STAND BY.** Given approximately 15 seconds from TOT. Return a thumbs-up. First jumper moves to edge of ramp or to jump door. • **GO.** Given at the release point. Exit as briefed. • **ABORT.** Given when release conditions are not favorable. Back up to hinge of ramp and await further instructions. ***Note:*** If at any time you experience an equipment-related problem, extend your arm toward the center of the aircraft and give a thumbs down signal.

Figure K-2. Aircraft procedures briefing (continued)

Oxygen – Aircraft Procedures/Jump Commands
Note: For the purpose of this segment, commands and procedures are written in capital letters. The following aircraft procedures and jump commands will be used for oxygen jumps: ● **LOAD AIRCRAFT.** Load the aircraft on the jumpmaster's signal in reverse stick order and— ▪ Wait to be seated by the oxygen representative. ▪ Receive console hose from the oxygen representative and connect to console. ● **DON HELMETS.** Don helmets and fasten seat belts. ● **UNFASTEN SEAT BELTS.** At 1,001 feet AGL, unfasten seat belts at the jumpmaster's command. ● **20-MINUTES.** At the 20-minute warning, everyone awake and keep eyes on the jumpmaster. ● **10-MINUTES.** At the 10-minute warning, keep eyes on the jumpmaster. ● **Obtain update on Winds.** Updated winds from the DZ, expressed in knots. ● **CYPRES/PIN CHECK.** Jumpers receive a CYPRES and pin check. ● **MASK.** On the command MASK: ▪ Connect right side oxygen fitting. ▪ Ensure you have a positive oxygen flow and extend a thumbs-up to the center of the aircraft. Hold the signal until the jumpmaster checks the entire aircraft and return a thumbs-up. Follow this procedure every time the jumpmaster initiates an oxygen check. ***Note:*** Do not remove helmets during oxygen operations. Clear goggles must be worn during oxygen jump operations. If at any time you experience oxygen-related problems, extend your arm, palm down, toward the center of the aircraft. ● **STAND UP.** Stand up, face the rear of the aircraft, check CYPRES, pins, and the oxygen bottle of the jumper to your front ensuring they are on and have sufficient pressure. (Gauge needle should be at 1 or above. Notify the jumpmaster, assistant jumpmaster, or oxygen representative of any deficiencies that are identified.) Check your handles and equipment; place right hand on the quick disconnect. ● **MOVE TO THE REAR.** Given approximately 1 minute from TOT. Pass signal back. The oxygen representative, assistant jumpmaster, and/or jumper will disconnect from the console and ensure you have a positive flow of oxygen. The first jumper moves to the hinge of ramp or 1 meter from jump door. ● **STAND BY.** Given approximately 15 seconds from TOT. Return a thumbs-up. First jumper moves to edge of ramp or to the jump door. ● **GO.** Given at the release point. Exit as briefed. ● **ABORT.** Given when release conditions are not favorable. Back up to hinge of ramp or 1 meter from the open door and await further instructions. ● **After Exiting:** ▪ Leave the mask connected until landing. ▪ After landing, turn off the oxygen bottle and disconnect the mask. Place mask in the container and replace red caps on all fittings.
Altimeter Failure Prior to Exit
If the jumper's altimeter fails on the aircraft, use the following procedures: ● The jumper will inform a jumpmaster and the defective altimeter will be exchanged with an onboard spare. ● If the onboard spare is in use or both altimeters fail prior to exit, the jumper will be moved to the front of the aircraft to a safe location, remain seated, and air land with the aircraft. ***Note:*** Even with an altimeter failure, the jumpmaster can command the jumper to exit the aircraft in an emergency situation.
Equipment Malfunction
Procedures for an equipment malfunction on the aircraft are as follows: ● Jumper gets the attention of the jumpmaster by extending his arm straight out with his thumb pointing down. ● Jumpmaster will correct the malfunction or make the determination for the jumper to land with the aircraft.

Figure K-2. Aircraft procedures briefing (continued)

EXIT PROCEDURES

K-3. As per jumpmaster's brief, jumpers will exit on a designated heading without losing stability in a controlled exit by executing a dive exit, poise exit, or box-man exit. Jumpmasters will cover all emergency procedures in figure K-3, pages K-6 through K-11.

Emergency Procedures During Exit

Procedures for a jumper in tow by equipment are as follows:

- The jumpmaster will try to free the hung equipment or cut the jumper free. As the jumper falls free, he will attempt to get into a good exit position. If the main parachute fails to deploy when pulled, the jumper will immediately execute cutaway procedures.
- If the jumper is unconscious, the jumpmaster will attempt to pull the jumper inside the aircraft.

Collision On Exit

Procedures for a collision on exit are as follows:

- Jumper will maintain his arch and gently push off the other jumper with an open hand.
- All jumpers involved will regain their stability, check their altimeter, check their ripcord handles, and continue the free-fall as planned.
- Jumpers making contact with other jumpers during exit will not grab any part of the other jumper or equipment if contact is made.

