*TC 18-11

Special Forces Double-Bag Static Line Operations

APRIL 2020

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***This publication supersedes TC 18-11, 30 April 2015.**

Headquarters, Department of the Army

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Training Circular
No. 18-11

Headquarters
Department of the Army
Washington, DC, 28 April 2020

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Contents

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Preface

TC 18-11 provides information for the use of the RA-1 Advanced Ram-Air Parachute System (ARAPS) during double-bag static line (DBSL) operations only. The techniques and guidelines prescribed herein are generic in nature and represent the safest and most effective methodologies available for executing DBSL operations.

TC 18-11 consolidates references for the DBSL airborne operations and training and will assist commanders, at all levels, in preparing special operations forces (SOF) in the execution of DBSL airborne operations. These operations may involve the employment of forces from air platforms to meet objectives across the operational continuum. DBSL operations may also be in support of or independent from other air or ground operations.

TC 18-11 provides information for United States (U.S.) Army DBSL-capable units. Other SOF units under the operational control of United States Special Operations Command (USSOCOM) may choose to supplement their own airborne publications with this TC to clarify and amplify procedures and equipment being used by United States Army Special Operations Command (USASOC) to meet the variety of operations conducted across the SOF enterprise. U.S. Army commanders can request waivers to this TC to meet specific operational requirements when methodologies contained in this TC impede mission accomplishment. Other Services, USSOCOM components, and sub-unified commands who choose to adopt portions or all of this publication for DBSL operations are strongly encouraged to do so to meet their unique mission requirements.

TC 18-11 derives its authorities from DODD 5100.01 and Title 10, United States Code. USSOCOM Directive 10-1 also designates USASOC as the lead component for static line parachute airborne operations, military free-fall (MFF) operations, nonstandard parachute operations, and other SOF parachute operations. USASOC Regulation 350-2 delegates and defines the limits of executive agent responsibilities—from the Commander, USASOC, to the Commander, John F. Kennedy Special Warfare Center and School (USAJFKSWCS)—for basic and advanced techniques and procedures required for safe training and combat-effective DBSL parachuting. TC 18-11 is also strongly influenced by the policy prescription and program management functions detailed in USASOC Regulation 350-2 and USASOC Regulation 385-1, respectively.

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

The principal audience for TC 18-11 is Special Forces (SF) Soldiers. Commander and staffs of Army headquarters serving as joint task force or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators will also use this TC. TC 18-11 provides information for all users within USASOC and it is useful to other Services within the Department of Defense (DOD), joint, and intergovernmental audiences.

Commanders, staffs, and subordinates ensure their decisions and actions comply with applicable U.S., international, and in some cases, host nation (HN) 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.)

TC 18-11 applies to the Active Army, the Army National Guard or Army National Guard of the United States (ARNG), and the United States Army Reserve (USAR) unless otherwise stated. Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

The proponent of TC 18-11 is the U.S. Army Special Operations Center of Excellence, USAJFKSWCS. Send comments and recommendations on a 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 email to AOJK-DT-SF@socom.mil; or submit an electronic DA Form 2028.

Introduction

TC 18-11 provides guidance for conducting DBSL operations from various aircraft using the RA-1 ARAPS.

The RA-1 System of Systems provides a rapid, cost-effective solution to mitigate the Army's premier large scale combat operations gap in support of multi-domain operations. Near-peer anti-access/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) and increases insertion by 40–80 kilometers. The increase in clandestine deployment reduces the exposure of aircraft and personnel to the threat's anti-access/area denial systems and allows Army personnel to conduct deep-sensing targeting missions. The RA-1 system—

- Provides the parachutist the capability to support higher exits.
- Affords longer mission duration times.
- Allows the parachutist to glide greater distances.
- Creates additional standoff distances for U.S. and coalition forces.

The RA-1 ARAPS is intended to improve the survivability of the airborne Soldier and preserve the commander's available combat power when conducting airborne 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. Aircraft belonging to the U. S. Air Force (USAF), those belonging to the U.S. Army, commercial aircraft, and nonstandard aircraft can deliver these elements into the operational area. However, these aircraft must be able to support the RA-1 in the DBSL configuration by fixed-wing (ramp exit), rotary-wing aircraft (ramp exit), or rotary-wing (side door) exits.

The main distinctions between the RA-1 ARAPS in the DBSL configuration and the RA-1 ARAPS in the MFF configuration are the parachute deployment method and the body position of the jumper when exiting the aircraft. For the DBSL jumps, the body position of the DBSL jumper consists of standing and bending forward with feet apart and with arms out and in a slightly forward position. In addition, the main parachute is deployed automatically by static line after exiting. Whereas for the MFF jump, the body position of the jumper is usually a dive or poised exit position and the jumper deploys the main parachute physically by hand during free-fall.

Other distinctions in jumping the two configurations include the different packing sequences and additional DBSL—

- Assembly components.
- Emergency procedures.
- Jumpmaster commands and hand-and-arm signals.

The procedures for postopening, canopy control, and landing remain the same for jumping the RA-1 in both the DBSL and MFF configurations.

Previously, the Program Executive Office Soldier New Equipment Training Team—with the use of applicable doctrine and training material—was the only department with trainers qualified to train SF MFF jumpers on the RA-1 ARAPS in the DBSL configuration. As of 2019, USSOCOM has authorized component and sub-unified commanders to train jumpers in the DBSL configuration in accordance with the specific guidance of each Service and its respective component.

TC 18-11 has fourteen chapters and ten appendixes, which are summarized in the following paragraphs.

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

Chapter 2 provides information on the main components and accessories of the RA-1 for DBSL configurations.

Chapter 3 provides information on the assembly of components for the RA-1 for DBSL configurations.

Chapter 4 discusses the donning procedures without oxygen or equipment for the RA-1 ARAPS in the DBSL configuration.

Chapter 5 discusses DBSL jumpmaster and jumper aircraft procedures, signals, and commands during nonoxygen DBSL operations.

Chapter 6 discusses DBSL exit procedures and the canopy deployment sequence for DBSL configurations.

Chapter 7 details canopy control for the RA-1 ARAPS.

Chapter 8 provides aircraft emergency procedures for fixed-wing aircraft, to include emergency procedures during exit, cutaway procedures, malfunction procedures, and canopy entanglement procedures for DBSL operations.

Chapter 9 discusses the use of the MA-10 altimeter.

Chapter 10 provides information on the Cybernetic Parachute Release System (CYPRES) 2 model 1500/35A.

Chapter 11 provides information on rigging weapons and equipment.

Chapter 12 provides information on oxygen safety, the oxygen mask and its donning and rigging, oxygen consoles (OXCONs) and aircraft procedures and commands for oxygen DBSL operations.

Chapter 13 provides information on DBSL rotary-wing procedures.

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

Appendix A provides the jumpmaster personnel inspection (JMPI) procedures for DBSL configurations.

Appendix B provides a sample pilot brief.

Appendix C provides jumpmaster responsibilities, currency, and requalification requirements.

Appendix D provides DBSL parachutist qualification and refresher training requirements.

Appendix E provides recommended training programs for DBSL operations.

Appendix F discusses the high-altitude release point (HARP) calculations for DBSL operations.

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

Appendix H discusses procedures for DBSL deliberate waterborne operations.

Appendix I discusses the Joint Precision Airdrop System (JPADS).

Appendix J provides the RA1-ARAPS DBSL jump brief and sustained airborne training (SAT).

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Chapter 1

Double-Bag Static Line Specifications, Configurations, Safety, and Capability Considerations

When designing the RA-1 ARAPS, engineers considered the tactical advantages the system would need to bring to today's battlefield. They also considered how to give the jumper the best designed system for 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.

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

SPECIFICATIONS

1-1. Table 1-1, pages 1-1 and 1-2, summarizes the specifications and limitations of the RA-1 for DBSL operations.

Table 1-1. RA-1 double-bag static line specifications and limitations

Description	
Both main and reserve chutes are elliptical, nine-cell, ram-air, pressurized stabilizers with identical dimensions and performance characteristics with the exception of one key feature: the reserve chute contains additional holes in the fabric to allow for faster opening.	
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
Line Strength and Type	Spectra 1,000-pound
Canopy Performance	
Lift-to-Drag Ratio, Full-Glide	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 1/4 Brake (200 pounds)	8 feet per second
Rate of Descent at 1/2 Brake (200 pounds)	7 feet per second
Rate of Descent at 3/4 Brake (200 pounds)	7 feet per second

Table 1-1. RA-1 double-bag static line specifications and limitations (continued)

Canopy Performance (continued)	
Stall	Resistant to stall
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	CYPRES 2/electronic automatic activation device
Harness	
Maximum Suspended Weight	450 pounds
DBSL Main Deployment Methods	Static line
Harness and Container Weight	17 pounds
Container Material	1,000-denier Cordura
Maximum Deployment Altitude	
DBSL	25,000 feet above MSL
Maximum Exit Altitude	
DBSL	25,000 feet above MSL
Minimum Exit Altitude	
DBSL Fixed-Wing Aircraft	3,500 feet AGL
DBSL Rotary-Wing (Side Door Only)	5,500 feet AGL
Minimum Opening Altitude	
DBSL	3,500 feet AGL
Maximum Opening Altitude	
DBSL	25,000 feet above MSL
Maximum Landing Altitude	
DBSL	13,000 feet above MSL
Exit Weight	
Maximum	450 pounds
Minimum	160 pounds

Legend:
AGL above ground level
CFM cubic feet per minute per square meter (porosity) (see note)
CYPRES Cybernetic Parachute Release System
MSL mean sea level
DBSL double-bag static line

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

DOUBLE-BAG STATIC LINE CONFIGURATION

1-2. When the RA-1 ARAPS is configured for DBSL (figure 1-1, page 1-3) the jumper uses the same accessory components (such as oxygen system, altimeters, CYPRES 2) and equipment (such as NVG, center-mounted weapon harness [CMWH], and the parachutist drop bag [PDB]) as an MFF jumper.

Note: Only qualified parachute riggers for the RA-1 ARAPS are authorized to change the configuration of the RA-1 from DBSL to MFF or from MFF to DBSL. (AR 750-32 provides more information on the responsibilities for personnel maintaining and packing parachutes.)

Double-Bag Static Line

Figure 1-1. Double-bag static line configuration

1-3. The DBSL configuration (figures 1-2 and 1-3, page 1-4) allows the jumper to exit the aircraft with the parachute deployed by static line; however, this configuration provides all the options of standoff from the target, maneuverability, and control of a ram-air parachute. The system in the DBSL configuration also permits the jumper to exit at lower altitudes than a MFF jumper.

Figure 1-2. Double-bag static line configuration (rigged)

Figure 1-3. Double-bag static line configuration (canopy deployed)

SAFETY

1-4. The RA-1 incorporates the most advanced safety features available on any parachute system in the world. These safety features include the following:

- Reserve static line (RSL).
- No-stall technology.
- 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.
- Drogue-slider connector lines, outer deployment bag and static line on the main parachute (for DBSL configuration only).
- Butt Strap (for DBSL configuration only).
- Cross connectors for riser extensions (for DBSL configuration only).
- Hybrid main canopy for slower, softer openings, thereby putting less force on the jumper.
- Increased suspended weight, allowing for heavier combat loads.
- Pressurized stabilizers.
- Collapsible slider (to enhance the viewing area of the jumper).
- Increased glide performance.
- CYPRES 2 or electronic automatic activation device (EAAD).
- High-altitude opening seat.

SAFETY CONSIDERATIONS FOR JUMPING FIXED-WING AIRCRAFT IN DOUBLE-BAG STATIC LINE CONFIGURATION

1-5. Jumpers must familiarize themselves with and adhere to the following safety considerations when jumping from fixed-wing aircraft in the DBSL configuration.

WARNING

Jumpers WILL NOT use the RA-1 ARAPS in the DBSL configuration to jump from a fixed-wing aircraft while using door exit procedures. Excessive line twists and lower deployments occur when the RA-1 is deployed from troop (side) doors of a fixed-wing aircraft. The RA-1 ARAPS only meets the requirements for DBSL deployments from the rear ramps (tail gate) of fixed-wing aircraft.

Note: Airdrop speed for the RA-1 ARAPS in the DBSL configuration from fixed-wing aircraft is 100-135 knots indicated airspeed.

Note: U.S. Army and USAF regulations do not permit DBSL exits from the C-17 ramp and these exits have not been tested. With the exception of C-17, parachutists will only jump from the ramp of a fixed-wing aircraft when conducting DBSL jumps.

Note: Parachutists jumping the C-130/C-130J, CASA 212, Caravan, Sherpa, UH-60 (door) and CH-47 are currently approved for over the ramp operations using the 15-foot static line. Parachutists jumping the C27-J will use the 5-foot extension (20-foot static line).

Note: Following aircraft exit, the parachutist must hold the DBSL standing simulated seated position for a minimum of 6 seconds or until the parachute is fully inflated and stable at a descent rate below 18 feet per second. The DBSL standing seated exit position must be trained and rehearsed by parachutists in order to ensure risks associated with DBSL deployments are mitigated.

DANGER

Jumpers should use caution when disconnecting the RSL snap shackle below 1500 feet AGL. When disconnecting the RSL from the RSL shackle below 1500 feet AGL, pull the red static line lanyard. Do NOT pull the yellow RSL connected to snap shackle, this may cause serious injury or death.

DANGER

Failure to conduct a standing seated exit when jumping from the aircraft rear ramp in the RA-1 ARAPS in DBSL configuration could lead to canopy malfunction, resulting in injury or death.

1-6. The body position of the parachutist during a fixed-wing aircraft ramp exit using the RA-1 in DBSL configuration is significantly different than the exit positions for MFF RA-1 and standard static line parachute (T-10, T-11, and MC-6) deployments.

1-7. For DBSL deployments from a fixed-wing aircraft the parachutist assumes a standing DBSL simulated seated position on the tail end of the aircraft ramp. The DBSL simulated seated position ensures that the parachutist deploys from the aircraft with the universal static line oriented toward the rear of his body and that his legs, arms, and head are as far away from the universal static line and deploying canopy as possible. The DBSL seated position also enables the parachutist to use the relative wind to maintain an on-heading opening.

Safety Considerations for Jumping Rotary-Wing Aircraft in the Double-Bag Static Line Configuration

1-8. Parachutists must familiarize themselves with and adhere to the following safety considerations when jumping from rotary-wing aircraft in the DBSL formation.

DANGER

For rotary-wing (side door) deployments in the DBSL configuration, the parachutist must exit the helicopter using a pike body position to mitigate the risk of injury or death. The rotor wash effects from the helicopter on a deploying RA-1 ARAPS canopy may cause injury or death.

Note: The parachutist will assume the pike position immediately after exiting the aircraft and hold this position for 6 seconds. After the 6-second count, the parachutist should check his canopy and gain canopy control. The minimum aircraft speed at the time of parachutist exit should be 90 knots indicated air speed with a minimum exit altitude of 3,500 feet above ground level (AGL) and a minimum exit dispersion time of 4 seconds between jumper exits.

RA-1 DOUBLE-BAG STATIC LINE CAPABILITY CONSIDERATIONS

1-9. The RA-1 DBSL configuration expands the operational capabilities available to the commander. Regardless of the configuration used, the RA-1 has tactical advantages that enhance operating limitations. These advantages allow jumpers to conduct operations at altitudes not normally associated with conventional parachuting, thereby permitting jumpers to assemble in the air and perform group precision landings with heavy loads on small DZs. The RA-1 provides a better standoff of insertion from opening to landing on the DZ. This increases stealth for team members and for insertion aircraft and enhances jumper and aircraft survivability. 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 DBSL—

- Jumper can use the same common equipment as an MFF jumper.
- Jumper can open at the same altitude as the MFF jumper.
- Jumper can exit at lower altitude than the MFF jumper (for fixed-wing aircraft only).
- Configuration reduces training time for units and commanders.
- Configuration reduces the requirement for body stabilization training as required for MFF jumpers.
- Configuration allows jumpers' main parachutes to deploy at the same altitude.

1-10. The RA-1 also—

- Allows for easier training because of a common harness-container assembly for all configurations.
- Incorporates improved ergonomics, better adjustment for improved harness comfort, and a high-altitude high-opening (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

Double-Bag Static Line Main Components and Accessories

This chapter details the main components and accessories of the RA-1 for DBSL configurations.

Note: Questions regarding employment of the RA-1 in the DBSL configuration should be addressed to USASOC, G-37 Special Skills, Fort Bragg, North Carolina.

Army TM 10-1670-335-23&P contains information on repairing and maintaining and packing the RA-1.

CAUTION

Jumpmasters should ensure that only approved equipment listed in TB 43-0001-80 is utilized during DBSL operations. Jumpmasters should also verify that all rigging is done in accordance with this manual and their units' SOPs. Any questions on rigging should be addressed to USAJFKSWCS Military Free-Fall School, Company B, 2d Battalion, 1st Special Warfare Training Group (Airborne), U.S. Army Yuma Proving Ground Yuma, AZ 85365-0999.

CONTAINER AND HARNESS ASSEMBLY

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 remain 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) with butt strap attached.

2-2. The harness has rapid doffing capability once the parachutist lands either on the ground or in the water. The harness has separate attachment points incorporated 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 containers are on the back of the harness in a piggyback configuration (figure 2-2, page 2-3), with the reserve parachute on top of the main parachute. Four container closing flaps—one for each compartment—secure the main and reserve parachutes within the container by a pin and soft closing loops.

MAIN COMPONENTS

2-4. Figure 2-2, page 2-3, illustrates and lists the main components. 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 uses are detailed 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 passed 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 and Elastic Pocket
- (D) Main Canopy Release Handle (Red Cutaway Pillow)
- (E) Reserve Static Line Snap, Shackle, and Ring
- (F) Static Line
- (G) Universal Static Line Snap Hook Pocket
- (H) Static Line Stow Bars
- (I) Chest Strap
- (J) Waist Band (Not Shown)
- (K) Equipment Lowering Line Attachment Point
- (L) Oxygen Pouch for Bailout Oxygen System
- (M) Accessory Pouch (Not Shown)
- (N) Equipment Attachment Rings
- (O) High-Altitude High-Opening Seat Attachment Points
- (P) Weapon Tie Down Loops
- (Q) Military Cybernetic Parachute Release System Location
- (R) Padded Adjustable Saddle and Leg Straps
- (S) Main Ripcord Elastic Pocket (for Military Free-Fall)
- (T) High-Altitude High-Opening Seat

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 and shackle) may also be disconnected for safety during certain emergency situations such as disengaging from entanglement with another parachutist, before high wind landing, being dragged after landing, water landing, 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.

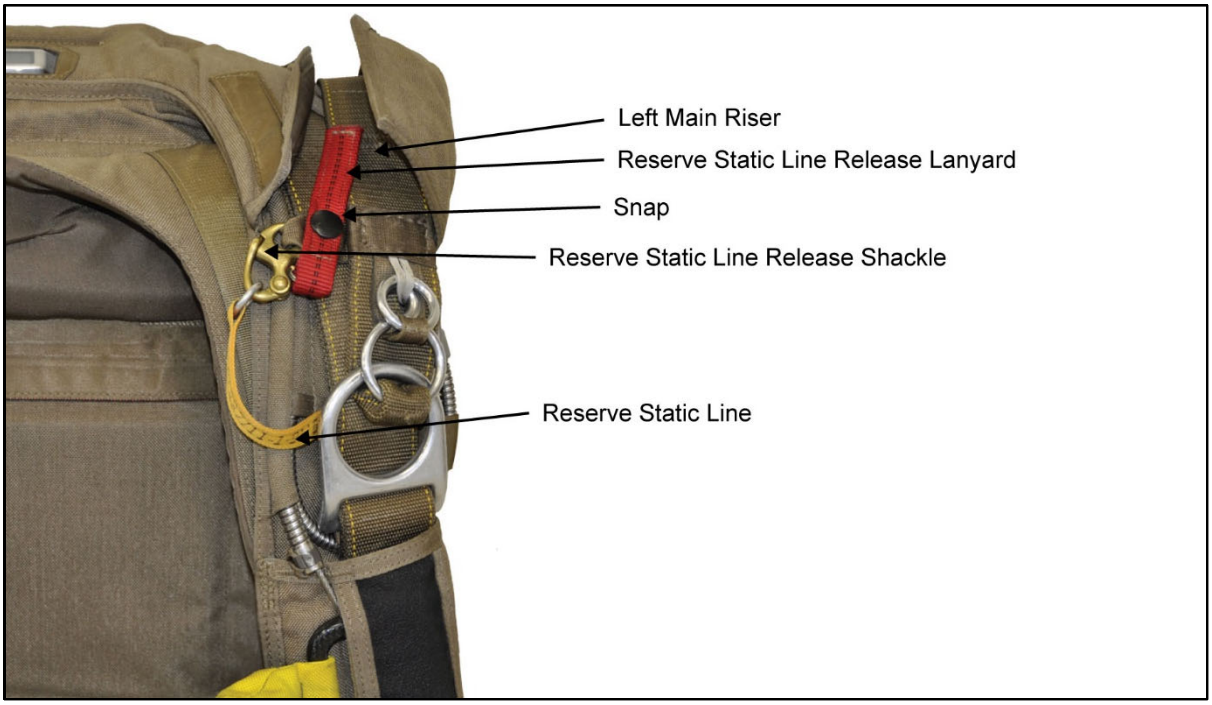

Figure 2-3. Reserve static line, snap, shackle, and ring

WARNING

Pulling the RSL should not replace pulling the ripcord during cutaway procedures. The RSL is a safety device hooked to the left main riser. The RSL is used to pull the reserve closing pin when the canopy is released.