Emergencies During Free-Fall

Procedures for emergencies during free-fall are as follows:

- **Spinning.** Arch, check your hands and feet, counter the spin and maintain altitude awareness. If spinning out of control and unable to maintain altitude awareness, wave off and pull.
- **Tumbling.** Arch, keep your head up, check your hands and feet, and maintain altitude awareness. If tumbling out of control and unable to maintain altitude awareness, wave off and pull.
- **Entering a Cloud or Loss of Visibility.** Stop all movement and return to a stable, relaxed arch. Maintain altitude awareness. Pull at the prescribed altitude even if you are still in the cloud.
- **Lost or Loose Goggles.** If your goggles become loose or dislodged during free-fall, make one attempt to replace them. If unsuccessful, continue the free-fall as planned. Squint your eyes in order to maintain your vision. Maintain altitude awareness and pull at the prescribed altitude.
- **Altimeter Failure or Lost Altimeter During Free-Fall.** During both day and night operations, observe other jumpers and pull when they do. If no other jumpers can be observed, clear your air space, wave off, and pull your main ripcord immediately.
- **Rucksack Shifts.** Counter any turn caused by the rucksack shifting in free-fall by turning in the opposite direction. If the rucksack strap moves below his knee, the jumper makes one attempt to replace it while maintaining stability. If the jumper loses altitude awareness and is unable to gain control, he will wave off and pull the main OTS ripcord or deploy the hand-deployed pilot chute from the BOC.
- **Collision Avoidance During Free-Fall.** Jumpers—
  - Remember that the lower jumper has the right-of-way.
  - Never get over the top of another jumper.
  - Use forward glide, back slide, or side slide to get off a jumper's back.

Premature Activation of Parachute in Free-Fall

In the event of a premature activation of a parachute in free-fall, the jumper must first determine which parachute has activated. Procedures for premature activation of a parachute in free-fall are as follows:

- **Premature Opening: Main Parachute.** If the jumper has a premature opening of the main parachute, he will be able to determine if it is the main parachute by the three-ring assembly, deployment bag, and pilot chute. The jumper will conduct a controllability check and continue as planned.

Figure K-3. Exit procedures briefing

Premature Activation of Parachute in Free-Fall (Continued)

- **Premature Opening: Reserve Parachute.** If the jumper has a premature opening of the reserve parachute, he will be able to determine if it is the reserve parachute by NO three-ring assembly (snowman) on reserve risers, NO deployment bag, NO pilot chute, NO trim tabs on risers, center of reserve slider will have a mesh, and the bottom skin of the reserve canopy will have square holes. The jumper will conduct postopening procedures and continue the jump as planned. The jumper will not activate the main parachute.

Pull Priorities

Procedures for main canopy deployment during free-fall are as follows:

- Pull.
- Never sacrifice altitude for stability.

For OTS Ripcord. At the prescribed pull altitude, maintain your ARCH, use head tilt method to LOOK at the main ripcord and with the right hand, TRACE the main ripcord cable housing to the main ripcord handle while moving your left hand into the counter position. PULL the ripcord to full-arm extension and CHECK over the right shoulder to ensure the pilot chute has launched.

For BOC with Hand-Deployed Pilot Chute. At the prescribed pull altitude, maintain your ARCH, maintain positive legs, and keep head and eyes up on the horizon. The jumper reaches and grabs the handle of the hand-deployed pilot chute with his right hand while countering with the left hand. PULL the hand-deployed pilot chute out of the BOC pouch and turn the right hand palm to the rear, extending the right arm to full-arm extension to RELEASE the hand-deployed pilot chute. CHECK over the right shoulder to ensure the pilot chute has launched.

Canopy Control Procedures

Upon canopy deployment, these procedures will be followed:

- Postopening: Check canopy, grasp rear risers, and clear air space.
- Riser turn toward DZ.
- Unstow toggles, gain canopy control, and assume position in formation.
- Reach up and collapse slider. Conduct a canopy controllability check (3 S's: Square, Stable, and Serviceable).
- If applicable, position HAHO seat under buttocks.

Canopy Flight

After canopy deployment, the jumper will use the following procedures during canopy flight:

- **Full Flight.** Arms fully extended. Maximizes forward airspeed.
- **Quarter Brakes.** Toggles at eye level. Slowest descent rate.
- **Half Brakes.** Toggles at chest level. Decreases forward airspeed by half.
- **Full Brakes.** Toggles at lowest possible level. No forward airspeed.
- **Full Flight Turn.** Toggle pulled to full arms extension. Fast and steep turn.
- **Half Brake Turn.** During half brakes, pull to full-arm extension the direction you want to turn while maintaining half-braked opposite toggle. Turn will be slow and flat.
- **Front Riser Turn.** Faster and steeper.
- **Rear Riser Turn.** Faster and flatter.
- **Holding.** Into the wind.
- **Running.** With the wind.
- **Crabbing.** Crossing wind line at an angle.