DANGER

Parachutists should use caution when disconnecting the RSL snap shackle below 1500 feet AGL. Parachutists should ensure that they pull the red static line release lanyard when disconnecting the RSL from its shackle. Failure to pull the red shackle may result in injury or death.

Universal Static Line Snap Hook Pocket

2-8. The universal static line snap hook pocket is located on both sides of the parachute container and is used for stowing the universal static line snap hook. Jumpers should only use the snap hook pockets for stowing the universal static line snap hook.

STATIC LINE STOW BARS

2-9. Static line stow bars are used for stowing the static line to the outside of the main container. The static line stow bars with retainer bands are located on both the right and left sides of the main container. There is one additional static line stow bar on the back-center of the main container to accommodate any slack left in the static line after it is attached to the container.

CHEST STRAP

2-10. The chest strap is designed to keep the parachutist from falling out of the harness during canopy deployment.

Note: The chest strap is one of the eight designated points of adjustment.

WAISTBAND

2-11. 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. In such a case, the waistband is routed over the left main lift web. The waistband secures equipment such as the weapon and the oxygen bailout system.

EQUIPMENT ATTACHMENT RINGS

2-12. Equipment attachment rings are used for attaching combat equipment. The rings are located directly beneath the main lift webs.

EQUIPMENT LOWERING LINE ATTACHMENT RINGS

2-13. 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

2-14. Barrel locks (figure 2-4, page 2-6) are located on both sides of the RA-1 container to secure the accessory pouch and oxygen pouch to the RA-1 ARAPS.

ACCESSORY POUCH

2-15. The accessory pouch (figure 2-4, page 2-6) can be used to contain and secure the radio or other mission equipment. The 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 side mounted weapon to secure the weapon to the jumper. The pouch is secured by a slide fastener on top of the pouch and by securing the snap tab.

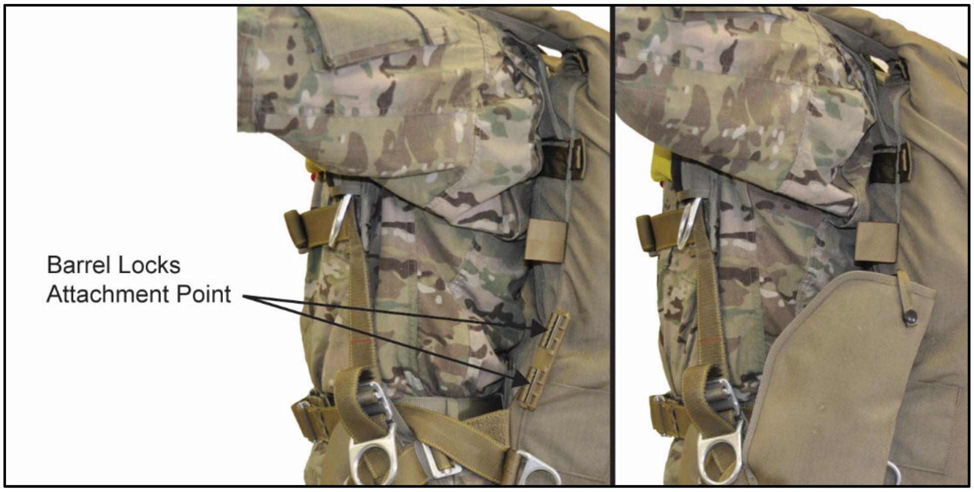

Figure 2-4. Barrel locks attachment point for accessory pouch

OXYGEN SYSTEM POUCH

2-16. The oxygen system pouch, as depicted in figure 2-5, secures the oxygen bottles to the jumper during the airborne operation. There are different types of oxygen 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

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Note: Additional information regarding the use of oxygen and rigging procedures for DBSL operations is provided in Chapter 12.

HIGH-ALTITUDE HIGH-OPENING SEAT ATTACHMENT POINTS

2-17. 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

2-18. The HAHO seat, as shown in figure 2-2, page 2-3, consists of a preformed padded seat and adjustable straps with quick-release connectors. The HAHO seat is used for for added comfort during a HAHO mission while the jumper is suspended under the canopy. 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

2-19. 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 body sizes of individual jumpers. The loops are also 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

2-20. 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 on the inner thighs of the jumper. The RA-1 butt strap will be attached to the padded saddle and leg straps when jumping in the DBSL configuration.

Note: The padded adjustable saddle and leg straps are two of the eight designated points of adjustment.

RA-1 BUTT STRAP

2-21. The butt strap is constructed of elastic cord and encased in nylon webbing with snap fasteners as shown in figure 2-6. The butt strap is attached to the leg pads of the harness or container, and it is used when in the DBSL configuration.

Figure 2-6. RA-1 butt strap attaching points

MAIN LIFT WEB ADJUSTMENT FRICTION ADAPTERS

2-22. The main lift web adjustment friction adapters are located on both left and right sides 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 for proper fit.

Note: The main lift web adjustment friction adapters are two of the eight designated points of adjustment.

HORIZONTAL ADJUSTMENT STRAPS

2-23. 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.

Note: The horizontal adjustment straps are two of the eight designated points of adjustment.

RA-1 ACCESSORIES

2-24. The accessories named below will be used by the jumper when conducting DBSL operations with the RA-1. The altimeter and CYPRES 2 must be used by all USASOC jumpers when conducting any DBSL operations.

PARACHUTIST OXYGEN MASK

2-25. 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 helmet. For additional information on oxygen related equipment, reference Chapter 12 of this TC.

PARACHUTIST OXYGEN MASK QUICK-DISCONNECT HOSE

2-26. The quick-disconnect hose is used to connect the portable bailout oxygen bottles to the POM.

TWIN-53-CUBIC-INCH PORTABLE BAILOUT OXYGEN BOTTLES

2-27. The twin-53-cubic-inch portable bailout oxygen bottles are used to supply jumpers with oxygen.

Note: For additional portable bailout oxygen bottles used during DBSL operations refer to Chapter 12 of this TC.

3,000-PSI PORTABLE BAILOUT OXYGEN BOTTLE

2-28. The 3,000-pounds per square inch(psi) portable bailout oxygen bottle provides significantly increased oxygen to jumpers during HAHO (stand-off) operations. Jumpers should use the bottles when opening above 17,500 feet AGL when jumping the RA-1 ARAPS.

Note: For additional information on oxygen related equipment, reference Chapter 12.

RA-1 KIT BAG

2-29. 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 during airborne operations in order to secure the parachute after landing. The RA-1 kit bag is attached above the horizontal adjustment straps between the jumpers back and pack tray.

ALTIMETER

2-30. The parachutist wears the MA-10 altimeter or an approved altimeter on his left wrist. The altimeter shows the parachutist's altitude above the ground during flight and under canopy.

Note: For more information on the altimeter, reference Chapter 9.

CYBERNTIC PARACHUTE RELEASE SYSTEM

2-31. The CYPRES 2 is designed to activate and enable the reserve parachute to deploy in the absence of the main parachute deploying or having a malfunction of his main parachute.

Note: For more information on the CYPRES 2, reference Chapter 10.

Chapter 3

Assembly Components

Chapter 3 details information regarding the assembly components of the RA-1 ARAPS for DBSL configurations.

MAIN PARACHUTE

3-1. The RA-1 main parachute serves as the functional component used to safely deliver the operator to the ground during combat and training airdrop 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 attachment points for the suspension lines and non-loadbearing support ribs separate a cell into two compartments.

3-2. The 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 top and a bottom main canopy with a 0–3 cubic feet per minute per square meter porosity and one set of toggles. It has inflatable stabilizers and a collapsible slider to reduce signature and increase glide ratio.

3-3. Trim tabs are located on the rear of the front risers. The tabs are used to increase attack angle, which also increases descent rate. Figure 3-1 demonstrates the RA-1 deployed in the DBSL configuration indicating the named parts of the main parachute.

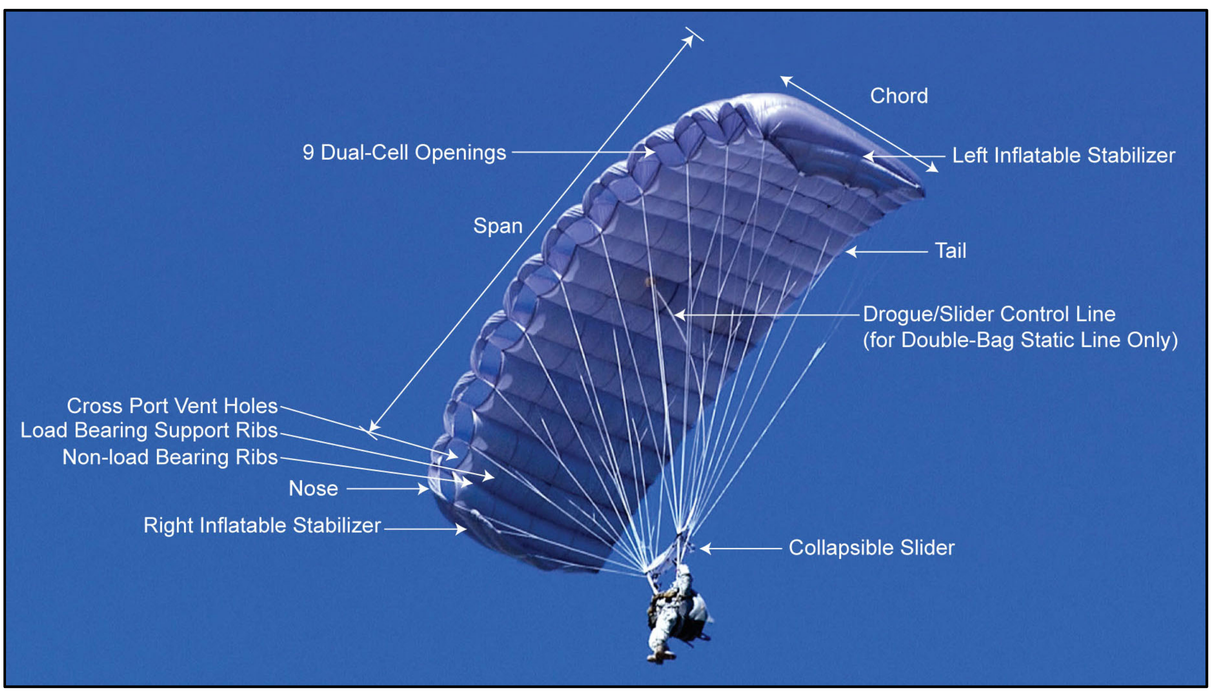


Figure 3-1. RA-1 in double-bag static line configuration

RESERVE PARACHUTE

3-4. The RA-1 reserve parachute is intended for emergency use in the event of a main parachute malfunction during airdrop operations. It comprises a pilot chute, free bag assembly, suspension lines, risers, control toggles, and an activation handle. 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. The reserve parachute has no static line components.

COLLAPSIBLE SLIDER

3-5. The collapsible slider is a rectangular piece of reinforced fabric with a large metal grommet in each corner. The collapsible slider slows the opening of the main canopy. As the canopy inflates, it forces the slider down toward the risers. The suspension lines then spread apart, pulling the drogue-slider control line down and bringing the drogue chute and inner deployment bag to the top tail of the canopy in DBSL configuration. 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

3-6. 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. For DBSL operations only, cross connectors (also called riser extentions) are attached to the front and rear risers.

STEERING TOGGLES

3-7. The steering toggles are used during 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 collision with other jumpers.

3-8. 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.

SUSPENSION LINE GROUPS

3-9. 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.

3-10. 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. This means they are routed directly from their attachment points on the bottom skin of the canopy to the Rapide links on their respective risers. 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.

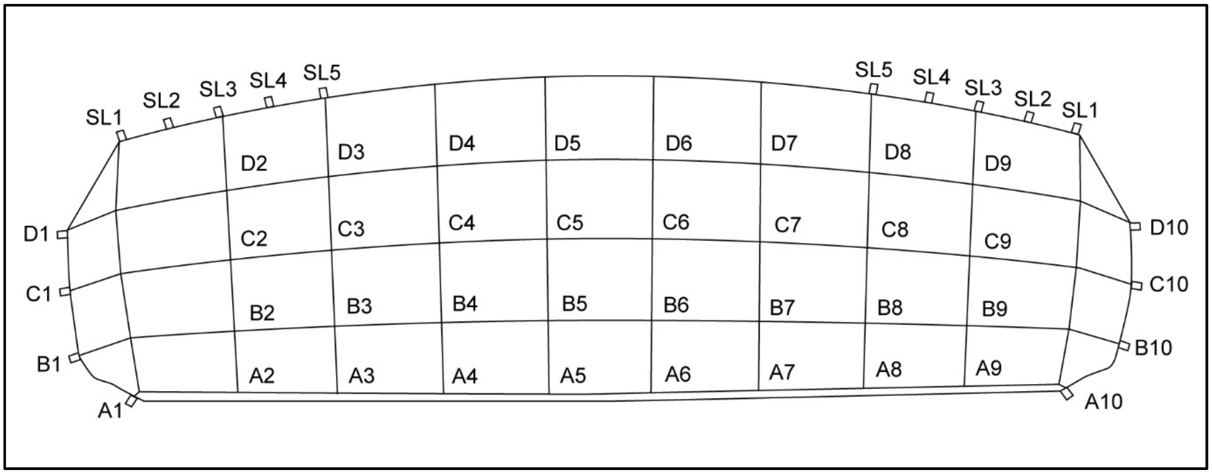


Figure 3-2. Suspension line groups

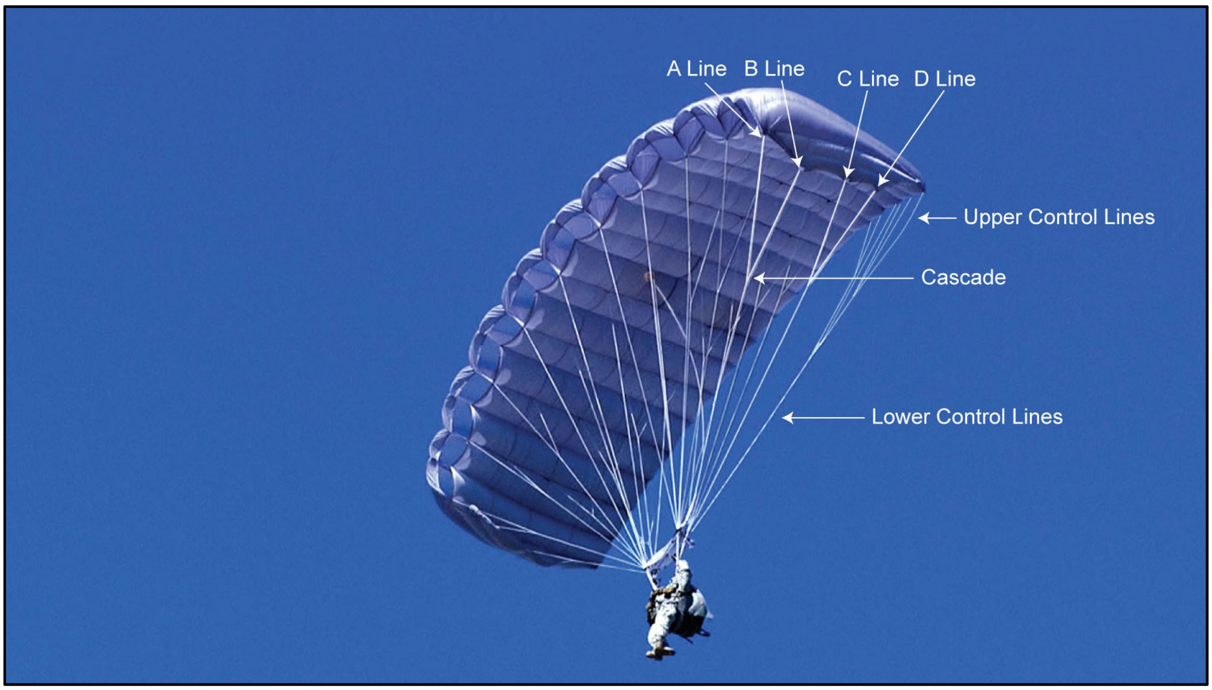


Figure 3-3. Suspension line groups with canopy in flight

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 which is defined by a soft toggle at the other end. The parachutist manipulates the control lines to maneuver the canopy. The deployment brake loops are found on the lower ends of the lower control line. When set, the brakes cause a ram-air canopy to open in the half-brakes configuration. This prevents a forward surge on opening and allows the canopy to properly inflate.

MAIN CANOPY RELEASE HANDLE (RED CUTAWAY PILLOW) WITH CANOPY RELEASE CABLES ATTACHED

3-12. The main canopy release handle (red cutaway pillow)—shown in 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 redesigned reserve ripcord handle (which will replace the currently fielded stainless steel, open frame handle) is a carbon fiber frame assembly with a pillow-shaped grip. This new assembly is designed to eliminate the snag hazard created by the open frame design. The yellow reserve ripcord pillow, depicted in figure 3-4, 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.

Note: Some older configurations of the reserve ripcord handle will be a stainless steel handle and are still authorized for use until replaced by the newer redesigned reserve ripcord handle yellow pillow.

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

RESERVE RIPCORD PIN

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

Note: The main ripcord is removed during DBSL operations. It is only used for MFF operations when jumping in the over the shoulder configuration. A qualified rigger is the only person authorized to convert the RA-1 system from the MFF to the DBSL configuration and vice versa.

CROSS CONNECTORS

3-15. Cross connectors are constructed of nylon webbing and are used as riser extensions when deploying the main canopy in the DBSL configuration. The cross connectors are attached to the front and rear risers on both the left and right sides at the connector links. The connectors are initially attached to the outer deployment bag with a break cord to facilitate the safe and controlled opening of the main canopy. For additional information on cross connectors reference TM 10-1670-335-23&P.

INNER DEPLOYMENT BAG

3-16. The inner deployment bag is constructed of cotton cloth. The main canopy is packed into the inner deployment bag. This deployment bag has an elastic stow loop and attachment points for 1 1/4-inch elastic stowage bands, which are used for locking the inner deployment bag closed and stowing the DBSL drogue-slider control line.

OUTER DEPLOYMENT BAG AND MAIN STATIC LINE

3-17. The outer deployment bag is constructed of nylon cloth. The universal static line snap hook consists of a 15-foot static line made of 3/4-inch tubular nylon webbing, a curved pin with pin protector cover, and a snap hook. The universal static line is attached to the 5-inch loop on the outer deployment bag by a girth hitch. An elastic stow band is located on the inside of the deployment bag to attach a 2-inch elastic stow band to allow the drogue parachute to be secured to the bag.

3-18. The outer deployment bag has attachment points for 2-inch elastic stowage bands, which are used to lock the bag closed and stow suspension lines.

3-19. There is an additional flap added to the outer deployment bag to ensure the deployment bag does not interfere with follow-on jumpers exiting the aircraft.