Postexit Emergency Procedures

Malfunction types are as follows:

- **High-Speed Malfunction.** When the ripcord has been pulled, the deployment bag remains in the container.
- **Low-speed Malfunction.** Container assembly opens, but canopy does not fully or properly deploy.
- **Cutaway Decision Altitude.** 2,500 feet AGL for high-speed and low-speed malfunction.

Figure K-3. Exit procedures briefing (continued)

WARNING

You must cutaway the main parachute before pulling the yellow reserve ripcord handle (yellow pillow).

Cutaway Procedures for OTS Ripcord

Once you initiate the CUTAWAY sequence, continue it through to completion. Cutaway procedures for OTS ripcord are as follows:

- THROWAWAY main ripcord handle.
- ARCH after assuming a hard-arch body position.
- COUNTER with left hand.
- LOOK to identify the red cutaway pillow on the right main lift web, chest high, inboard.
- GRAB the red cutaway pillow with your right hand.
- PULL the red cutaway pillow to full-arm extension.
- THROW AWAY the red cutaway pillow.
- COUNTER with right hand.
- LOOK to identify the yellow reserve ripcord handle on the left main lift web, chest high, inboard.
- GRAB the yellow reserve ripcord handle with your left hand.
- PULL the yellow reserve ripcord handle to full-arm extension.
- THROW AWAY the yellow reserve ripcord handle.
- CHECK over right shoulder to ensure the reserve pilot chute deploys.

Cutaway Procedures for the BOC Hand-Deployed Pilot Chute

Once you initiate the CUTAWAY sequence, continue it through to completion. Cutaway procedures for the BOC hand-deployed pilot chute are as follows:

- ARCH after assuming a hard-arch body position.
- COUNTER with left hand.
- LOOK to identify the red cutaway pillow on the right main lift web, chest high, inboard.
- GRAB the red cutaway pillow with your right hand.
- PULL the red cutaway pillow to full-arm extension.
- THROW AWAY the red cutaway pillow.
- COUNTER with right hand.
- LOOK to identify the yellow reserve ripcord handle on the left main lift web, chest high, inboard.
- GRAB the yellow reserve ripcord handle with your left hand.
- PULL the yellow reserve ripcord handle to full-arm extension.
- THROW AWAY the yellow reserve ripcord handle.
- CHECK over right shoulder to ensure the reserve pilot chute deploys.

Total Malfunction

Only two attempts will be made to clear the total malfunctions listed below.

Note: Your first attempt is made during normal pull procedures.

- **Hard Ripcord Pull.** For OTS ripcord, if the initial pull is unsuccessful, reach across with the left hand in a punching motion and push the right hand and ripcord out. If this does not pull the ripcord, execute cutaway procedures.
- **Hard Hand-Deployed Pilot Chute Pull.** For BOC, if the initial pull is unsuccessful, use right elbow on the side of the container as leverage when pulling the pilot chute from the BOC. If the jumper is unsuccessful, he will execute cutaway procedures.

Figure K-3. Exit procedures briefing (continued)

Total Malfunction (Continued)
• **Floating Ripcord.** Look at the ripcord stow pocket. Locate the ripcord housing with the right hand. Locate the ripcord cable, which should be protruding from the housing. Pull the cable. If this attempt is unsuccessful, execute cutaway procedures. • **Failure to Locate the BOC Hand-Deployed Pilot Chute Handle.** Jumper will only make two attempts to locate the hand-deployed pilot chute handle. If unsuccessful, the jumper will execute cutaway procedures. • **Pack Closure.** After the jumper pulls the ripcord, he checks over the right shoulder. If no pilot chute deploys, he immediately checks over the right shoulder again. If this does not correct the problem, execute cutaway procedures.
Partial Malfunction
The below malfunctions are partial malfunctions; the jumper will execute cutaway procedures immediately. NO attempt will be made to clear these partial malfunctions: • **Horseshoe.** Pilot chute, parachute, or suspension lines are caught on you or your equipment. Execute cutaway procedures immediately. • **Bag Lock.** Canopy remains in deployment bag after pulling the main OTS ripcord or releasing the main hand-deployed pilot chute. Execute cutaway procedures immediately. **Line-Over.** Suspension line(s) routed over the canopy causing a distorted or bowtie canopy. Execute cutaway procedures immediately.
Deployment Emergencies
These procedures will be followed to correct the below actions during deployment emergencies: • **Hard Ripcord Pull (Main OTS Ripcord).** If the jumper pulls the main ripcord and the pull is unsuccessful, the jumper will come across with the left hand in a punching motion and push the right hand and ripcord out. If still unsuccessful, the jumper will perform cutaway procedures. • **Hard Hand-Deployed Pilot Chute Pull (BOC).** If the initial pull is unsuccessful, the jumper will use his right elbow on the side of the container as leverage when pulling the pilot chute from the BOC. If the jumper is unsuccessful, he will execute cutaway procedures. • **Floating Ripcord or Unable to See Ripcord (OTS Ripcord).** The jumper will maintain arch and look at the OTS ripcord pocket. If the jumper is unable to see the ripcord or if it is floating, he will locate the cable housing on his right shoulder with his right hand. The jumper will trace the cable housing down to where the ripcord cable protrudes out. He will then make a circle with his index finger and thumb around the cable and pull the cable to full-arm extension. The jumper will only make one attempt; if unsuccessful, he will perform cutaway procedures. • **Failure to Locate Hand-Deployed Pilot Chute Handle (BOC).** The jumper will only make two attempts to locate the hand-deployed pilot chute handle. If unsuccessful, he will execute cutaway procedures. • **Pilot Chute Entangled with Right Arm (BOC).** If the pilot chute is entangled with the right arm, the jumper will attempt to untangle it by using a swimming motion to remove the bridle from his arm. If unsuccessful, he will perform cutaway procedures. • **Pack Closure.** The jumper pulls the OTS ripcord or releases the hand-deployed pilot chute (BOC) and checks over his right shoulder. If no pilot chute deploys, he immediately checks over the right shoulder again. If this does not correct the malfunction, he will execute cutaway procedures. • **Hand-Deployed Pilot Chute in Tow (BOC).** In the event the main container assembly does not open after the hand-deployed pilot chute has been released, the jumper executes cutaway procedures. • **Pilot Chute Hesitation.** The jumper looks over the right shoulder to disrupt the partial vacuum to clear the burble. If the main parachute does not deploy, the jumper will perform cutaway procedures.

Figure K-3. Exit procedures briefing (continued)

Postopening Emergency Procedures
With all malfunctions, a canopy controllability check is required after appropriate actions are taken as per the malfunction. Postopening emergency problems that require a visual and/or canopy controllability check are as follows: ● Look left; turn left 90 degrees. ● Look right; turn right 90 degrees. ● Determine the flare point. ● 50-percent Rule: If the canopy requires 50-percent opposite toggle to counter a turn or if the canopy stalls prior to 50-percent brakes, the canopy is uncontrollable. ***Note:*** Make only two attempts to clear a malfunction. Cutaway procedures must be initiated by 2,500 feet AGL.
Streamer/Snivel
The jumper will reach up and release the brakes and pull the toggles down to full-brakes position for 3 to 4 seconds. The jumper will then let up slowly to 50-percent brake setting. If the malfunction is not clear, the jumper will make one more attempt to pull the toggles down to full-brakes position for 3 to 4 seconds. If the malfunction still has not cleared, the jumper will perform cutaway procedures.
Line Twists
Follow these procedures for line twists: ● Reach up with both hands, thumbs pointed down, and separate the risers. ● Use a bicycling motion or kick both legs in the opposite direction of the twist to untwist the lines. ● Do not unstow the brakes until line twists are cleared. ● Maintain altitude awareness and if unable to clear twists or the twists are still above the cascades by 2,500 feet AGL, initiate cutaway procedures.
Hung Slider
If the slider remains above the cascades, it will deform the canopy and degrade lift and drive performance to an unacceptable level. Follow these procedures for a hung slider: ● Pump both rear risers vigorously to move the slider downward. ● Release both sets of toggles and pump vigorously to bring the slider down completely if the rear risers are not successful. The slider must travel at least half way down, past the suspension line cascades, before attempting a canopy controllability check. ● If unable to clear the slider past the cascades or pass a canopy controllability check, initiate cutaway procedures by 2,500 feet AGL.
Closed End Cells
Follow these procedures for closed end cells: ● Pull toggles down to full-brake position and hold for 4 seconds and let up quickly. ● Repeat the procedure if end cells do not open. ● Conduct a canopy controllability check. Use the 50-percent rule if necessary. Consider wind, turbulence, distance, and condition of the DZ if canopy barely passes the test. If the canopy is controllable, fly and land as planned. ● If the canopy is uncontrollable or does not pass the test, initiate cutaway procedures by 2,500 feet AGL.
Pilot Chute Over The Nose
Follow these procedures for drogue pilot chute over the nose: ● Attempt to flip the pilot chute back over the top of the canopy by bringing toggles to full brakes (flaring) and letting the toggles up abruptly. ● Conduct a canopy controllability check 50-percent rule if necessary. ● If the canopy is controllable, fly and land as planned. ● If the canopy is uncontrollable, initiate cutaway procedures by 2,500 feet AGL.