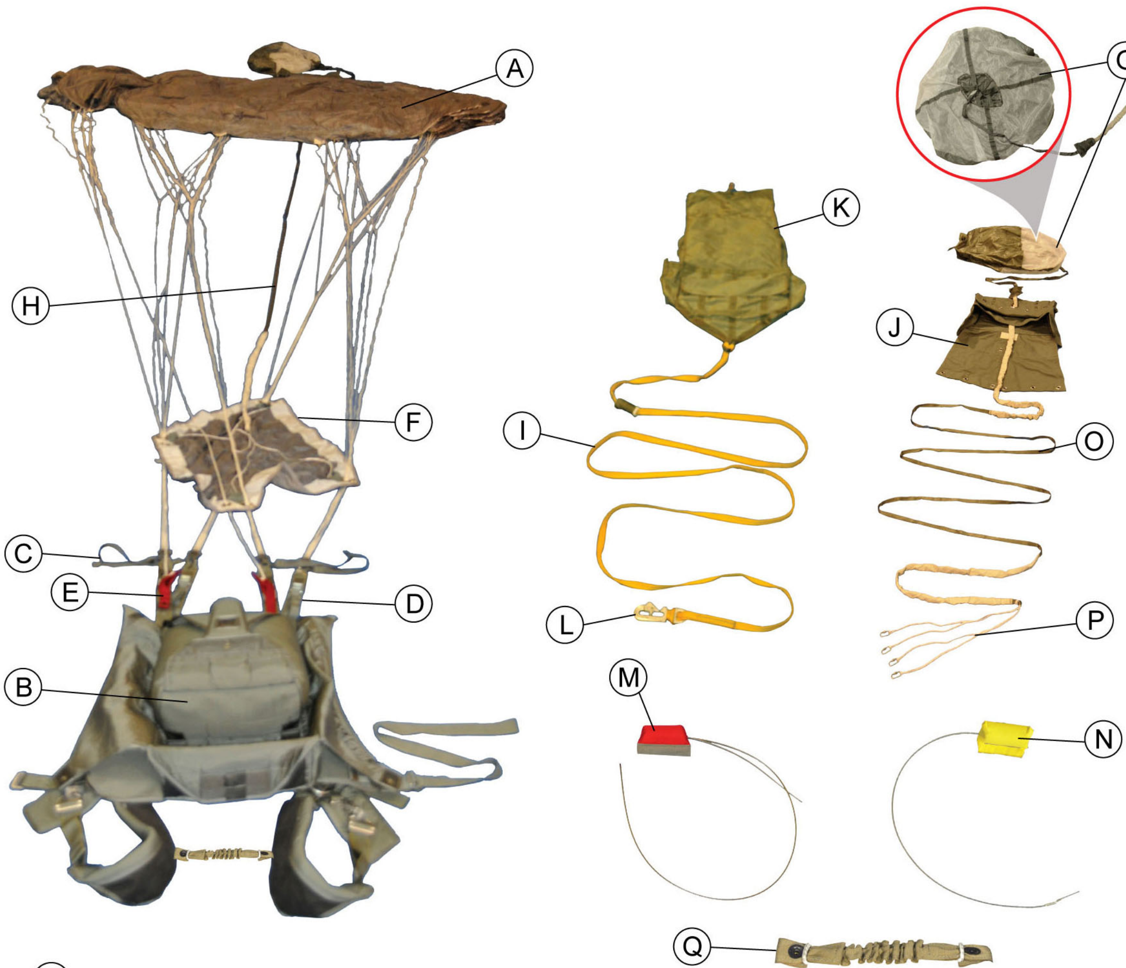
MAIN STATIC LINE DROGUE PARACHUTE

3-20. The drogue parachute is constructed of nylon fabric and mesh netting. The drogue parachute is used to initiate the deployment of the main canopy. The drogue parachute is attached with a girth hitch to the drogue and drogue slider control line.

DROGUE-SLIDER LINE

3-21. The drogue-slider control line is constructed of 5/8-inch tubular nylon, a bag stop, and cotton protection cloth. The drogue-slider control line goes through the number 8 grommet on the inner deployment bag, through the center cell grommets and buffer tubes on the canopy, and attaches to the drogue-slider connector lines. The drogue-slider connector lines are girth-hitched to the drogue-slider control line. The four legs are separated and attached to the corners of the slider.

3-22. Figure 3-5, page 3-6, depicts the outer deployment bag, main static line, main static line drogue parachute, and main static line drogue-slider control line.



(A) Main Parachute
(B) Reserve Parachute
(C) Cross Connectors (only used during double-bag static line operations)
(D) Main Parachute Risers
(E) RA-1 Toggles
(F) Slider
(G) Drogue Parachute
(H) Drogue/Slider Control Line
(I) Main Static Line
(J) Inner Deployment Bag with Safety Stow Loop
(K) Outer Deployment Bag
(L) Universal Static Line Snap Hook
(M) Main Release Ripcord (red cutaway pillow)
(N) Reserve Ripcord Pillow
(O) Drogue/Slider Control Line
(P) Drogue/Slider Connector Line
(Q) Butt Strap (only used during double-bag static line operations)

Figure 3-5. Assembly components for double-bag static line

Chapter 4

Donning Without Oxygen or Equipment

This chapter provides instructions on inspection, torso measurement, and donning and adjusting the eight points of adjustments. For information on donning weapons, equipment and oxygen, reference Chapter 12 and Chapter 13.

DONNING

4-1. 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.

4-2. Before donning the RA-1, the jumper should always inspect the system to ensure that the RA-1 is serviceable and in the correct configuration for the airborne operation. The jumper will ensure that all additional equipment (such as helmet, goggles, altimeter, PDB, lowering line, and complete oxygen system) for the airborne operation is properly adjusted. The jumper folds the kit bag and attaches it to the RA-1 on the front of the container against the back pad using retainer bands (figure 4-1).

Figure 4-1. Parachute ready for donning

Note: Jumpers should refer to Chapter 12 for rigging the POM and oxygen system for use with the RA-1.

Note: Jumpers should refer to Chapter 11 for rigging the parachutist weapon, rucksack and PDB for use with the RA-1.

DANGER

When using the RA-1 in DBSL mode, parachutists should adjust the harness tighter than required for MFF mode and ensure the DBSL saddle strap is present. The harness must be tight enough to keep the parachute harness, container, and leg straps correctly oriented on the parachutist's body, but not so tight that it significantly hampers movement or causes debilitating discomfort. An incorrectly oriented harness, container, or leg strap that slips past the knee could lead to a poor exit and dangerous canopy deployment sequence that results in injury or death.

4-3. The RA-1 can be donned, fitted, and successfully jumped by parachutists wearing a variety of clothing configurations including the army combat uniform, Nomex flight suit, and the enhanced cold weather clothing system with intermediate cold weather gloves (the arctic mittens cannot be worn with the RA-1).

DANGER

When using the RA-1 in DBSL configuration, parachutists should only wear organizational clothing and individual equipment commonly worn during static line and MFF parachute operations. Improperly worn, ill-fitting, or non-standard clothing could interfere with RA-1 rigging and deployment and lead to injury or death.

Note: During JMPIs, jumpmasters should correct any deficiencies and provide a final determination on rigging safety regarding the fit of organizational and individual equipment and their function with the RA-1 system.

DONNING AND ADJUSTING

4-4. The RA-1 has eight points of adjustment. Figure 4-2, page 4-3 depicts these points of adjustment which 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 side) with matching sewn thread colors.
- Two horizontal adjustment straps (right and left sides).
- Two leg straps (right and left) with butt strraps attached.

4-5. There are a total of nine steps to donning and adjusting the RA-1, as described in the following paragraphs.

Figure 4-2. Eight points of adjustment

STEP 1

4-6. The jumper begins by inspecting the equipment and loosening all eight points of adjustment, taking out all excess slack from the retainers and ensuring the butt strap is attached. If jumping the kit bag, he can fold and attach the kit bag to the front of the container against the back pad using retainer bands at this time. The kitbag should be attached above the two horizontal adjustment straps (right and left sides).

4-7. The jumper then determines his torso length (if not already known). He 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, page 4-4). He then pinches the tape with his fingers at the hip bone to acquire the length to be read and that is 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, page 4-4, and table 4-1, page 4-5) 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. The jumper should measure his torso length twice when wearing body armor.

Figure 4-4. Main lift web thread stitching location

4-8. If the jumper's torso length falls between two numbers on the torso conversion table (table 4-1, page 4-5), 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 measures 19 inches, the jumper should use the 18-inch gold thread stitching on the main lift web. If the torso length measures 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 with body armor (ballistic vest), the jumper may need to extend the lift web adjustment to the next size so the RA-1 fits properly.

4-9. Parachutists reference the torso conversion table (table 4-1, page 4-5) 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, white). The marks are positioned every 1 1/2 inches. The table also provides recommended relationship between torso length and the colored marks. Parachutists adjust the main lift web adjustment by moving the proper stitch color to the center of the main lift web buckle.

Table 4-1. Torso conversion 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

4-10. Figure 4-5 demonstrates the assistant holding the RA-1 system so the jumper may don the system while standing. If sitting, the jumper will place the RA-1 on his back and loosely connect the chest strap and stand.

STEP 3

4-11. The jumper bends forward at the waist (figure 4-5) until his upper body is parallel to the floor. The assistant then places the container as high up on the jumper's back as possible so the carrying handle rests at the base of the jumper's neck.

Figure 4-5. Assistant holding parachute

STEP 4

4-12. The jumper loosely secures the chest strap through the chest strap friction adapter (figure 4-6). All excess webbing should remain unstowed at this stage.

Figure 4-6. Securing chest strap friction adapter

STEP 5

4-13. The assistant hands the leg straps 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 (figure 4-7, page 4-7). 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-loop retainer band around the quick-ejector snap activation lever.

Figure 4-7. Attaching leg straps

STEP 6

4-14. 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 (namely, the hollow of the shoulder). He should feel some tension in the main lift web between the shoulder and the hip joint. If not, he repeats steps 1 through 6 for adjusting the main lift web.

STEP 7

4-15. The jumper tightens the horizontal adjustment straps (figure 4-8, page 4-8). This is accomplished by grasping both horizontal adjustment straps and pulling them until the container is snug to the back.

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

Figure 4-8. Horizontal adjustment straps

STEP 8

4-16. 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 should not impede the jumper's ability to arch. When jumping with 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 then, 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 finally routed through the keeper on the accessory pouch to the friction adapter. Reference Chapter 11 for rigging of the side-mounted weapon.

Note: When jumping the CMWH, the waistband is routed under the right lateral adjusting strap then, under the right main lift web across the jumper's front. The waistband is then routed under the left main lift web and under the left lateral adjusting strap to the friction adapter.

Figure 4-9. Waistband adjustment

STEP 9

4-17. Once all points of adjustment have been properly made, the jumper stows the excess webbing 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 must undergo the JMPI at this time.

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

Figure 4-10. Stowed excess webbing

Chapter 5

Double-Bag Static Line Aircraft Procedures, Signals, and Commands for Nonoxygen Jumps

Aircraft noise, the parachutist's helmet, hearing protection, and the POM make verbal communication extremely difficult. Therefore, the jumper receives aircraft procedure signals and jump commands by hand-and-arm signals. The DBSL 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 DBSL-capable units. Safety significantly increases when the jumper understands the jumpmaster's intent and the jumpmaster understands the jumper's response.

Note: DBSL oxygen procedures and jump commands are discussed in Chapter 12.

Note: DBSL rotary-wing aircraft procedures are discussed in Chapter 13.

DOUBLE-BAG STATIC LINE NONOXYGEN AIRCRAFT PROCEDURE SIGNALS AND JUMP COMMANDS

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

5-1. Aircraft procedure signals are those that are used between aircraft boarding and the STAND UP jump command. The aircraft procedure signals discussed in the following paragraphs begin before takeoff and are given by the jumpmaster. The following sequence depicts the procedures used by the jumpmasters to communicate with jumpers when jumping without oxygen:

- **LOAD AIRCRAFT.** On jumpmaster's signal, jumpers load the aircraft in reverse stick order.
- **DON HELMETS.** Jumpers don helmets and fasten seat belts.
- **UNFASTEN SEAT BELTS.** At 1,000 feet AGL the jumpmaster gives the command to unfasten seat belts. The jumpmaster may allow jumpers to remove their helmets at his discretion.
- **20 MINUTES.** When the jumpmaster issues this warning all parachutists must be awake and keep their eyes on the jumpmaster.
- **10 MINUTES.** When the jumpmaster issues this warning, all parachutists must keep their eyes on the jumpmaster and must don helmets if they were removed.
- **UPDATE ON WINDS.** The jumpmaster updates the parachutist on the wind speed from the DZ, expressed in knots.
- **CYPRES/PIN CHECK.** On the jumpmaster's signal, jumpers lean forward and check CYPRES and pins.
- **STAND UP.** The jumpmaster gives this command approximately 6 minutes from time on target (TOT). Each jumper passes the signal back, stands and faces the rear of aircraft, and checks the CYPRES setting and pins on the jumper in front of him. Then he passes the static line snap-hook of the jumper to his front to the appropriate side.
- **HOOK UP.** On the jumpmaster's command, each jumper passes the signal back, hooks up to the anchor-line cable with the gate facing the outboard side (skin) of aircraft and acquires a high reverse bight.
- **CHECK STATIC LINES.** On the jumpmaster's command, each jumper passes the signal back. Then, starting with his own snap hook, traces the static line down to the reverse bight and through

his hand with a thumbless grip. Next, he traces the static line of the jumper in front of him from the shoulder to the first locking stow. He ensures there is no equipment interfering with static line, such as, a weapon or radio antennae. Finally, the last two jumpers turn and face the skin of the aircraft and check each other's static line if applicable.

- **CHECK EQUIPMENT.** On the jumpmaster's command, each parachutist passes the signal back, then checks all points of attachment. After checking the points of attachment, the parachutist checks the location and seating of the release and reserve handles (pillows) and ensures that his goggles are down. The points of attachment are the—
  - Chinstrap.
  - Chest strap.
  - Quick-ejector snap on lowering line.
  - Quick-ejector snap on leg straps.
  - Equipment attaching straps.
- **SOUND OFF FOR EQUIPMENT CHECK.** On the jumpmaster's command, each jumper passes the signal back. Then, starting with the last jumper in the pass, each jumper passes a thumb up, over the inboard shoulder of the jumper to his front. The jumpmaster receives the signal from the first jumper in the pass.
- **MOVE TO THE REAR.** The jumpmaster gives this command approximately 1 minute from TOT. Each parachutist passes the signal back then the first jumper moves to the hinge of the ramp.
- **STAND BY.** The jumpmaster gives this command approximately 15 seconds from TOT. Each jumper responds with a thumbs-up signal. The first jumper moves to the edge of ramp.
- **GO.** The jumpmaster gives this command at the release point. Jumpers exit as briefed.
- **ABORT.** The jumpmaster gives this command when release conditions are not favorable. Jumpers then back up to the hinge of the ramp and await further instructions.

Note: If at any time a jumper experiences an equipment-related problem, proper procedure requires that he extend his arm; thumb down, toward the center of the aircraft.

AIRCRAFT PROCEDURE SIGNALS

5-2. The following paragraphs detail the aircraft procedure signals for DBSL operations.

DON HELMETS

5-3. The jumpmaster gives the DON HELMETS signal before takeoff (figure 5-1). He may also give it during the flight or if the aircraft is landing with the jumpers (for example, if the windspeed is out of limits on the DZ or if the mission is 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

5-4. The jumpmaster normally gives the UNFASTEN SEAT BELTS signal upon reaching an altitude of 1,000 feet AGL or when the flight crew chief indicates that it is safe to do so (figure 5-2). If the aircraft descends through 1,000 feet AGL later in the flight, the parachutist dons his helmet and refastens his seat belt upon receiving the DON HELMETS command.

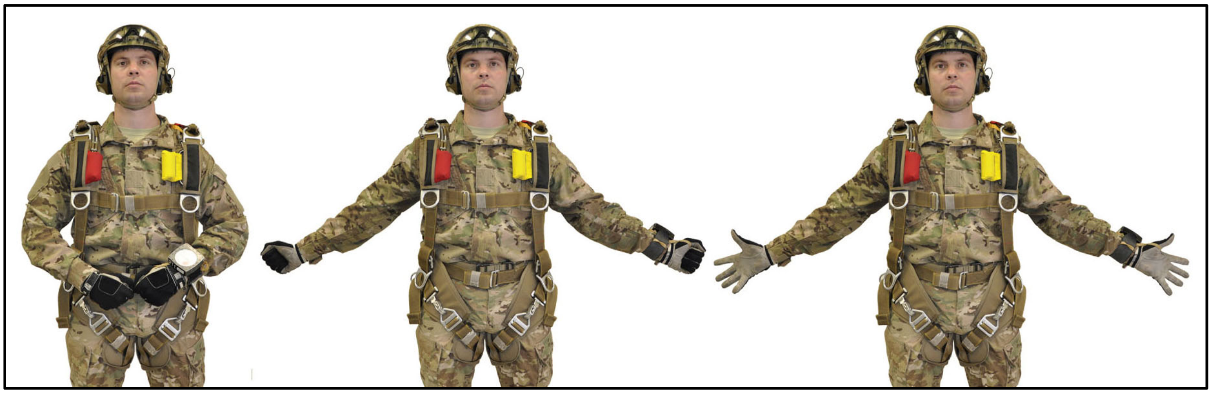


Figure 5-2. UNFASTEN SEAT BELTS signal

EMERGENCY BAILOUT

5-5. The jumpmaster gives the EMERGENCY BAILOUT signal 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:

- **Emergency Bailout (1,001 to 3,000 feet AGL).** As demonstrated in figure 5-3, 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 and thrust his arm out to the side.
- **Emergency Bailout (3,001 feet AGL and Above).** The jumpmaster will give the emergency bailout signal as shown in figure 5-4, page 5-4. The jumpers will stand up, hook up, and exit (on the jumpmaster's command) in a good DBSL exit position. Once under canopy, jumpers attempt to land in the same general area as other jumpers and assemble for a head count. If time does not permit, the jumpmaster will give the emergency bailout signal to exit using the reserve parachute.

Figure 5-3. EMERGENCY BAILOUT signal (1,001 to 3,000 feet AGL)

Figure 5-4. EMERGENCY BAILOUT signal (3,001 feet AGL and above)

TIME WARNINGS

5-6. The jumpmaster receives time warnings from the flight crew. Figure 5-5 depicts the jumpmaster signaling TIME WARNINGS to the parachutists to allow them adequate time to prepare for the jump. The parachutist normally receives the time warnings 20 minutes and 10 minutes before TOT.

Figure 5-5. TIME WARNINGS signal

WIND SPEED

5-7. The jumpmaster signals WIND SPEED (figure 5-6) 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 to indicate the higher wind speed (figure 5-7, page 5-6).

Note: All jumpers must receive a Military CYPRES 2 and pin check after the WIND SPEED or GUSTING WINDS signal is given, then the jumpers must pass the THUMBS-UP signal.