Figure K-3. Exit procedures briefing (continued)

Tension Knots
Follow these procedures for tension knots: ● Stop the turn with opposite rear riser input. ● Snap the risers of the affected line group by pulling down and releasing. ● After two attempts, release the toggles and come to a full brake position, hold for 3 to 4 seconds, then let up slowly. ● After two attempts, conduct a canopy controllability check. If the canopy is controllable, fly and land as planned. ● If the canopy is uncontrollable, initiate cutaway procedures by 2,500 feet AGL.
Broken Suspension Lines
If suspension lines (A, B, C, D) break during opening, follow these procedures: ● **Stop the Turn with Rear Riser Input.** It may be difficult to identify the broken lines and the canopy may or may not look deformed. If there are two or more lines broken or if there are any A-lines broken, immediately perform cutaway procedures. ● **Conduct a Canopy Controllability Check.** Use the 50-percent rule if necessary. Consider wind, turbulence, distance, and condition of the DZ. If the canopy is controllable, fly and land as planned. If the canopy is uncontrollable, initiate cutaway procedures by 2,500 feet AGL.
Rips Or Tears
If you notice rips or tears in the bottom skin of the canopy during canopy check, follow these procedures: ● If possible, check your rate of descent with other jumpers. ● If you are descending faster than the other jumpers, execute cutaway procedures. ● If you are not descending faster than other jumpers, conduct a canopy controllability check. ● If there is a rip or tear on the top skin of the canopy, execute cutaway procedures.
Premature Brake Release
Follow these procedures for a premature brake release: ● Stop the turn with rear riser input (the released side). ● Immediately release the other toggle control line. ● Conduct a canopy controllability check. If the canopy is uncontrollable, initiate cutaway procedures by 2,500 feet.
Broken Control Lines
Follow these procedures for broken control line(s): ● Stop the turn using the opposite rear riser. ● Release the other control line. ● Steer using the good control line and opposite rear riser. ● Determine the flare point at a safe altitude using only the rear risers; note that the canopy responds much quicker while using the rear risers. ● Flare using both rear risers only.

Figure K-3. Exit procedures briefing (continued)

CANOPY CONTROL AND LANDING PROCEDURES

K-4. Jumpmasters will cover all canopy control and landing procedures in figure K-4, pages K-12 through K-17.

Canopy Control Procedures

Upon canopy deployment, these procedures will be followed:

- Postopening: Check canopy, grasp rear risers, and clear air space.
- Riser turn toward DZ.
- Unstow toggles, gain canopy control, and assume position in formation.
- Reach up and collapse slider. Conduct a canopy controllability check (3 S's: Square, Stable, and Serviceable).
- If applicable, position HAHO seat under buttocks.

Canopy Flight

After canopy deployment, the jumper will use the following procedures during canopy flight:

- **Full Flight.** Arms fully extended. Maximizes forward airspeed.
- **Quarter Brakes.** Toggles at eye level. Slowest descent rate.
- **Half Brakes.** Toggles at chest level. Decreases forward airspeed by half.
- **Full Brakes.** Toggles at lowest possible level. No forward airspeed.
- **Full Flight Turn.** Toggle pulled to full arms extension. Fast and steep turn.
- **Half Brake Turn.** During half brakes, pull to full-arm extension the direction you want to turn while maintaining half-braked opposite toggle. Turn will be slow and flat.
- **Front Riser Turn.** Faster and steeper.
- **Rear Riser Turn.** Faster and flatter.
- **Holding.** Into the wind.
- **Running.** With the wind.
- **Crabbing.** Crossing wind line at an angle.

Entering A Cloud Under Canopy

The jumper will follow these procedures when entering a cloud:

- Stops all turns and stays alert.
- Uses 50-percent brakes.
- Maintains heading and picks up reference points if possible prior to entering the cloud.
- Maintains altitude and air awareness.

Dual Canopy Deployments

If both the main and reserve canopies deploy on exit, the jumper identifies the configuration: side-by-side, bi-plane, in between, or down plane.

Side-By-Side

- Ensure canopies are not entangled by tracing all eight risers through the sliders to respective lines and canopies. Risers should cross properly.
- Do not release the brakes on either canopy. If brakes released on one canopy, fly at half brakes to match forward speed of the other canopy.
- If canopies are not entangled, place the left hand on the left rear riser of the left canopy.
- Place the right hand on the red cutaway pillow.
- Separate the canopies into a down plane with the left hand on the left rear riser of the left canopy.
- Peel and pull the red cutaway pillow to full-arm extension and let go of the riser and cutaway handle simultaneously.
- If the canopies are entangled, or if unsure whether they are entangled, or below 1,000 feet AGL, steer the best-looking canopy with the rear risers; gently turn toward the other canopy to prevent a down-plane configuration; do not attempt to flare and be prepared for a parachutist landing fall (PLF).

Figure K-4. Canopy control and landing procedures briefing

Bi-Plane

- Ensure canopies are not entangled by tracing all eight risers through their sliders to respective lines and canopies. Risers should cross properly.
- Separate canopies into a side by side.
- Use left rear riser of the left canopy to separate canopies into a down plane.
- Release the rear riser with the left hand while pulling the red cutaway pillow with the right hand.
- If the canopies are entangled or below 1,000 feet AGL, steer the front canopy with the rear risers, making all turns gently and the trail canopy will follow along.
- Make all turns gently in either direction, preventing canopies from going into a down plane.
- Attempt to steer into the wind.
- Do not attempt to flare and be prepared to conduct a PLF.

In Between

- Ensure canopies are not entangled by tracing all eight risers through their sliders to respective lines and canopies. Risers should cross properly.
- Separate canopies into a side by side.
- Use left rear riser of the left canopy to separate canopies into a down plane.
- Release the rear riser with the left hand while pulling the red cutaway pillow with the right hand.
- If the canopies are entangled or below 1,000 feet AGL, steer the front canopy with the rear risers, making all turns gently and the trail canopy will follow along.
- Make all turns gently in either direction, preventing canopies from going into a down plane.
- Attempt to steer into the wind.
- Do not attempt to flare and be prepared to conduct a PLF.

Down Plane

- Ensure canopies are not entangled by tracing all eight risers through their sliders to respective lines and canopies. Risers should cross properly.
- Pull the red cutaway pillow with the right hand.
- If the canopies are entangled, or if unsure whether they are entangled, or below 1,000 feet AGL, steer canopies toward each other with rear risers to get them into a side-by-side configuration. It may require a continuous effort all the way to the ground to keep canopies together.
- Do not attempt to flare and be prepared to conduct a PLF.

Partially Deployed Reserve

- Do not unstow brakes. If brakes have already been unstowed, slow the main to prevent the reserve from fully deploying.
- Attempt to pull in the reserve deployment bag and contain it in your arms.
- If the canopy begins to inflate, make sure that the suspension lines or risers do not become entangled with you or your equipment.
- Let the canopies settle into a configuration, continuously inspecting for entanglements. Follow the procedures for that configuration.
- If the reserve is still in the deployment bag, carefully gather and coil the suspension lines in one hand while lifting the bagged canopy.
- Attempt to prevent the locking stows from popping open and allowing the reserve canopy to slide out of the deployment bag.
- Continue until the bagged canopy is in hand. Keep a firm grip on the bagged canopy.
- Steer by leaning in the harness or reaching up with one hand to make rear riser turns.
- At 15 feet AGL, drop the bagged canopy to the ground and flare the canopy on rear risers. Be prepared to conduct a PLF.

Figure K-4. Canopy control and landing procedures briefing (continued)

Canopy Entanglements
Follow these procedures for entanglements with another jumper: ● Always attempt to steer clear of other jumpers by turning away. ● Lower jumper has the right of way. ● If a collision with another jumper is imminent, steer to avoid body-to-body contact. Assume the modified spread-eagle position. ● Protect your cutaway pillows with your left arm and attempt to bounce off. ● If line entanglement occurs, stay calm and do not grab cutaway pillows. ● Check altitude and look for the other jumper. ● Assess the situation before acting in any way. ● Communicate altitude and positive commands only. ● Never say "cutaway" unless you are telling the other jumper to execute cutaway procedures. If you intend to cutaway, use the words, "I'm executing emergency procedures."
Follow these procedures for entanglements above 2,000 feet AGL: ● If the higher jumper has a good canopy, that jumper should attempt to clear the entanglement while protecting emergency pillows. ● Follow your lines out of the entanglement if possible. ● If the entanglement can be cleared, the lower canopy should re-inflate within 150 to 200 feet. Both jumpers should complete a canopy controllability check and inspect their parachute and harness thoroughly for damage, then decide whether it is safe to continue to fly and land. ● If the canopy cannot be cleared, the engulfed jumper fails to respond or appears to be going unconscious, or the altitude is approaching 2,000 feet AGL, the lower jumper should communicate his intention to cutaway by saying "2,000 feet, I'm executing emergency procedures," then initiate cutaway procedures by 2,000 feet AGL after disconnecting his RSL. ● The higher jumper should clear the canopy from his face and controls so that he can see and steer. ● He should continue to clear the canopy if possible, keeping his cutaway pillows protected. ● If the canopy cannot be cleared safely, he should fly slowly with brakes to diminish the other canopies drag and potential for interference in flight and control.
Follow these procedures for entanglements between 2,000 feet AGL and 1,000 feet AGL: ● Jumpers should communicate altitudes and positive commands, such as "1,500 feet, hold onto me" or "1,000 feet, I got you". ● The lower jumper has two options. He can perform cutaway procedures after disconnecting his RSL or land with the higher jumper. ● If the lower jumper decides to land with the higher jumper, the lower jumper should jettison his equipment if worn. ● The higher jumper should maintain control of the lower parachutist and fly final approach at half brakes if possible. ● Higher jumper lands at half brakes; both jumpers should execute a PLF.
Follow these procedures for entanglements below 1,000 feet AGL: ● The higher jumper should make every effort to maintain the lower jumper's canopy. ● The higher jumper should maintain control of the lower jumper and fly final approach at half brakes if possible. ● The lower jumper should jettison combat equipment if worn. ● Both jumpers need to be prepared to execute a PLF.