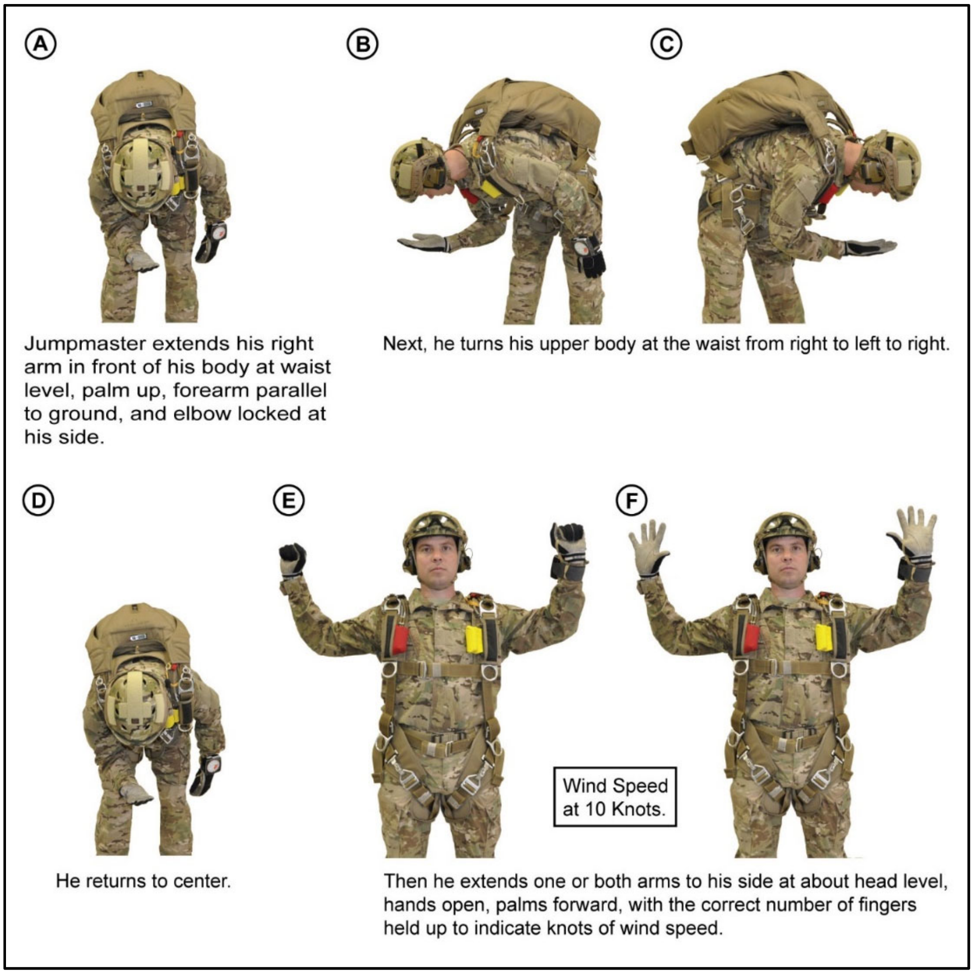


Figure 5-6. WIND SPEED signal

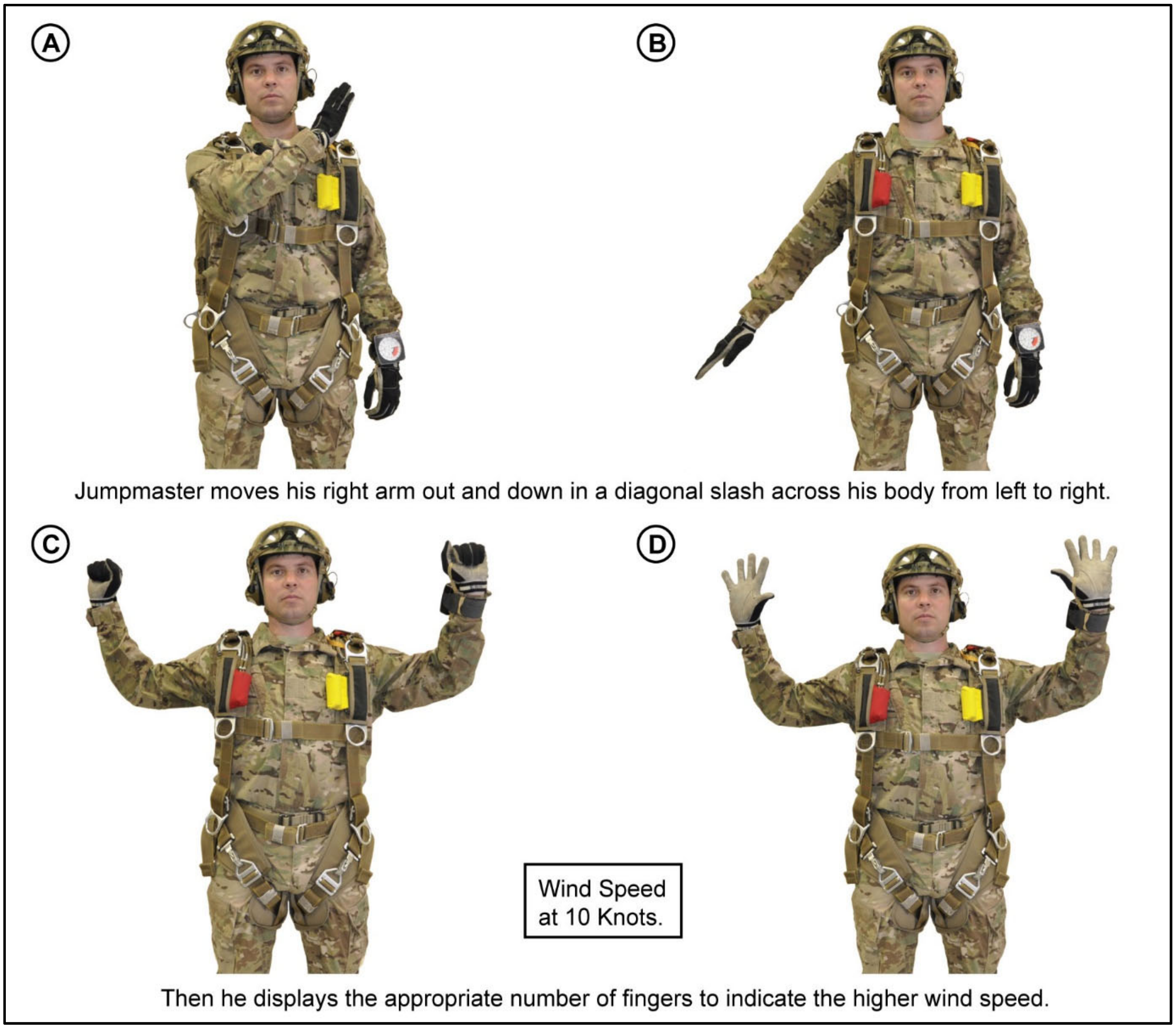


Figure 5-7. GUSTING WINDS signal

JUMP COMMANDS

5-8. The jump commands discussed in the following paragraphs begin as early as 2 minutes before the jump. The jumpmaster gives these commands.

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

STAND UP

5-9. The jumpmaster commands STAND UP (figure 5-8, page 5-7) about 10 to 6 minutes before TOT. Upon receiving this command, the parachutist stands up and faces the rear looking at the jumpmaster. The parachutist checks his equipment and receives the CYPRES and pin check from the jumper to his rear. The parachutist then disconnects the quick-disconnect adapter for console hose at the swivel-T connector on the bailout bottle. He grasps the universal static line snap hook of the jumper to his front and passes the snap hook forward to the outboard shoulder of the jumper to his front. The last two parachutists in the stick will assist each other.

Figure 5-8. STAND UP command

HOOK UP

5-10. When the jumpmaster commands HOOK UP (figure 5-9) each parachutist hooks up to the appropriate anchor line cable, with the dual-locking, spring-opening gate portion of the universal static line snap hook toward the skin of the aircraft. Each parachutist must ensure that the snap hook locks properly. The parachutist maintains control of the static line and grasps excess static line with a high reverse bight. The parachutist releases the reverse bight after exiting the aircraft.

Figure 5-9. HOOK UP command

CHECK STATIC LINE

5-11. When the jumpmaster commands CHECK STATIC LINE (figure 5-10, page 5-8), each parachutist checks his static line and the static line of the parachutist to his front. He checks visually and by feeling with his free hand. He does not release his reverse bight during checks. The parachutist verifies that the universal static line snap hook is properly attached to the anchor line cable and that the static line is not misrouted and is free of frays and tears. The parachutist will also ensure that the static line to the parachutist's front is not misrouted and is properly stowed on the pack tray. He also ensures that all excess slack is taken up and stowed in the static line slack keeper (retainer) and that the pin positions for the reserve and main lines are in the proper position.

Figure 5-10. CHECK STATIC LINE command

Check Equipment

5-12. When the jumpmaster commands CHECK EQUIPMENT (figure 5-11) each parachutist checks his equipment (starting at the helmet) and ensures there are no sharp edges on the rim and that the chinstrap is secured. The parachutist then physically checks the chest strap, main release ripcord (red cutaway pillow), and reserve ripcord handle (yellow pillow), ensuring they are in their proper location. The parachutist also checks and ensures that the equipment straps, lowering line and leg straps are all attached and properly stowed.

Figure 5-11. CHECK EQUIPMENT command

Sound Off for Equipment Check

5-13. At the command SOUND OFF FOR EQUIPMENT CHECK (figure 5-12) the last parachutist in the stick passes the thumbs up signal over the inboard shoulder of the parachutist to his front. The signal is continued until it gets to the first parachutist, who notifies the jumpmaster by giving the jumpmaster the thumbs up. If any parachutist is experiencing a problem with his equipment he extends inboard arm out and places his thumb down and holds it until an assistant jumpmaster corrects the problem, as in figure 5-13, page 5-9.

Figure 5-12. SOUND OFF FOR EQUIPMENT CHECK command

Figure 5-13. EQUIPMENT PROBLEM signal

Move to the Rear

5-14. The jumpmaster commands MOVE TO THE REAR (figure 5-14) 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 the hinge of the cargo ramp. This command can be given from a standing or kneeling position.

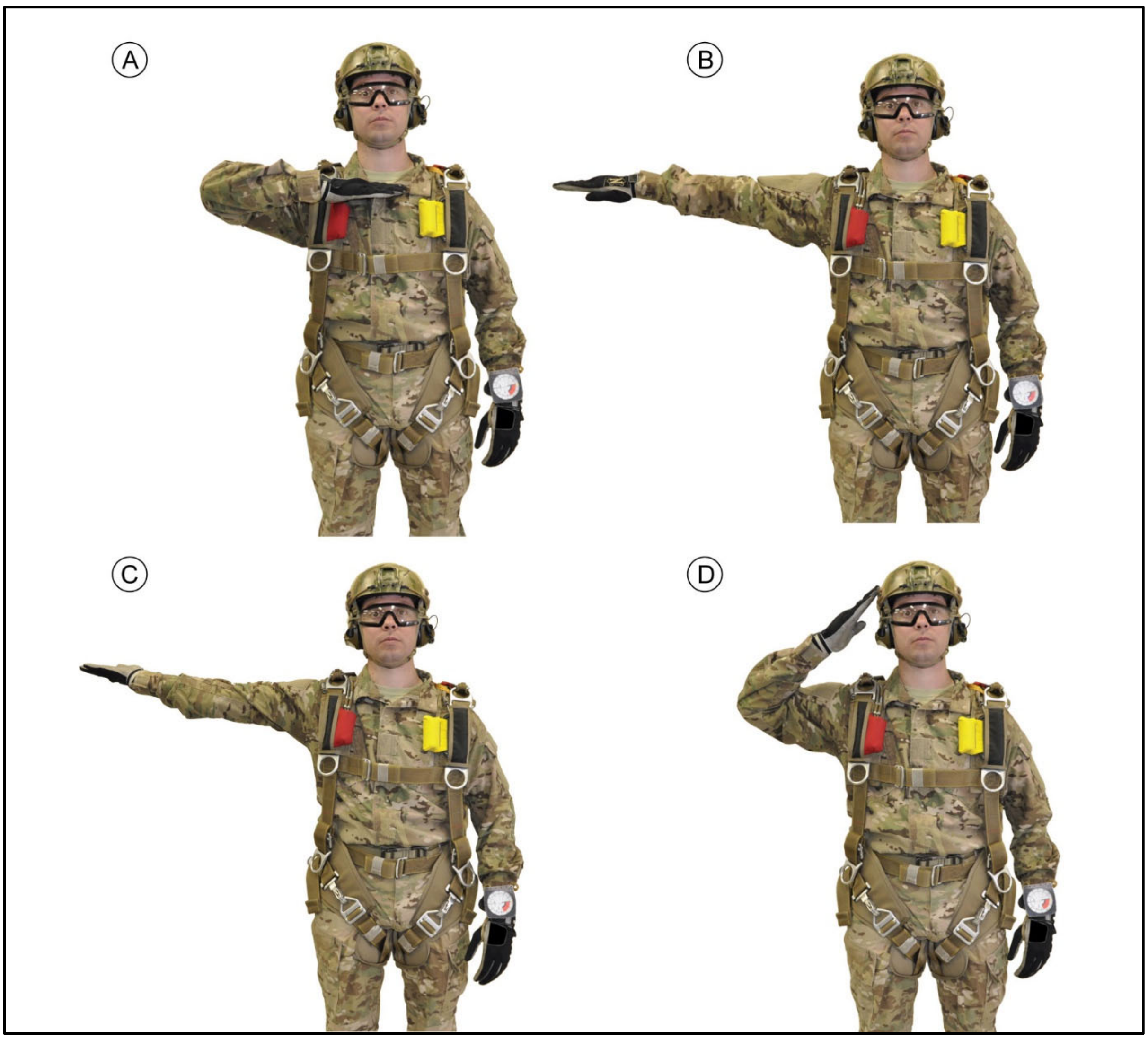


Figure 5-14. MOVE TO THE REAR command

Stand By

5-15. The jumpmaster commands STAND BY (figure 5-15) 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 ramp.

Figure 5-15. STAND BY command

> ***Note:*** Two types of commands can be used for the parachutist to exit the aircraft: GO and FOLLOW ME. The jumping jumpmaster may either use the GO command and be the last parachutist or he may use the FOLLOW ME command and be the first parachutist.

Go

5-16. If the airborne operation will consist of a static jumpmaster, then the GO command (figure 5-16, page 5-11) will be given by the static jumpmaster. The jumpmaster will bring his hand up across his chest and then point toward the ramp. If the airborne operation will consist of a jumping jumpmaster, the jumpmaster must be on a separate anchor line cable. After the jumpmaster has released all parachutists and ensured all parachutists have cleared the aircraft, he will assume a good DBSL position and exit the aircraft. Both the static and jumping jumpmasters command GO when the aircraft is over the release point and the green jump light is on. Jumpmasters will maintain a 1-second interval between each jumper exiting the aircraft.

Figure 5-16. GO command

FOLLOW ME

5-17. The jumpmaster will continue to spot the release point and the safety officer will continue to control his static line. At the release point the jumpmaster will move into the number 1 position with the safety officer controlling his static line. The jumpmaster will give the FOLLOW ME command (figure 5-17) by bringing his non-static line hand behind him at waist level, raising his hand, and bringing it to the front pointing toward the exit. All parachutists will exit the aircraft, following the jumpmaster, in a good DBSL exit position ensuring they have the proper separation (1-second interval) between the parachutist to their front. The safety officer will ensure all parachutists have safely cleared the aircraft.

> ***Note:*** During training, the jumpmaster or static jumpmaster may conduct individual tap out to control separation of parachutists to ensure the parachutists gets a good DBSL exit. The jumpmaster must be on a separate anchor line cable. The static jumpmaster must wear the RA-1 in the MFF configuration or compatible parachute for the operation being conducted.

Figure 5-17. FOLLOW ME command

ABORT

5-18. The jumpmaster commands ABORT (figure 5-18, page 5-12) anytime an unsafe condition exists inside or outside the aircraft (and the red jump light comes on) or on the DZ. Upon receiving this command, the parachutist will focus his attention on the jumpmaster and wait for instructions. The jumpmaster may instruct the parachutists to STAND BY for another pass or move back to the front of the aircraft and reconnect the console. If the delay will be longer or the airborne operation is permanently aborted, the jumpmaster may have the parachutists disconnect their universal static line snap hooks and sit down.

Figure 5-18. ABORT command

> **CAUTION**
>
> **If the jumpmaster has positioned his arm to give the GO command, 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

Double-Bag Static Line Exit Procedures and Canopy Deployment Sequence

The jumper's exit procedure in the DBSL configuration when using the ARAPS RA-1 is a total different procedure than what an MFF jumper or conventional static line jumper would use with the RA-1 configured for DBSL. The jumper must understand the correct theory, fundamentals, and procedures involved for a safe and controllable exit when jumping the RA-1 in the DBSL configuration. Jumpers will maintain a minimum of a 1-second interval between jumpers.

WARNING

The RA-1 ARAPS will not be jumped from the side door of any fixed-wing aircraft in the DBSL configuration. The RA-1 ARAPS can only be jumped from an approved fixed-wing, rotary-wing aircraft ram (tail gate) and rotary-wing side door in the DBSL configuration.

WARNING

Parachutists will use the 15-foot static line when jumping the C-130, C-130J, CASA 212, Caravan, Sherpa, UH-60 (door exit) and CH-47 for the over-the-ramp operations. The universal static line extension is required when conducting over-the-ramp DBSL operations from the C-27J Spartan aircraft. Parachutists will use the 5-foot extension (making a 20-foot static line) when jumping the C27-J.

WARNING

When conducting over-the-ramp DBSL operations from the C-27J Spartan aircraft, the anchor line cables—one on each side of the aircraft—are rigged from the forward anchor line cable attachment to the aft anchor line cable attachment. The anchor line stop (a small clevis, padded and taped) must be installed on the anchor line cable 20 inches forward of the aft anchor line cable attachment bracket at Aircraft Fuselage Station 610. The center anchor line cable support brackets at the door are disconnected and secured at the top of the fuselage. The static line retriever cables are tied or taped to the sides of the fuselage aft of the doors to ensure that they remain secured.

WARNING

For all fixed-wing aircraft, once all jumpers have exited and the static jumpmaster or safety officer has completed clearing the parachute deployment bags, he will communicate to the loadmaster that all jumpers are clear and that deployment bag recovery can begin. The loadmaster will utilize the towed parachutist retrieval system (when exercisable) to return the deployment bags to the aircraft. Once the static lines and deployment bags are onboard, the safety officer will take control and prepare for subsequent passes. Parachutists' deployment bags will be retrieved after every pass, before putting out another stick of jumpers.

DOUBLE-BAG STATIC LINE JUMPMASTER, SPOTTING SAFETY, AND FORWARD SAFETY POSITIONS WITHIN THE AIRCRAFT DURING EXIT

6-1. The DBSL jumpmaster has two options when jumping with the stick. He can either lead the stick out of the aircraft being the first jumper wearing the RA-1 in the DBSL configuration or follow the stick by utilizing the RA-1 ARAPS in the MFF configuration. Both configurations are acceptable. The following explains the options:

- **Jumpmaster Jumping in DBSL Configuration.** A jumping jumpmaster is authorized in the DBSL configuration. However, if the jumpmaster elects to jump in DBSL configuration, he will be the first parachutist of each stick. Therefore, the safeties control the flow of the parachutists exiting the aircraft.
- **Jumpmaster Jumping in MFF Configuration.** A jumping jumpmaster is authorized in MFF configuration. First, adequate space will be given to all DBSL jumpers to ensure they clear the aircraft before the jumpmaster exits in the MFF configuration using the "clear and pull method".
- **Static Jumpmaster or Spotting Safety Officer.** If using a static jumpmaster or spotting safety officer, that individual will be wearing an approved parachute system according to their duty and responsibility (i.e. safety harness, advanced emergency bailout parachute system, MFF configuration ARAPS parachute). If using a safety harness, it will be attached to the floor no further back than the last attachment point before the hinge of the ramp. The length should be sufficient enough for the jumpmaster or safety officer to conduct respective jumper checks, as well as perform spotting duties from either the ramp or the window. The harness should also be such a length that the jumpmaster or safety officer cannot fall off the ramp. If using a ground-marked release system (GMRS), the jumpmaster may spot the ground marking from either side of the ramp or windows. When jumpers are exiting, the jumpmaster will be in a position that bisects the hinge of the ramp. He will be opposite the anchor line cable to which the jumpers are hooked up in order to adequately control the flow of jumpers. Due to the 5-foot extension and jumpers stopping and setting before exiting the aircraft, the safety officer should position himself at the hinge of the ramp of the aircraft between the jumper and skin of the aircraft. The safety officer will receive and control (not grab) the static line to prevent the static line from whipping around in the wind.
- **Forward Safety Officer.** A forward safety officer will be utilized to assist the static jumpmaster or safety officer with jumper checks. The forward safety officer will be in an approved bailout parachute.

CAUTION

During a bailout with the use of an MFF or non-standard parachute system, the possibility exists of an individual being extracted or ejected from the aircraft while assisting in either deployment bag retrieval or towed jumper retrieval.

EXIT THEORY

6-2. Three factors that influence a good exit include—

- Understanding relative wind.
- Executing proper body position.
- Maintaining correct exit body position and dispersion.

RELATIVE WIND

6-3. Relative wind is defined as the wind that will affect the parachutist from the time of exiting the aircraft until the canopy deploys. Because of the forward movement of the aircraft, the relative wind will be coming from the front of the aircraft during exit. Relative wind—

- Is directly related to the speed of the aircraft.
- Comes from the direction of flight.
- Affects the jumper's body through canopy deployment.

DOUBLE-BAG STATIC LINE EXIT BODY POSITION

6-4. The body position of the parachutist during aircraft ramp exit with the RA-1 in DBSL mode is significantly different than the exit positions for MFF (RA-1 ARAPS) and standard static line parachute (T-10, T-11, MC-6) deployments. For DBSL, the parachutist assumes a standing simulated seated position on the tail end of the aircraft ramp. The DBSL simulated seated position ensures that the parachutist deploys from the aircraft with the universal static line oriented toward his rear, and that his legs, arms, and head are as far away from the universal static line and deploying canopy as possible.

DANGER

Failure to conduct a simulated seated exit when jumping the RA-1 in DBSL mode from the aircraft ramp could lead to a canopy malfunction resulting in injury or death. Following aircraft exit, the parachutist mist also hold the DBSL simulated seated position for a minimum of 6 seconds or until the parachute is fully inflated and stable at a descent rate below 18 feet per second.

6-5. The DBSL seated position also enables the parachutist to use the relative wind to maintain an on-heading opening. The DBSL seated exit position must be trained and rehearsed by parachutists in order to ensure risks associated with DBSL deployments are mitigated. Figure 6-1, page 6-4, shows the seated body position that was used during DBSL deployments. Employ the following body position:

- Ensure leg straps are tight, chest strap is low and tight, and combat equipment is tight when bent over.
- Bend forward at the waist.
- Place feet approximately shoulder width apart with knees slightly bent.

- Extend arms out at shoulder height and slightly forward.
- Keep head up and maintain eyes on the horizon.
- Keep pack tray and buttocks exposed to relative wind.
- Maintain body position throughout exit and canopy deployment keeping arms out to the sides.
- Do not reach for the risers until 6 seconds after exit and the canopy has deployed.

Figure 6-1. Fixed-wing double-bag static line jumper exit

RAMP EXIT WITH OVERHEAD ANCHOR LINE

6-6. Employ the following for a ramp exit with overhead static line:

- Control the static line (figure 6-2, page 6-5) as briefed by the jumpmaster.
- Take position in the center and as close to the edge of the ramp as possible.
- Bend forward at the waist.
- Place feet shoulder width apart.
- Extend arms out at shoulder height and slightly forward.
- Keep head up and maintain eyes on the horizon.
- Hop (gently) or step off the center of the ramp.
- Keep back exposed to the relative wind.

Figure 6-2. Ramp exit with overhead anchor line

OTHER TYPES OF EXITS WITH DOUBLE-BAG STATIC LINE CONFIGURATION

6-7. The following paragraphs detail other types of exits which may be executed with the DBSL configuration.