Figure K-4. Canopy control and landing procedures briefing (continued)

Canopy Entanglements (continued)
Follow these procedures for entanglements when neither jumper has a good canopy: • Jumpers should attempt to establish communication such as altitudes and positive commands. • If both canopies are uncontrollable and/or collapsed, it may be difficult to establish which jumper is higher and which is lower and it may be alternating repeatedly. • If a jumper is entangled in lines, that jumper should attempt to free himself and cutaway first. • The lower jumper should cutaway after the higher jumper. • The higher jumper could be fatally engulfed in the lower jumper's lines and canopy if the lower jumper were to cutaway first. • If impact with the ground is imminent, both jumpers should deploy their reserve to increase the amount of fabric exposed and the extra drag created. • If both reserve canopies deploy, both jumpers perform cutaway procedures to clear from entanglement to prevent a down plane.
Follow these procedures for entanglements of an unclear traffic pattern: • Stay alert and keep your air space clear. • Maintain 25 meters horizontally and vertically. (Low man has the right of way.) • Offset canopies; do not fly directly behind another canopy as it causes turbulence. • Assess the situation and move into formation or get on the wind line and establish the traffic pattern. • Follow the low man or lead the group if you are the low man. • Stay upwind and use the 60-degree method to reach intended target. • Keep your options open and look for alternate landing areas en route to the DZ. Set up the pattern so that the entire group can be into the wind by 300 feet AGL. • When flying through clouds, come to half brakes and maintain your heading and altitude awareness until you pass through the clouds. Keep a sharp lookout for other jumpers.
Landing Pattern
Components of the pattern include holding area, downwind leg, base leg, and final approach. • **Downwind Leg.** Enter the landing pattern at 900 feet AGL. Offset from where you want to land 60-degree angle (dependent upon winds). Check lowering line. Fly the landing pattern at quarter to half brakes making no radical turns. • **Base Leg.** Turn onto the base leg (crosswind) at approximately 600 feet AGL. Adjust the angle (upwind or downwind) if needed, so that when you turn onto final approach you can land at the desired impact point. • **Final Approach.** Turn onto final approach (into the wind) so that you are facing upwind by 300 feet AGL and in normal wind conditions at a 60-degree angle. Continue to fly the canopy by applying brakes as needed and making heading adjustments of no more than 45 degrees with half brakes. Once on final, clear airspace below and lower combat equipment at 200 to 100 feet AGL. Be prepared to counter the weight shift. If your combat equipment has not been lowered by 100 feet AGL, you will land with your equipment attached.
Landing
Follow these procedures for landing: • At 200 feet AGL, go to full flight to fully inflate the canopy and generate speed for landing. • Initiate the flare between 10 to 15 feet AGL depending on the wind speed. Higher winds (11 to 18 knots) flare lower; lower winds (0 to 10 knots) flare higher. If you flare too high, hold toggles in the full brake position and be prepared to do a PLF. Do not use combat equipment as a flare indicator. • Continue to give toggle input as needed to counter gusts and keep the canopy over your head. • After landing, push risers to one side or pull one toggle to collapse the canopy. Follow SOPs for assembly procedures. For night landings, go to full brake position at approximately 100 feet AGL, look to the horizon, keep your feet and knees together, and execute a PLF.

Figure K-4. Canopy control and landing procedures briefing (continued)