DECK-MOUNTED ANCHOR LINE CABLE

6-8. Follow these procedures when executing a DBSL jump with a deck-mounted anchor line cable (figure 6-3, page 6-6)—

- Control the static line as briefed by the jumpmaster.
- Take position in the center and as close to the edge of the ramp as possible.
- Bend forward at the waist, eyes on the horizon.
- Keep head up and maintain eyes on the horizon.
- Hop (gently) or step off the center of the ramp.
- Bring feet and knees together.
- Keep hands tight to the sides.
- Keep back exposed to the relative wind.
- Transition to the DBSL exit body position after a 2-second count.

Figure 6-3. Ramp exit deck-mounted anchor line cable

SIDE DOOR ROTARY-WING

6-9. The DBSL pike exit position for side door rotary-wing aircraft is different than fixed-wing aircraft or jumping from the ramp of a rotary-wing aircraft. Parachutists must exit the helicopter using a pike body position (figure 6-4, page 6-7) to control the risk of injury or death. The pike position consists of the parachutist placing his elbows at his side, hands gripping his cargo pockets and with his body bent slightly at his waist while keeping his feet and knees together. The parachutist will assume the pike position immediately after exiting the aircraft and then hold the pike position for 6 seconds. After the six second count, the parachutist should check his canopy and gain canopy control. Reference Chapter 13 for more information on exiting from rotary-wing (side door and ramp) aircraft in the DBSL configuration. Follow these procedures for a side door exit from a rotary-wing aircraft:

- On the command STAND BY, grasp the edge of the fuselage or deck and return eyes to the jumpmaster.
- On the command GO, vigorously push away from the aircraft, pivoting to present back to the relative wind.
- Assume DBSL pike exit body position and maintain throughout canopy deployment.

Figure 6-4. Side door rotary-wing pike exit body position

EXIT DISPERSION

6-10. Multiple parachutists can be deployed in one pass using the DBSL method; however, a minimum separation of one second between jumpers should occur in order to safely deploy multiple parachutists from the rear ramp of the aircraft in DBSL configuration. The jumpmaster will determine exit dispersion by factoring aircraft type, speed, configuration, upper winds, type of equipment worn, and static line handling. The jumpmaster should also consider the qualification of the jumpers conducting the operation.

> ***Note:*** To control risk during airborne operations from a rotary-wing side door helicopter using the RA-1 in DBSL mode, jumpmasters should use the minimum exit dispersion time of 3 to 4 seconds between jumper exits to ensure jumper clears the aircraft before the next jumper is released.

CANOPY DEPLOYMENT SEQUENCE

6-11. Only the RA-1 main parachute may be deployed using the DBSL configuration. Before exiting the aircraft using the DBSL configuration, the parachutist ensures that the universal static line snap hook is attached to the aircraft anchor line cable (figure 6-5 [A], page 6-9). As the parachutist exits and falls away from the aircraft, the following operations take place.

Static Line Deployment

6-12. The static line is pulled from the stows on the outside of the main RA-1 container as depicted in figure 6-5 [B], page 6-9.

Container Opening

6-13. The universal static line main safety pin is pulled from the closing loop on the RA-1 container. The side, top, and lower flaps separate, allowing the outer deployment bag to be pulled from the RA-1 main parachute compartment (figure 6-5 [C], page 6-9).

Outer Bag Deployment

6-14. The drogue pilot chute and suspension lines are extracted from the outer deployment bag (figures 6-5 [D and E], page 6-9). The tandem retainer bands and the outer deployment bag are pulled away from the main container.

Drogue Bridle Control Line Deployment

6-15. When the suspension lines are at full stretch, the removal of the last four suspension line stows will unlock the outer deployment bag (figure 6-5 [F], page 6-9).

6-16. The inner deployment bag is extracted from the outer deployment bag.

6-17. The pilot chute is pulled from the small retainer band located inside the outer deployment bag, creating separation from the outer deployment bag and aircraft.

6-18. The parachutist is free from the static line and aircraft, allowing the drogue to fill with air (figure 6-5 [G], page 6-9).

PARACHUTE DEPLOYMENT

6-19. Upon full extension, the drogue-slider control line releases the main canopy assembly from the inner deployment bag.

6-20. The drag load from the drogue now permits deployment and inflation of the main canopy to be similar to that of the free-fall configuration, except that the drag force of the drogue assists the slider. As the suspension lines spread apart and the canopy inflates, it forces the slider down toward the risers, bringing the drogue line down and the drogue parachute and inner deployment bag to the top of the main canopy (figure 6-5 [H], page 6-9).

6-21. After complete canopy deployment, the parachutist conducts postopening procedures then pulls down on the control line toggles to release from the keepers (figure 6-5 [I], page 6-9); the parachutist can now control the parachute during descent by using the control line toggles.

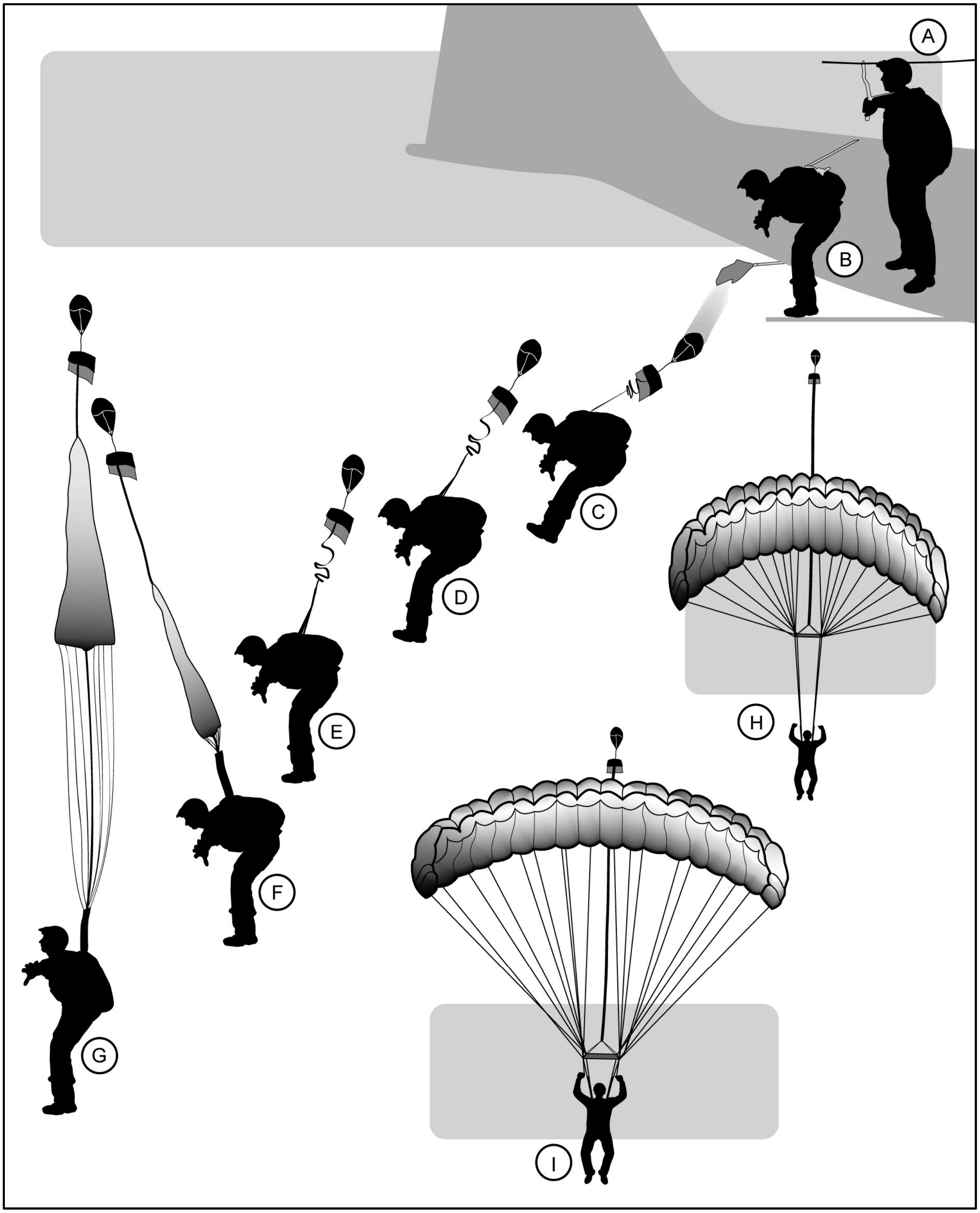


Figure 6-5. Double-bag static line deployment sequence

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Chapter 7

Canopy Control

Chapter 7 details the canopy control procedures and considerations for the RA-1 ARAPS.

ADVANCED RAM-AIR PARACHUTE SYSTEM THEORY OF FLIGHT

7-1. The RA-1 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.

7-2. The ram-air parachute's nose 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 nose (figure 7-1). The focal point of this stagnant air acts as a true nose, 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 nose of the airfoil is slightly lower than the tail.

7-3. 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 and, the parachutist and his equipment. Gravity, plus the resultant sum of these aerodynamic forces on the upper surface, act to pull the ram-air parachute through the air and contributes to the flat glide angle of the canopy (figure 7-1).

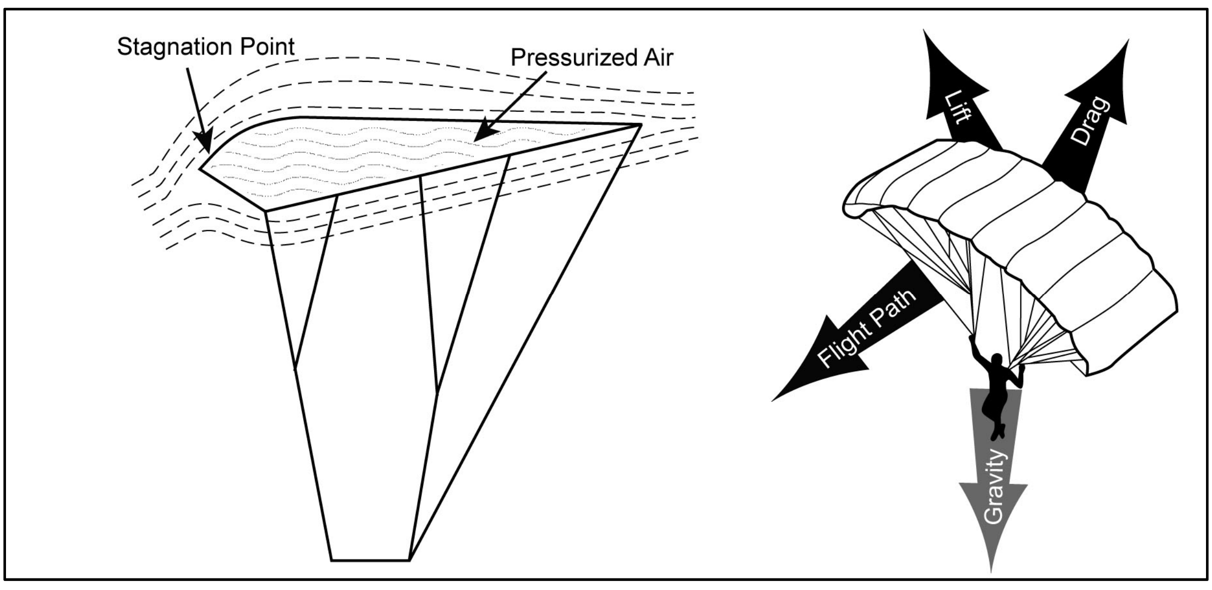


Figure 7-1. Ram-air parachute theory of flight

7-4. 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.

7-5. 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 braking application and the existing wind conditions.

7-6. Applying brakes on the ram-air parachute causes the tail to deflect downward, creating additional drag (figure 7-2). 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 drag results in a yaw-type turn toward the side with the highest drag and the lowest lift.

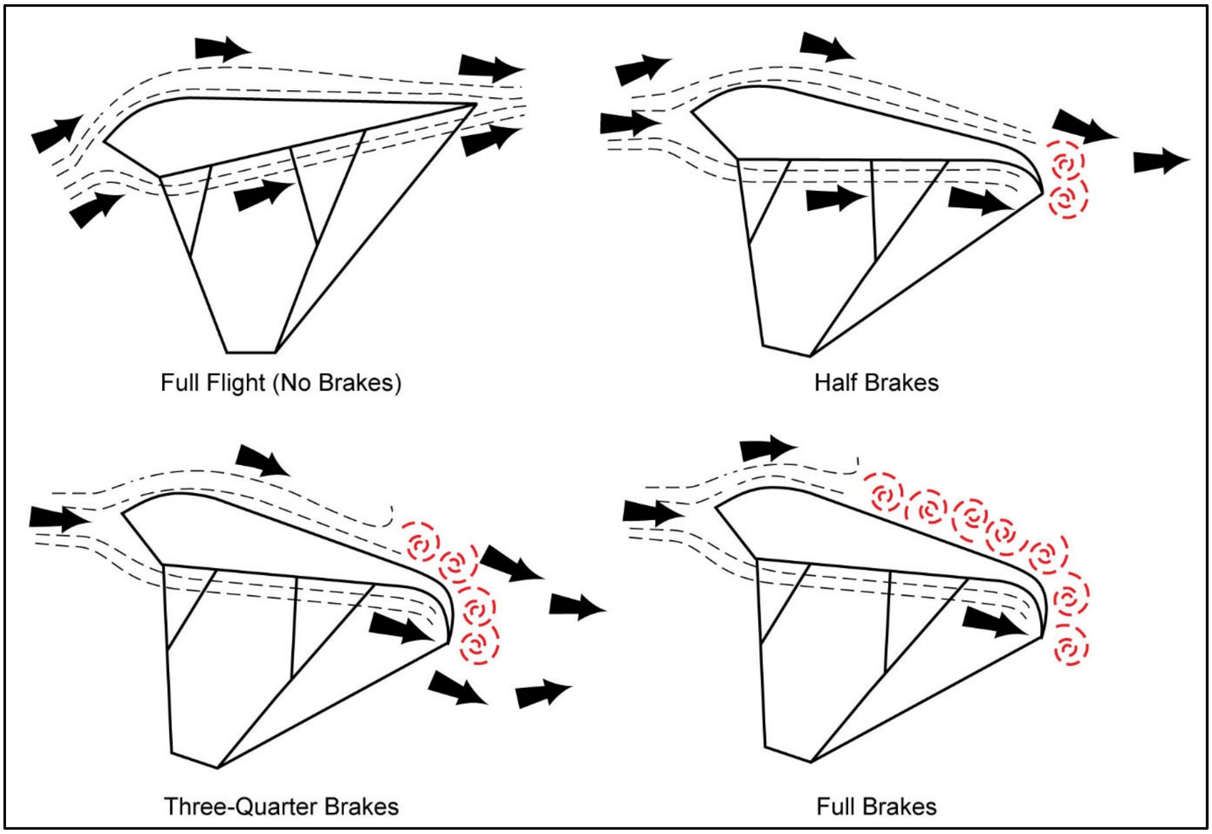


Figure 7-2. Effects of applying brakes

7-7. 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

7-8. 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 Jumper and Equipment

7-9. 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

7-10. 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.

7-11. 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-mile 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 7-3). If the ram-air parachute faces into 20-miles per hour winds, the ground speed will be 6 miles per hour.

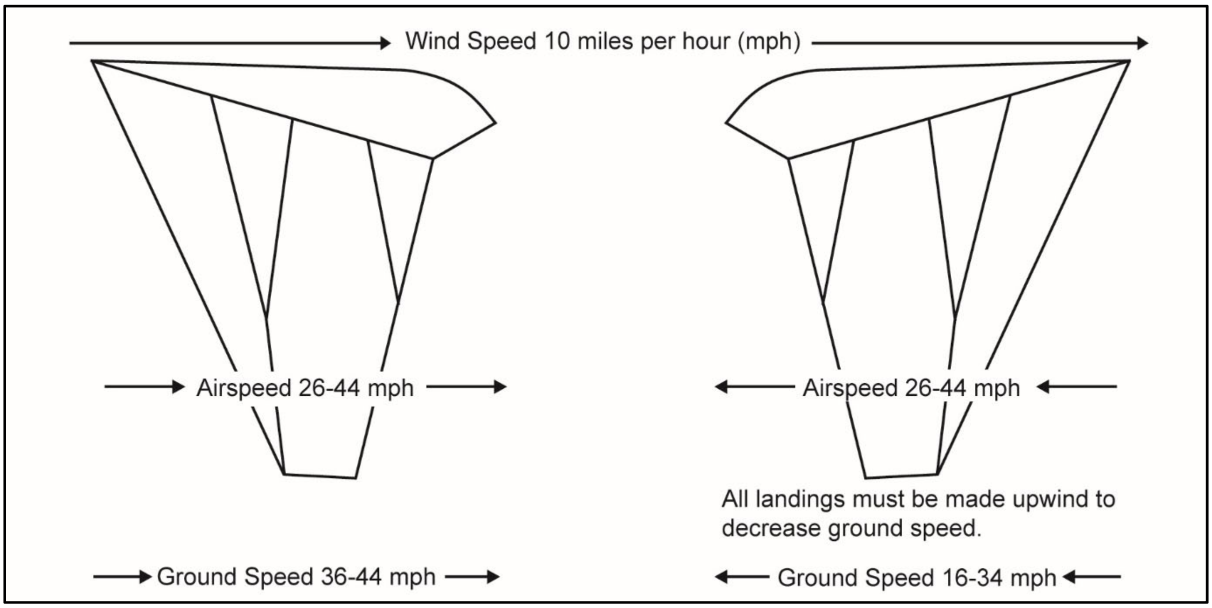


Figure 7-3. Controlling ground speed

7-12. 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.

7-13. 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.)

7-14. 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.

7-15. 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

7-16. 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.

7-17. Turbulence is the result of wind flowing over natural and manmade 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 approach during preparation for landing. Turbulence can often be experienced 500 feet above and 500 feet past the obstacle.

7-18. Air turbulence can cause the parachutist to stop descending or to even gain altitude. It can collapse all or part of the parachutist's canopy. It can double the parachutist's rate of descent or make his 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

7-19. 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

7-20. The overall objective of DBSL 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 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 7-4, page 7-5, provides a condensed guide to good canopy control.

7-21. 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.

7-22. 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 point.
- Picks out intermediate ground references between him 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 7-4. Parachutist's guide to good canopy control

DETERMINING WIND DIRECTION

7-23. Due to the penetrating ability 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 their parachutes into the direction of the wind origin. All landings should be made facing into the wind.

7-24. At altitude, the parachutist can determine the wind direction by allowing the advanced ram-air parachute to naturally seek its inherent downwind path. He should leave the toggles at the guide rings, full-flight position. It is faster, however, to manipulate the steering lines to the full-brakes position and visually observe the position over the ground. Ground movement will display the parachute's actual drift. Drift will then be easily observed. The parachutist 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. The parachutist may perform this procedure repeatedly, for assurance and verification of drift.

CRABBING MANEUVER

7-25. The parachutist performs a crabbing movement (figure 7-5, page 7-6) by pointing the canopy at any given angle to the wind direction. The force of the wind from one direction and the flight of the canopy at an angle to it move the canopy at an angle to 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.

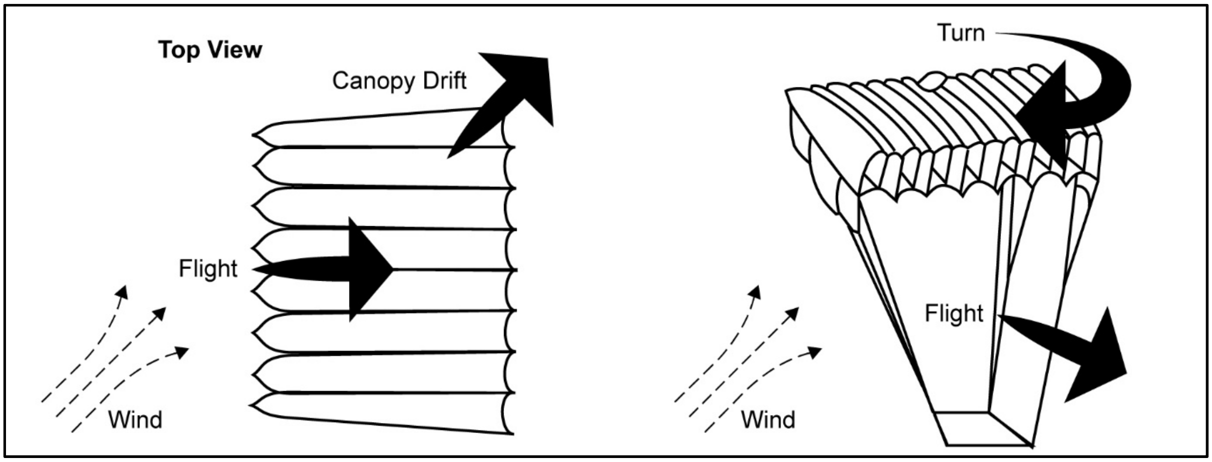


Figure 7-5. Crabbing maneuver

RUNNING MANEUVER

7-26. Running, as depicted in figure 7-6, 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. The parachutist 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.