Emergency Landing Procedures
Tree Landings
Attempt to steer away. If unable to avoid trees: ● If you have already lowered your combat equipment, jettison it. If not, leave it attached for added protection. ● Keep your goggles over your eyes and oxygen mask on if worn. ● Turn the canopy into the wind and attempt a vertical descent between the trees if growth is sparse. If dense trees, attempt to cap your canopy on top of the trees or catch the canopy on the thickest branches. ● Protect your face with your forearms. ● Keep your feet and knees together and be prepared to execute a PLF. ● If you are suspended and cannot climb down, wait for assistance.
Water Landings
Attempt to steer away. If unable to avoid water: ● Attempt to land as close to shore as possible. ● Jettison your combat equipment and oxygen mask if worn. ● Unhook your RSL; unfasten your chest strap and waistband. ● Land into the wind and flare as normal. Be prepared to do a PLF in case the water is shallow. ● After you have entered the water, release your leg straps, arch out of the harness, and swim free of the harness and suspension lines. ● If you are being dragged, pull the red cutaway pillow. ● If you are trapped under the canopy, follow a seam to the edge. If you need to breathe, form a triangle with your hands, push up on the fabric enough to create an air pocket.
Wire Landings
Attempt to steer away. If unable to avoid wires: ● Disconnect your RSL. ● Jettison your combat equipment and turn off your oxygen if worn. ● Attempt to parallel the wires in a braked position to attain a vertical descent through the wires. Be prepared to do a PLF in case you pass through the wires. ● If contact with the ground is made, cutaway the main canopy and move away. ● If suspended, remain motionless until the power is cut off. Do not let anyone touch you and do not cutaway.
High Wind Landings: (11–18 knots)
● At 1,500 feet AGL, disconnect your RSL. ● As soon as your feet touch the ground, release one toggle and pull the other toggle hand over hand until the canopy collapses. ● Pivot in the direction of the pulled toggle. ● Attempt to contain the tail of the canopy.
Recovery from a Drag
● Release one toggle completely. ● Pull the other toggle and steering line in hand over hand until the canopy collapses or canopy fabric is in hand. ● If you cannot get to your feet or collapse the canopy because of injury or other issues, disconnect the RSL (if not already disconnected), and pull the red cutaway pillow.

Figure K-4. Canopy control and landing procedures briefing (continued)

Emergency Landing Procedures (Continued)
Dust Devils
• If you fly through a dust devil, go to full flight in an attempt to build speed. Be prepared to execute a PLF if close to the ground. If you land and are overtaken by a dust devil, gather up as much canopy as possible and lay down on it. • After landing if control of the canopy is lost, ensure the RSL is disconnected and pull the red cutaway pillow.
Obstacles on or Near the Drop Zone
• Attempt to steer away. Look away; steer away. • If you are unable to steer clear, make contact with both feet and execute a PLF.
Assembly Procedures
Assembly procedures for administrative and tactical jumps will be explained to all jumpers. • Administrative. • Tactical.
MFF HAHO Procedures
• Check in. • Identify the low man, number 2 man, and high man. Low man drives to the DZ, taking control cues from the number 2 and high man.
Bundle Procedures
• Duty positions (bundle safety/bundle pusher/loadmaster). • Complete bundle operation (timeline). • Jumper’s actions on exit, under canopy, and landing. • Collision or entanglement emergency procedures with the bundle.

Figure K-4. Canopy control and landing procedures briefing (continued)

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Glossary

ACH	advanced combat helmet
ACH-ARC	advanced combat helmet accessory rail connector
AFI	Air Force instruction
AGL	above ground level
AGU	Autonomous Guidance Unit
ALICE	all-purpose lightweight individual carrying equipment
AR	Army regulation
ARC	accessory rail connector
ARAPS	Advanced Ram-Air Parachute System
ATP	Army techniques publication
AUL	Authorized for Use List
BOC	bottom of the container
CMWH	center-mounted weapon harness
CYPRES	Cybernetic Parachute Release System
DA	Department of the Army
DZ	drop zone
EAAD	Electronic automatic activation device
EPDB	enhanced parachutist drop bag
FM	field manual
GPS	Global Positioning System
HAHO	high-altitude high-opening
HALO	high-altitude low-opening
HARP	high-altitude release point
HPT	hook pile tape
JMPI	jumpmaster personnel inspection
JPADS	Joint Precision Airdrop System
LAR	launch acceptability region
lbs	pounds
LED	light-emitting diode
LPU	life preserver unit
MFF	military free-fall
MSC	Major Subordinate Command
MSL	mean sea level
MSV	maritime swimmer vest
NVG	night vision goggle(s)
OTS	over-the-shoulder
OXCON	oxygen console
PDB	parachutist drop bag
PHANTOM	Parachutist High Altitude Next Generation Technology Oxygen Mask

POM	parachutist oxygen mask
PHAOS	Parachutist High-Altitude Oxygen System
PRICE	pressure, regulator, indicator, connections, emergency equipment
psi	pounds per square inch
RAPPS	Ram-Air Personnel Parachute System
RSL	reserve static line
SAT	sustained airborne training
SC	safety confirmation
SOF	special operations forces
SOP	standard operating procedure
TB	technical bulletin
TC	training circular
TFSS	Tactical Flotation Support System
TM	technical manual
TOT	time on target
UDT	underwater demolition team
USAF	United States Air Force
USAJFKSWCS	United States Army John F. Kennedy Special Warfare Center and School
USASOC	United States Army Special Operations Command
USSOCOM	United States Special Operations Command
VDZ	virtual drop zone

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28 April 2020

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