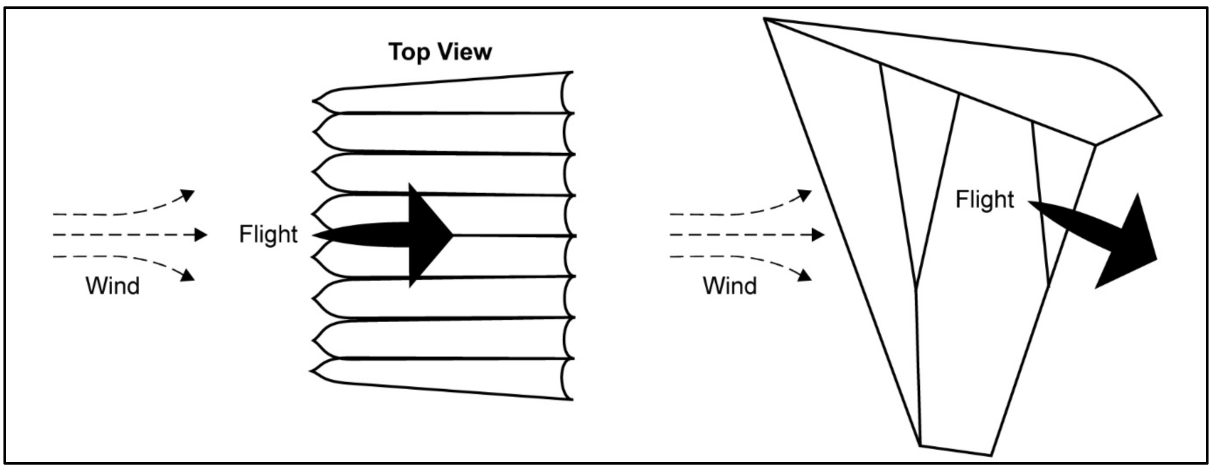


Figure 7-6. Running maneuver

HOLDING MANEUVER

7-27. When the parachutist points the canopy into the wind, or holding (figure 7-7, page 7-7), the wind speed minus the glide of the canopy produce 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.

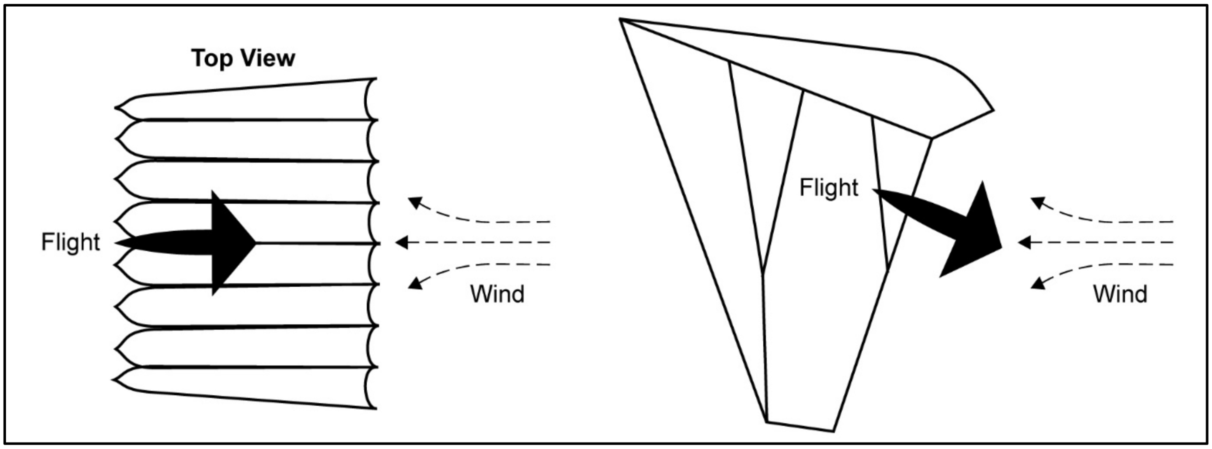


Figure 7-7. Holding maneuver

MANEUVERING TOWARD THE TARGET AREA

7-28. 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 (figure 7-8) 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. Changes in wind direction and conditions may cause this range to shift in any direction.

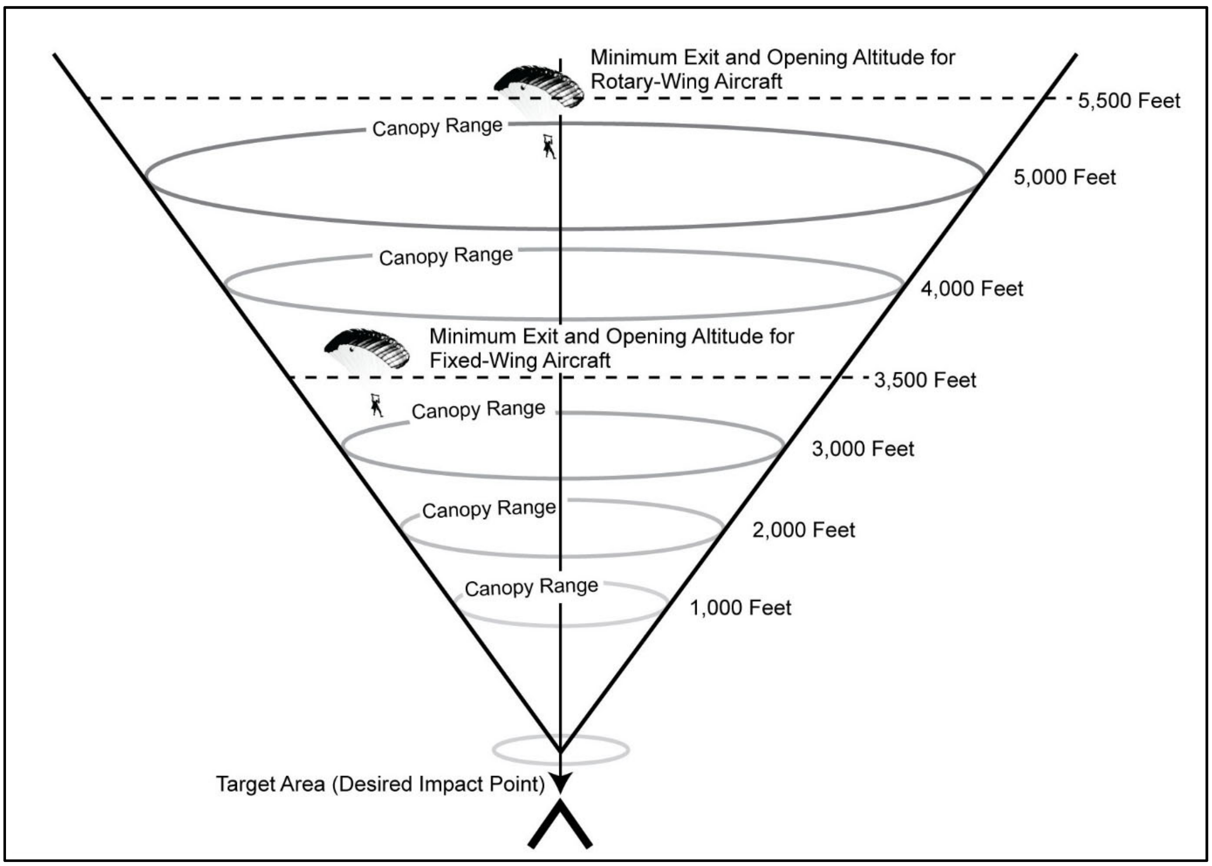


Figure 7-8. Effective double-bag static line canopy range

Note: Maximum exit and opening altitude for DBSL is 25,000 feet MSL

7-29. 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.

7-30. The wind cone is an imaginary area representing the area around the wind line in which the parachutist can maneuver a parachute left, right, upwind, and downwind and still be able to land in the target area.

7-31. Once the parachutist has determined the wind line and the wind cone (figure 7-9), he may attempt to maintain a 60-degree angle down to the target. If he must lose altitude to maintain the angle, he may S-turn within the wind cone.

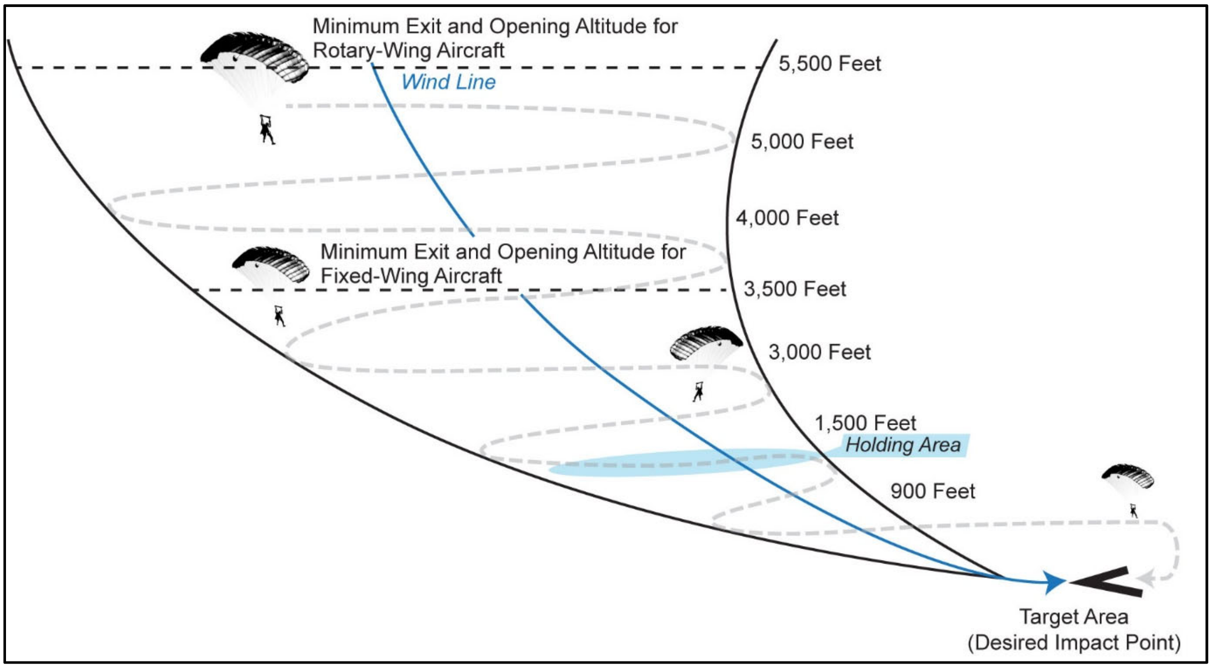


Figure 7-9. Double-bag static line wind line and wind cone

7-32. 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.

HALF METHOD

7-33. For the half method, the parachutist picks a ground reference point on the wind line, halfway between the opening point and the target area. This point is the first checkpoint 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.

HORIZON METHOD

7-34. 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. 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 where he will not be blown behind his target area and become unable to recover and land with his group.

7-35. 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.

7-36. 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 flare point will be at a different position as wind speed increases and also 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.

CANOPY MANEUVERS

7-37. 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 andgle depending on whether the parachutist is flying with the wind or into the wind. Figure 7-10 shows the flight angles for a ram-air canopy at the various toggle settings and riser inputs as the parachutist flies into the wind as if on the final leg of a the landing pattern. As toggles are applied, the glide angle decreases and there is increaed drag at the tail of the canopy which slows the ground speed.

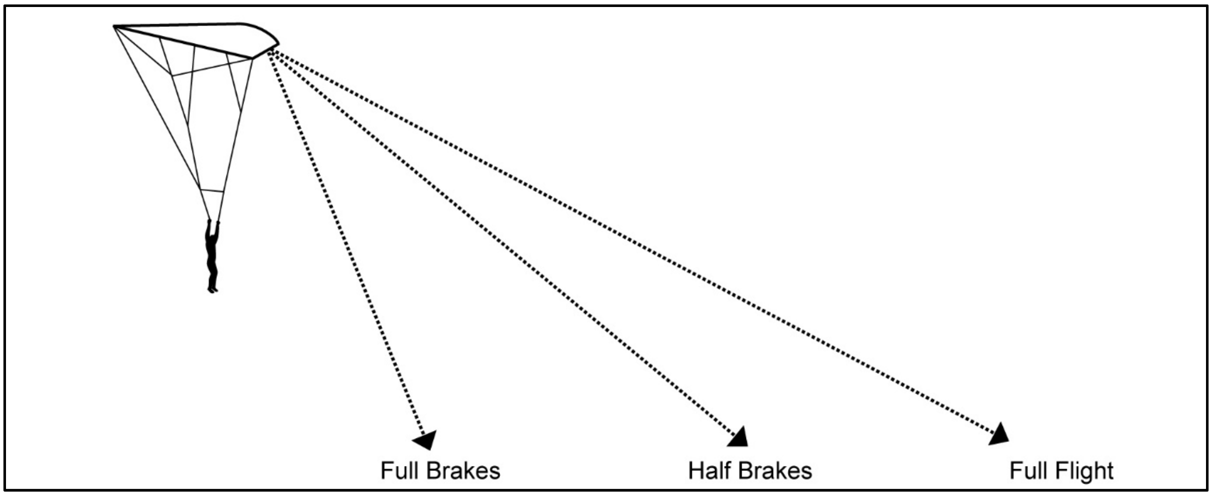


Figure 7-10. Brake-setting flight angles

FULL FLIGHT

7-38. Full flight (no brakes), as shown in figure 7-11, page 7-10, 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.

7-39. The maximum canopy flight and penetration for maneuvering are obtained using full flight as depicted in figure 7-10. The toggles are in the all-up position behind the rear risers. During full-flight maneuvering the following apply:

- Toggles are all the way up (an unacceptable toggle position for landing).
- Greatest forward speed of any toggle setting is 26 to 34 miles per hour.
- Greatest descent rate of any toggle setting aside from sink/stall is 8 to 10 feet per second.

Figure 7-11. Full flight

HALF BRAKES

7-40. The parachutist grasps the toggles and pulls them down to about shoulder or chest level for the half-brakes position (figure 7-12, page 7-11). 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 one quarter brakes or full flight. In the half-brakes position the following apply:

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

Figure 7-12. Brakes (half and full)

FULL BRAKES

7-41. The parachutist pulls the toggles to about waist level for full brakes (figure 7-12, above). 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. In the full-brakes position the following apply:

- Toggle position is at about waist level. This is an extremely unacceptable toggle position for stand-up landings, but safe parachute landing falls can be conducted at deeper brake settings (in which the toggle position is past waist level).
- Forward speed is 0 to 5 miles per hour.
- Descent rate is 7 to 10 feet per second.
- Variance between canopies can be significant.

TOGGLE TURNS

7-42. The parachutist can make turns from the full-flight, half-brakes, or full-brakes 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.

DANGER

Never initiate a sharp turn while flying close to the ground, especially as a novice jumper. Sharp turns result in rapid loss of altitude, potentially leading to serious injury or death if not performed properly.

FLAT TURNS

7-43. The reduced banking associated with flat turns (turns made with the off-hand) makes it the preferred type of turn for many parts of the jump. Using flat turns (figure 7-13) 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 are generally preferred over spiral turns.

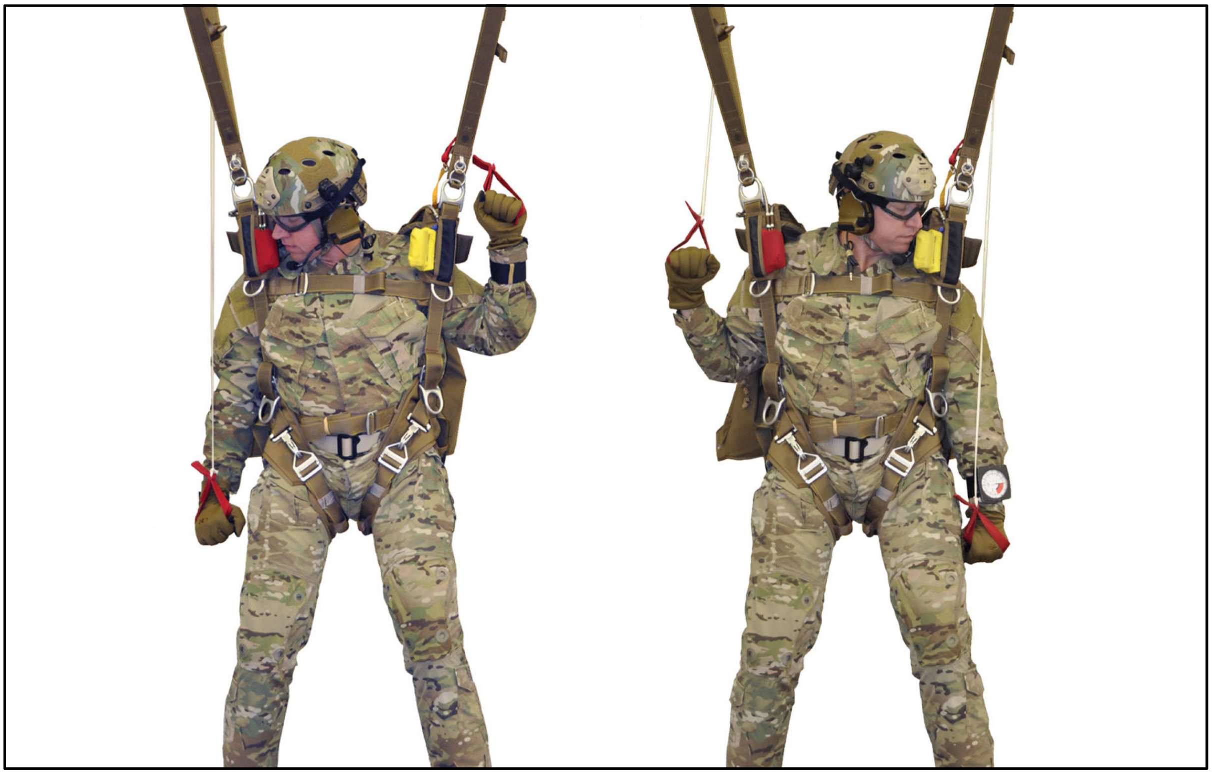


Figure 7-13. Flat turn (right and left)

7-44. With flat turns the following apply:

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

SPIRAL TURNS

7-45. Spiral turns or full-glide turns (figure 7-14) are turns from full flight which are maintained 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. Characteristics of a spiral turn include the following:

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

Figure 7-14. Spiral turns (right and left)

FRONT RISER TURNS

7-46. Sustained front riser turns are an effective tool for gaining vertical separation early in a jump due to loss of altitude. The same maneuvers listed under spiral turns apply to sustained front riser turns. 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. During front riser turns the—

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

REAR RISER TURNS

7-47. Rear riser turns (figure 7-15) 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 in that they deflect the rear sections of the canopy. Rear riser turns require more force to execute because the jumper is pulling down a larger area of the canopy with force that will cause 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. In executing rear riser turns, the—

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

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.

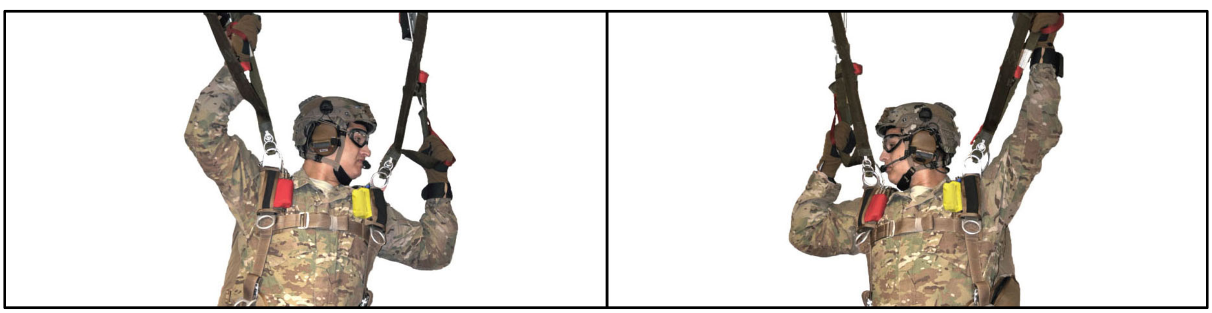


Figure 7-15. Rear riser turn (left and right)

LANDING MANEUVERS

7-48. Unsafe landing maneuvers contribute to most injuries during parachuting operations. The jumper's misjudgment during this maneuver while flaring his canopy could result in a high-speed impact with the ground or other hazards on the ground. Additional hazards that could contribute to risky 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

7-49. Full-brake landings with the RA-1 are often the best choice for jumps at night, as well as days consisting of low visibility, rough terrain spots that require a high degree of accuracy. 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.

Note: The parachutist can safely land the RA-1 ARAPS in the full-brakes position. This procedure is especially useful during night or limited-visibility operations when he cannot see the ground. He must be prepared to perform a parachute landing fall upon ground contact.

FLARE

7-50. The parachutist makes flared landings into the wind. He starts the flare at an altitude of approximately 10 to 15 feet above the ground, with room ahead for the actual touchdown. First, at 200 feet AGL, he eases both toggles to the full flight position, allowing airspeed to build. Then at about 10–15 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

7-51. The two-staged flare is a good compromise between half-brake landings and dynamic flares. Landings can be lighter that 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 aand a safe brake setting can be held if timing is off and/or turbulence is encountered. In addition, the two-staged flare helps the jumper develop his timing for executing a dynamic flare.

7-52. Proper altitudes to initiate are very dependent on density altitude, with high-density altitudes requiring the jumper to initiate at a higher altitude than 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 staright 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 the flare until the canopy starts losing lift and momentum. When the jumper loses forward momentum, he executes the second stage.

7-53. 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 the horizon when he is at altitude. The jumper should remember this toggle brake setting as it will be the same when executing an actual landing.

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

7-54. 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.

7-55. 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

7-56. 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 making adjustments 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

7-57. The holding area is the jumper's location 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

7-58. 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 above the ground (depending on winds) and about 60 degree angle (view point) to the side of the target area. He continues the downwind leg about 300 to 400 feet downwind of the target (again, depending on winds). The 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 at approximately 900 feet AGL.
- Ends with turn onto base leg, approximately 600 feet AGL.

BASE LEG

7-59. When 300 to 400 feet 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 directly downwind of the target and at an altitude of 600 feet. The base leg—

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

FINAL APPROACH (LEG)

7-60. Under light wind conditions (0 to 5 knots) and 300 feet 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 (at no lower than 200 feet AGL) after turning on final approach (leg).

7-61. The final leg (as depicted in figure 7-16, [below] and figure 7-17, page 7-17, respectively—

- Begins at the end of the base leg (setup point), approximately 300 feet AGL.
- Lowers 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.**

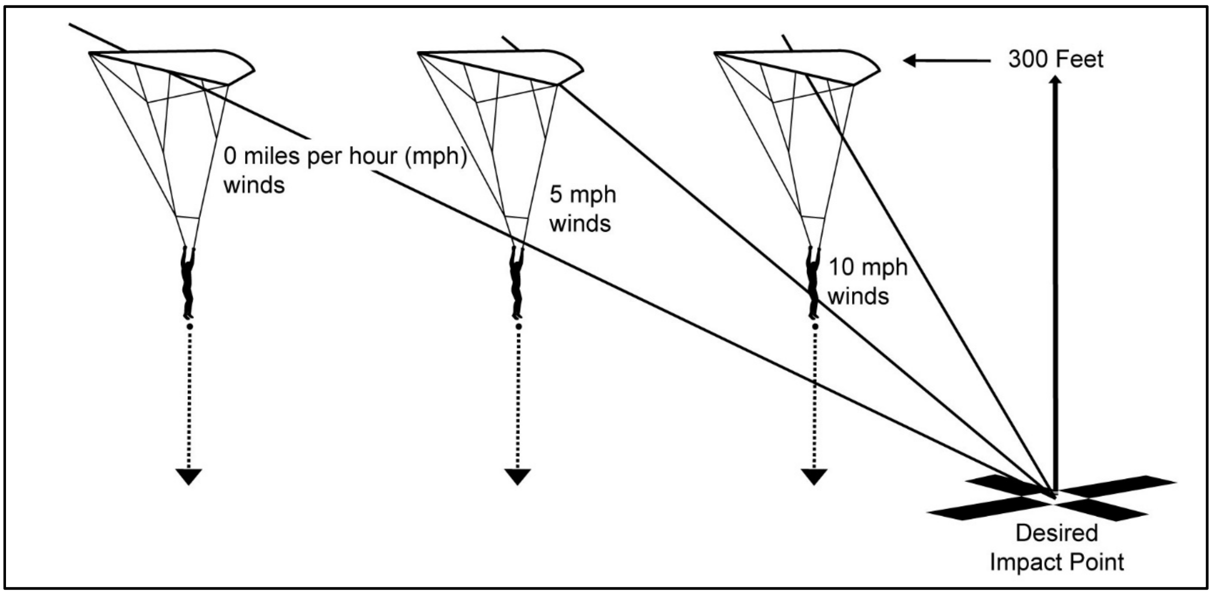
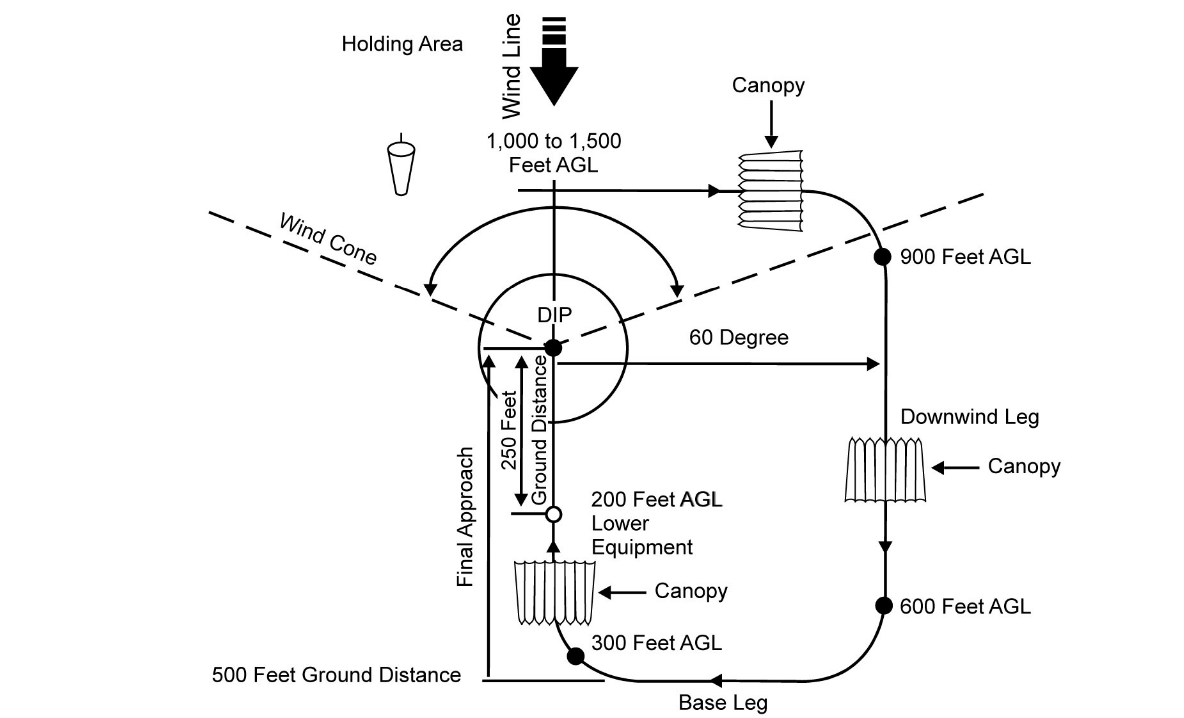


Figure 7-16. Flight angles for a final approach



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

Legend:

DIP	Desired Impact Point
AGL	above ground level

Figure 7-17. Landing approaches

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 follow the established pattern than it is to land into the wind. Any wind that is quartering headwind is safe for jumpers of any level to land in.

WARNING

The parachutist makes 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.

WIND

7-62. One of the most important factors to a parachutist conducting DBSL 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

7-63. The parachutist will tighten the pattern as wind speed increases as depicted in figure 7-18. The downwind leg should be closer to wind line, and the base leg will move closer to the desired impact point.

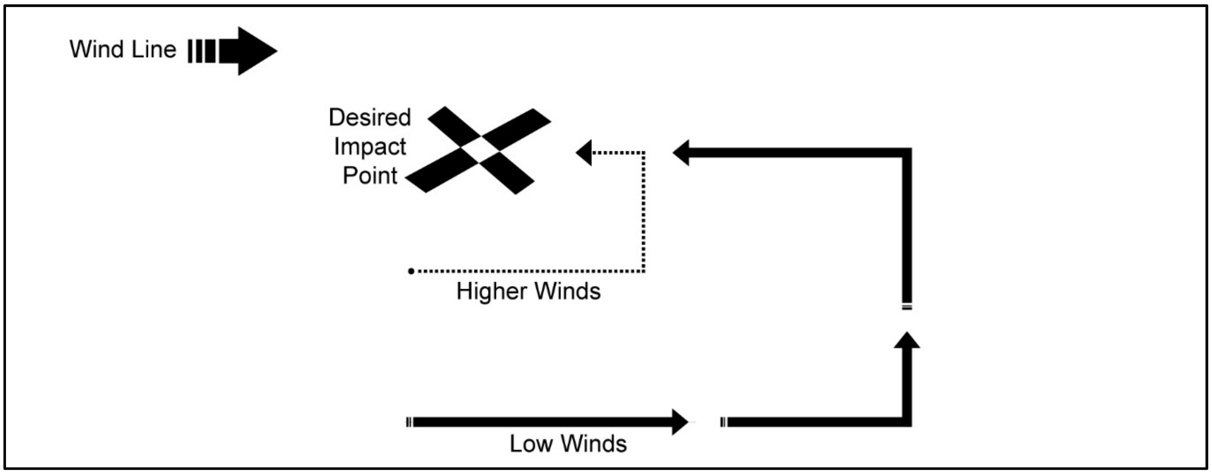


Figure 7-18. High and low wind patterns

ADJUSTING FOR CHANGES IN WIND DIRECTION

7-64. It is not uncommon for the wind to change during DBSL operations. Most changes are minor and can be corrected by slight adjustments on final approach. If the change in wind direction is significant and it is recognized prior to entering the pattern, it may be preferable to shift the entire pattern as depicted in figure 7-19. 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.

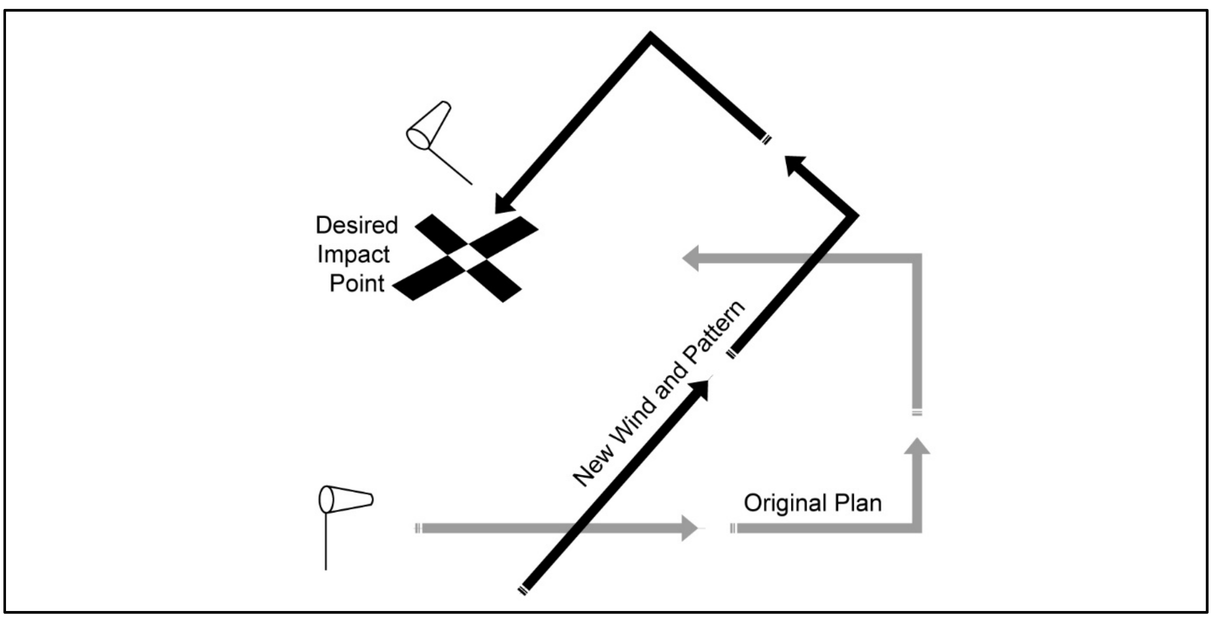


Figure 7-19. Significant change in wind direction

TURBULENCE

7-65. Turbulence is the result of an air mass (wind) flowing over obstructions on the earth's surface. Common obstructions are rugged 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 uneven 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.

7-66. 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. Air moving over smooth water surfaces only form minor eddies and currents. 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 DBSL 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.

7-67. 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 also exist around any cloud mass. Individual clouds probably will not create turbulence but, 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, resulting in altimeter readings that can be inaccurate because the parachutist could be 1,000 feet lower than the indicated altitude on the altimeter.

> ***Note:*** The parachutist should actively and avidly avoid clouds that contain thunderhead activity because of the violent turbulence associated with those formations.

ADJUSTING FOR CHANGES IN WIND SPEED

7-68. When wind speed increases during the jump, it is important to recognize the change and make the necessary adjustments as shown in figures 7-20 through 7-22, page 7-21. 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 wind speed 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.

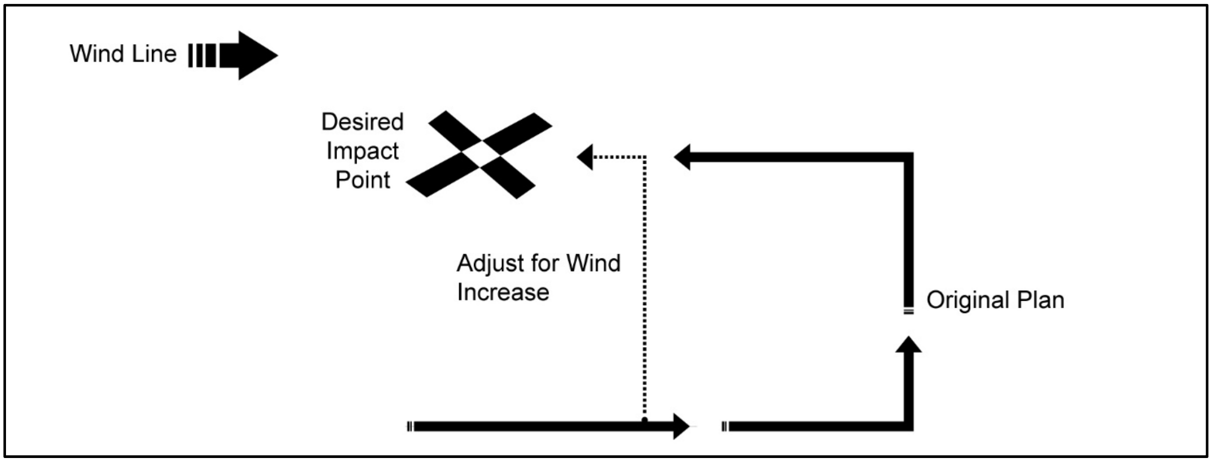


Figure 7-20. Adjusting for increase in winds on downwind leg

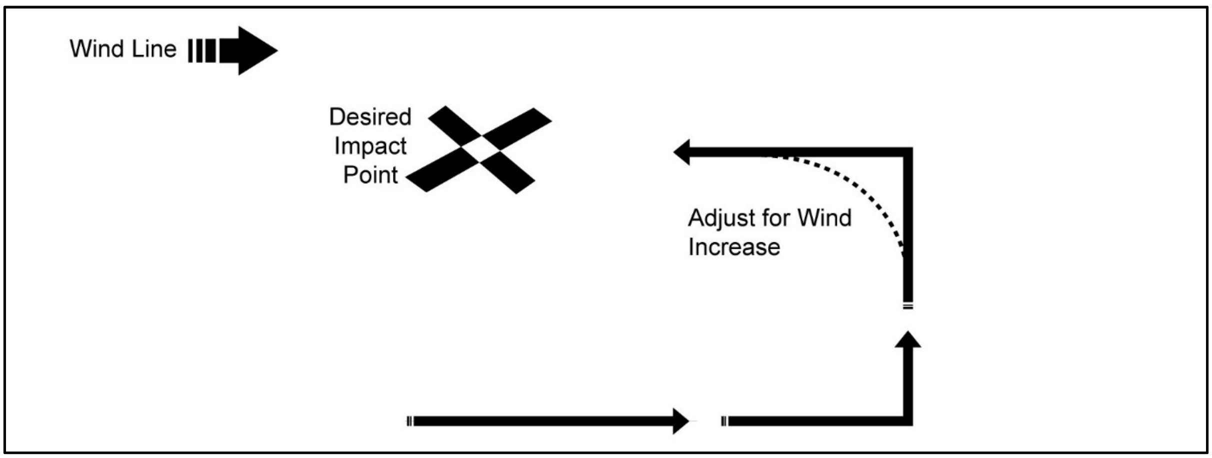


Figure 7-21. Adjusting for increase in winds on base leg

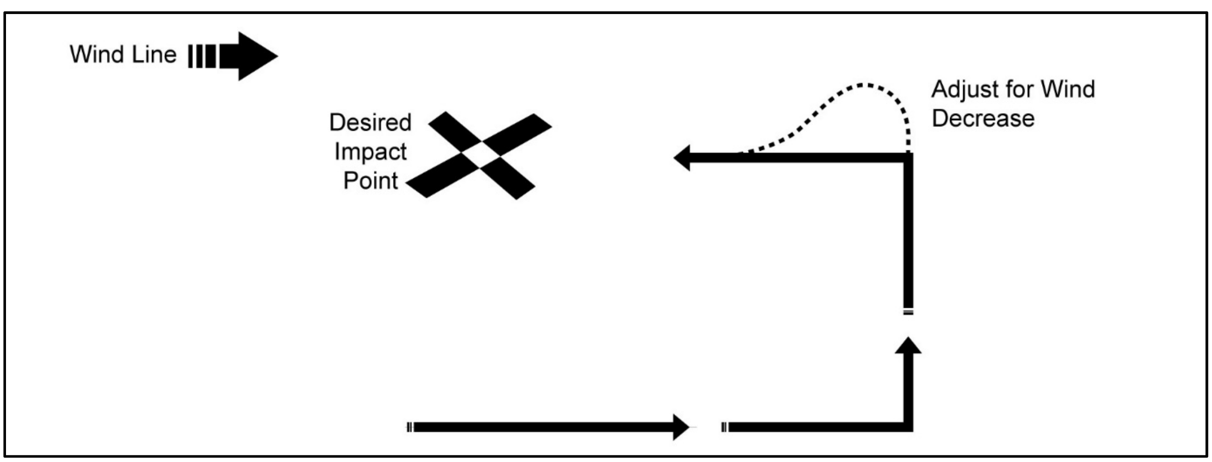


Figure 7-22. Adjusting for decrease in winds on base leg

Land and Sea Breezes

7-69. The thermal differences of air masses associated with the interface along shorelines (oceans, lakes, and rivers) cause 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 reverse process creates land breezes. The airflow over obstacles near shoreline DZs creates turbulence; when farther away from the coast, turbulence may not exist.

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

Valley and Mountain Breezes

7-70. 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 8

Double-Bag Static Line Emergency Procedures

Most DBSL jumpers recognize that parachuting operations involve 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 DBSL configuration.

REFRESHER TRAINING

8-1. The conditioned response executed as the correct procedure for an 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 DBSL 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.

EMERGENCY MEASURES

8-2. The procedures established in this publication in response to emergency situations have proven to be the most successful for jumping the RA-1 in the DBSL configuration.

AIRCRAFT EMERGENCIES ON THE GROUND AND PRIOR TO TAKEOFF

8-3. Before the start of the airborne operation all jumpmasters and jumpers should have an orientation and egress plan for all emergencies and ensure that all jumpers know the location of emergency exits and how to open them. Before take-off all cargo and loose items will be secured, jumpers will wear helmets and securely fasten seat belts. For an emergency prior to takeoff, jumpers—

- Take all commands from the primary jumpmaster.
- Exit the aircraft and assemble 100 meters upwind in a safe direction, as directed by the primary jumpmaster.
- Once assembled, report to the primary jumpmaster.

CRASH LANDING (TAKEOFF TO 1,000 FEET AGL)

8-4. For an emergency that takes place between takeoff and 1000 feet AGL, adhere to the following procedures:

- Listen for the signal of six short rings of the alarm bell (or a verbal warning) alerting jumpers to prepare for a crash landing. One long continuous bell from the aircrew will indicate that a crash is imminent.
- Prepare for crash by remaining seated with seat belts fastened then, assume the emergency landing position (place your head between your legs, cover head with arms, and brace for impact).
- Wait for the aircraft to come to a complete stop then, unfasten the seat belt.
- 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 jumpmaster.
- Conduct a head count, administer first aid and signal for help.

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

8-5. In the event of an emergency bailout that takes place between 1,001 and 3,000 feet AGL, each jumper will—

- Listen for signal of three short rings of alarm bell (or a verbal warning) alerting jumpers to prepare for an emergency bailout.
- Observe the jumpmaster for the emergency bailout signal in which he extends his arm over his head with his index finger pointed and moves it in a circular motion.
- Watch the jumpmaster for the signal to exit on reserve parachute in which he will place a clenched fist over his reserve ripcord handle and thrust it out to the side.
- Be vigilant for the jumpmaster issuing abbreviated jump commands.
- Execute a DBSL exit on the jumpmaster's command.
- Alternate his exit direction based on the exit direction of the preceding jumper .
- 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 the RA-1 ARAPS in the DBSL configuration.

EMERGENCY BAILOUT (3,001 FEET AGL AND ABOVE)

8-6. In the event of an emergency bailout that takes place at 3,001 feet AGL or above, jumpers must—

- Listen for signal of three short rings of alarm bell (or verbal warning) alerting jumpers to prepare for an emergency bailout.
- Observe the jumpmaster for the emergency bailout signal in which he extends his arm over his head with his index finger pointed and moves it in a circular motion.
- Be vigiliant for the jumpmaster issuing jump commands or abbreviated jump commands
- Follow the jumpmaster's commands to stand up, hook up, and exit the aircraft in a DBSL exit position using the main canopy.
- Watch the jumpmaster for the command to exit on reserve parachute (if time doesn't permit a main parachute exit procedure) in which he will place a clenched fist over his reserve ripcord handle and thrust it out to the side
- Execute a DBSL exit on the jumpmaster's command.
- Clear the aircraft and deploy the reserve.
- Complete the canopy controllability check, attempt to land with other jumpers, and assemble for a head count.

PREMATURE DEPLOYMENT INSIDE THE AIRCRAFT

8-7. In the event that a main parachute, reserve parachute or pilot chute prematurely deploys inside the aircraft with the ramp or doors open or closed, the first person to notice will shout, "PILOT CHUTE" and attempt to contain the pilot chute or parachute. Jumpers will adhere to the following procedures:

- If the ramp or doors are closed, shout, "PILOT CHUTE", contain the parachute or pilot chute, and notify the jumpmaster (to ensure the ramp or doors do not open). If the pilot chute activates or container comes open, close the container and the jumper will sit, put on the seat belt, and not jump. If the deployment bag and the suspension lines fall out, disconnect the RSL, then cut-away the main parachute 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 land with the aircraft.
- If the ramp or doors are 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. 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 must try to contain it. If any portion of the parachute goes out of the aircraft, he must exit immediately to minimize or avoid serious injury.

ALTIMETER FAILURE PRIOR TO EXIT

8-8. If a jumper's altimeter fails inside the aircraft, he will inform the jumpmaster and the defective altimeter will be exchanged with an on-board spare. If the onboard spare is in use, or if both altimeters fail prior to exit, the jumper will be moved to the front of the aircraft to a safe location, be seated ,and will land with the aircraft.

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

EQUIPMENT MALFUNCTION

8-9. If a jumper experiences an equipment malfunction on the aircraft he should get the attention of the jumpmaster by extending his arm straight out with his thumb pointing downwards. The jumpmaster will correct the malfunction or determine if the jumper will land with the aircraft.

EMERGENCY PROCEDURES DURING EXIT

8-10. The following details the emergency procedures for those incidents that occur during exit.

JUMPER IN TOW BY STATIC LINE (CONSCIOUS JUMPER)

8-11. The conscious jumper in tow by his static line must also be physically and emotionally capable of mitigating the risk associated with his emergency procedure. If a conscious jumper is in tow by his static line adhere to these procedures:

- The jumper will maintain a tight body position.
- The jumpmaster will cut the static line.
- The jumper will start his 6-second count as he feels himself falling free and he will simultaneously attempt to execute a DBSL body position.
- At the end of the 6-second count, the jumper will look and verify that his canopy has opened.
- If the main parachute fails to deploy, the jumper executes cutaway procedures immediately.

Note: If a jumper is being towed from a rotary-wing aircraft, he must maintain a good, tight body position and protect his reserve ripcord handle. The aircraft will slowly descend to the DZ and come to a hover and the jumpmaster will free the towed jumper from the aircraft.

Note: For combat operations or for areas the rotary-wing aircraft cannot descend, the jumpmaster may cut the static line. This will be briefed prior to the airborne operation.

Jumper in Tow by Static Line (Unconscious Jumper)

8-12. The jumpmaster will make every attempt to retrieve the jumper into the aircraft using the retrieval system.

Jumper in Tow by Equipment

8-13. If a jumper is being towed by his equipment the jumpmaster will first try to free the jumper's equipment. If this is unsuccessful the jumpmaster will cut the jumper free. As the jumper feels himself falling free, he must attempt to get into a DBSL exit position and start his 6-second count (altitude permitting). At the end of the 6-second count, he must look and verify that the main canopy has opened. If the main canopy fails to deploy, the jumper immediately executes cutaway procedures as described below:

- The jumpmaster will try to free the hung equipment or cut the jumper free.
- As the jumper feels himself falling free, he will attempt to get into a good DBSL exit position.
- If the main parachute fails to deploy after his 6-second count, the jumper will immediately execute cutaway procedures.
- If the jumper is unconscious the jumpmaster will make every attempt to retrieve the jumper into the aircraft.

DEPLOYMENT EMERGENCIES

8-14. The following paragraphs detail information regarding deployment emergencies.

Decision Altitude for Emergency Procedures

8-15. 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

8-16. The jumper will conduct a 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 the 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.

Emergency Cutaway Procedures

8-17. The jumper will follow these emergency cutaway procedures for a DBSL malfunction (whether high-speed or low-speed):

- Arch his body.
- 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 on the left main lift web, chest high, inboard.
- Grab the reserve ripcord handle with the left hand.
- Pull the reserve ripcord handle to a full-arm extension.
- Throw away the reserve ripcord handle.
- Look over the right shoulder to ensure the reserve pilot chute has launched.

HIGH-SPEED MALFUNCTIONS

8-18. 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.

Failure to Hook Up Static Line, Static Line Breaks, or Anchor Line Cable Breaks

8-19. Failure to hook up the static line, static line breaks or anchor line cable breaks will result in a total malfunction which will become apparent after the 6-second count. The parachutist—

- Verifies that he has a total malfunction.
- Conducts cutaway for total malfunction.

Horseshoe Malfunction

8-20. Horseshoe malfunctions occur when the main parachute or suspension lines are snagged on the jumper or his equipment. The jumper initiates cutaway procedures immediately.

Bag Lock

8-21. Bag locks occur when 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

8-22. If the main parachute is spinning and less than 50-percent inflated, the jumper initiates cutaway procedures immediately.

LOW-SPEED MALFUNCTIONS

8-23. 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 malfunction, 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

8-24. 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 Twist

8-25. When the parachute deploys, if the risers and suspension lines are twisted, the jumper—

- Reaches up with both hands (thumbs pointed downwards) 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

8-26. 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 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 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.

Closed End Cells

8-27. 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

8-28. 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

8-29. 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

8-30. 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

8-31. 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

8-32. 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

8-33. 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.

POSTOPENING PROCEDURES

8-34. Upon opening, the jumper—

- Places hands on rear risers as he clears his airspace.
- Turns right to avoid collision, unless left is safer.
- Releases the toggles, gains control of the canopy, and assumes position in formation.
- Reaches up and collapses slider.
- Conducts a canopy controllability check (3 S's - Square, Stable and Serviceable).
- Checks rate of descent with other jumpers.
- Orients himself to the DZ.
- Positions HAHO seat under buttocks (if applicable).
- Locates other jumpers and achieves separation.
- Maintains altitude awareness.

ENTERING A CLOUD UNDER CANOPY

8-35. When entering a cloud while under canopy, the jumper—

- 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.

WARNING

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 performed by 2,000 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

8-36. In the event a DBSL jumper encounters a dual deployment of both canopies, the jumper must identify the dual-canopy deployment scenario at hand and take corrective action to resolve the problem. Various scenarios can result in having both parachutes deploy and this dual-canopy deployment may cause several results. The jumper, with practice, may correct the dual-deployment emergencies by performing the corrective procedures described below.

Common Causes of Dual Deployments

8-37. There can be several different causes of dual deployments. The most common reasons are—

- 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

8-38. Some common results of dual deployments consist of the following:

- Canopies that 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 another parachute.
- Deployment devices can be entangled in the other canopy or with the deployment devices of the other canopy.

Common Configurations of Dual Deployments

8-39. Dual deployments may be described as side by side, biplane, down plane, and partially deployed as depicted in figure 8-1, page 8-9.

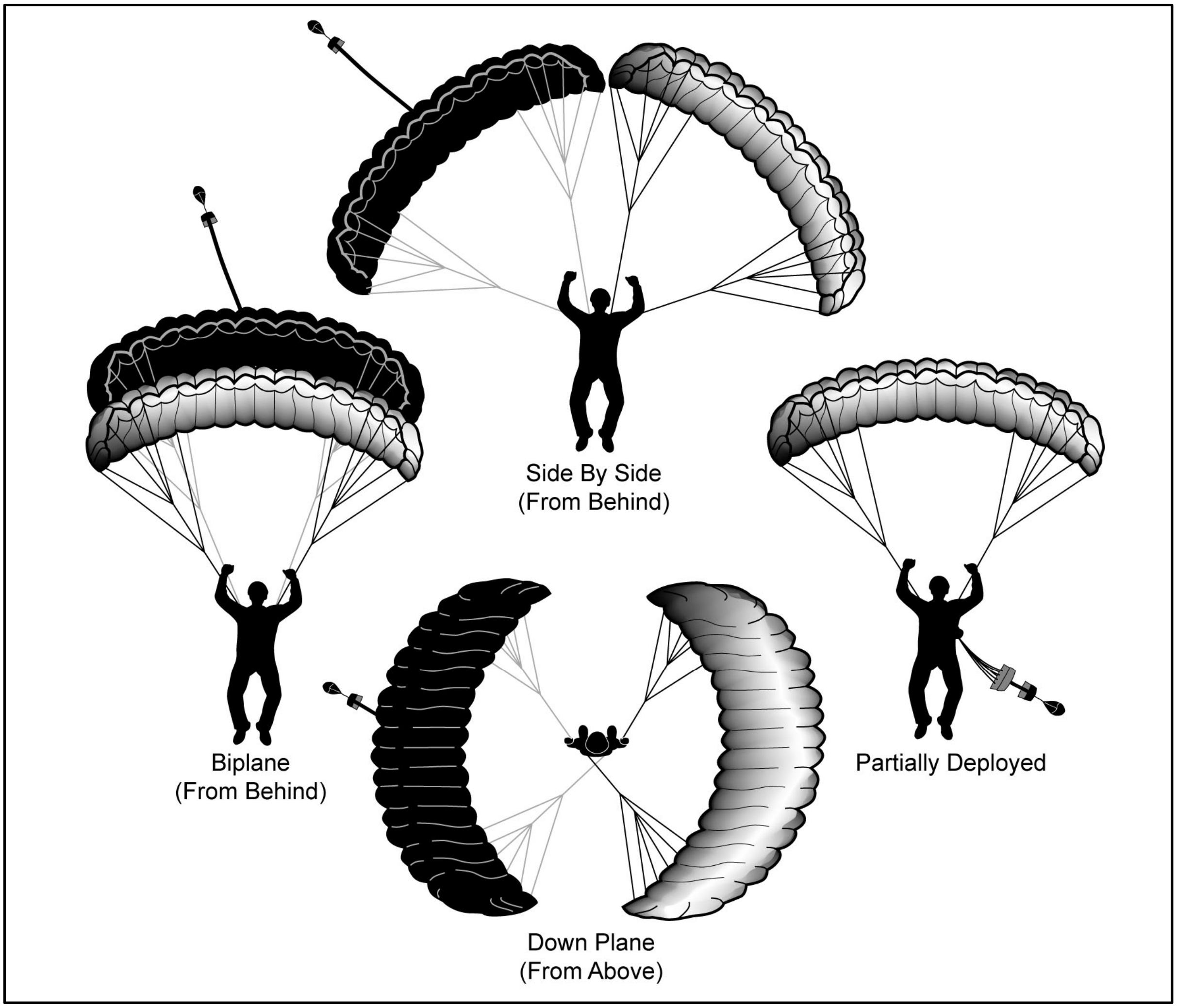


Figure 8-1. Dual deployments

Side by Side

8-40. 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 determine at night. Do not assume that 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 brakes are already released on one canopy, fly in half brakes to match forward speed of the other canopy.
- Place the left hand on the left rear riser of the left canopy, if canopies are not entangled.
- 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 red cutaway pillow with the right hand to full arm extension and let go of left rear riser and main release ripcord (red cutaway pillow) simultaneously.
- Steer the most controllable canopy toward the other with the rear risers by making gentle turns toward the other canopy to prevent them from going into a down plane configuration if—
  - The canopies are entangled.
  - Unsure whether they are entangled.
  - Below 1,000 feet AGL.

- 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 and 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. If both canopies are touching end cell to end cell, they should be descending very slowly.

Biplane

8-41. The most likely canopy configuration from a simultaneous or near simultaneous deployment is a biplane configuration with the main canopy in front and the reserve 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 biplane configuration:

- Ensure both canopies are not entangled by tracing all eight risers and suspension lines through their slider to their respective canopies.
- Do not release the brakes on either canopy.
- Separate canopies into a side-by-side configuration.
- Use the left rear riser of the left canopy and continue to separate them into a down plane configuration.
- Release the rear riser in the left hand as the red cutaway handle is pulled with the right hand.
- Steer the front canopy with the rear risers by making gentle turns if the canopies are entangled or below 1,000 feet. The trailing canopy will follow. Steer the front canopy into the wind if possible.
- Do not attempt to flare either or both canopies.
- Conduct a parachute landing fall.

Down Plane

8-42. In a down plane configuration one canopy fully inflates and the other inflates possibly with line twists. Additionally, both canopies are diving toward the ground, one on either side of the jumper. Adhere to the following procedure in the event of a down plane configuration:

- Ensure both canopies are not entangled by tracing all eight risers and suspension lines through their sliders and to their respective canopies. (Risers should cross properly.)
- Pull the main release ripcord (red cutaway pillow) with your right hand.
- Clear any line twists, unstow toggles, and find a safe place to land.
- Steer the most controllable canopy by making gentle turns toward the other with the rear risers if the canopies are entangled or below 1,000 feet. Attempt to steer them together to get them into a side-by-side configuration. This may require a continuous effort all the way to the ground to keep canopies together.
- Do not attempt to flare either or both canopies.
- Conduct a parachute landing fall.

Partially Deployed

8-43. Follow these procedures when the main canopy is completely deployed and the reserve partially deploys:

- Do not unstow the brakes.
- Slow the main to prevent the reserve from fully deploying (if brakes have already been unstowed).
- Make sure the suspension lines or risers do not become entangled with you or your equipment (if the canopy begins to inflate).
- Allow 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.
- Use rear risers to move canopies into a side-by-side configuration (if not entangled) by following the side-by-side procedures.
- Fly the most controllable canopy with the rear risers by making gentle turns toward the other canopy (if the canopies are entangled or below 1,000 feet).
- Gather and coil the suspension lines carefully in one hand while lifting the bagged canopy (if the reserve is still in the deployment bag).
- 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 firm grip on bagged canopy.
- Steer by leaning in the harness or reaching up with one hand to make rear riser turns.
- Drop the bagged canopy to the ground and flare the canopy with the rear risers conducting a parachute landing fall at 15 feet AGL.

CANOPY COLLISION EMERGENCIES

8-44. Most canopy collisions occur during limited visibility or the landing phase of the DBSL jump. This is a result of too many parachutists maneuvering their canopy to get into one small area or a jumper losing awareness of his surroundings. Vigilance in maintaining canopy control, observing your surroundings, and choosing a less congested area can help avoid a canopy collision.

ACTIONS TO AVOID A CANOPY COLLISION

8-45. 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, unless steering left is safer.
- Avoid body-to-body contact.
- Assume the spread eagle position while covering the emergency handles with your left arm if collision is imminent.
- Be prepared for a violent impact.

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.

ENTANGLEMENT WITH ANOTHER JUMPER

8-46. Follow these procedures if entangled with another parachutist:

- Always attempt to steer clear of other jumpers.
- Remember that the lower jumper has the right away.
- Steer to avoid body to body contact if a collision with another jumper is imminent.
- Assume the modified spread eagle position.
- Protect emergency handles with the left arm and attempt to bounce off other canopy and or suspension lines.
- Stay calm and do not grab pillows if entanglement occurs.
- Check altitude and look for other jumper.
- Assess the situation before acting in any way.

- Use effective communication measures between jumpers and maintain altitude awareness since these are critical to successful disengagement. Jumpers should—
  - 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

8-47. 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 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 executing emergency procedures.” 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, the jumpers should fly slowly with brakes to diminish the drag of the other canopies and potential for interference in flight and control.

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

8-48. 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 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 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

8-49. 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 combat equipment, if worn.
- Both jumpers should be prepared to execute a parachute landing fall.

NEITHER JUMPER HAS A GOOD CANOPY

8-50. Follow these procedures when neither jumper has a good canopy:

- Jumpers should attempt to establish communication such as altitudes and positive commands.
- If a jumper is entangled in his suspension lines, he should attempt to free himself and cutaway first.

- The lower jumper cuts away 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 the extra drag created.
- If both reserve canopies deploy, both jumpers will perform cutaway procedures to clear from the entanglement to prevent a down plane.

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.

ACTIONS IF COMBAT EQUIPMENT WILL NOT LOWER

8-51. If combat equipment will not lower, jumpers should 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 perform 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

8-52. 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. Follow these procedures if an 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 cut away no lower than 2500 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, jumper should clear himself from the entanglement and cut away 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

8-53. There are many landing obstacles that are potentially hazardous to parachutists such as trees, bodies of water, 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 DBSL operation, jumpers should be briefed on the DZ hazards and alternate landing areas.

TREE LANDINGS

8-54. Follow these procedures for tree landings:

- Look away; steer away to avoid obstacle.
- Do not lower combat equipment for extra protection.
- Jettison combat equipment if it has already been lowered.
- Keep goggles and oxygen mask on for protection.
- Face into the wind to decrease ground speed.
- Turn the canopy into the wind and attempt a vertical descent between the trees if growth is sparse.

- Turn the canopy into the wind and attempt to cap your canopy on top of a tree or catch on thickest branches if tree coverage is desnse.
- 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.
- Wait for assistance if suspended.

WATER LANDINGS

8-55. Follow these procedures for water landings:

- Attempt to land as close to shore as possible.
- Jettison ruck or PDB, helmet, and oxygen mask if worn.
- Disconnect the RSL and unfasten the chest strap and waistband.
- Turn the canopy into the wind, flare normal, and prepare for a parachute landing fall.
- Release leg straps, arch, slide free of the harness and swim clear of the harness and parachute system once in the water.
- Pull the red cutaway pillow if being dragged.
- Push the canopy up (if trapped under the canopy) 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

8-56. Power lines are nearly invisible from above. Never fly between two telephone poles, as there is usually a wire 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.
- Disconnect the RSL, turn off the oxygen, and jettison the PDB or ruck if time permits.
- Land downwind or in a braked turn as a last resort to avoid contact with the wires.
- Attempt to parallel the wires in a braked position to attain a vertical descent through the wires.
- Be prepared to execute a parachute landing fall once you clear the wires and make ground contact.
- Cutaway the main canopy and move away once you make ground contact.
- Remain motionless until power is turned off if suspended.
- Do not let anyone touch you and do not cutaway.

Note: If time and altitude permit, jettison the PDB/rucksack, turn off oxygen and disconnect oxygen mask.

OBSTACLES IN THE LANDING AREA

8-57. Jumpers should attempt to steer clear of all obstacles, including trees, cacti, buildings, and vehicles (on or off the DZ). If unable to avoid the obstacle, jumpers should 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.
- Contact feet first and perform a parachute landing fall if contact with the object is imminent.
- Gather your canopy and move away quickly when landing near a road.

HIGH-WIND LANDINGS (11–18 KNOTS)

8-58. Jumpers should always attempt to land into the wind with the canopy level with the ground. When landing in high winds, the jumper should perform the following actions:

- Disconnect RSL at 1,500 feet AGL.
- Flare slowly and gently. It may not require a complete flare to arrest the descent and prevent going backward.
- Release one toggle pivot in the direction of the pulled toggle and pull the other toggle hand over hand until the canopy collapses upon touchdown.
- Attempt to contain the tail of the canopy once the canopy has collapsed.

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 drug.

Turbulent Air

8-59. 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 void 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 does begin 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 reattempt this procedure until the canopy reinflates or landing is imminent. As the jumper approaches the ground, he should be prepared to conduct a parachute landing fall.

8-60. 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.
- Disconnect the RSL (if not already disconnected) and cut away if unable to control the canopy.

DANGER

Jumpers should use caution when disconnecting the RSL snap shackle below 1500 feet AGL. When disconnecting the RSL from the RSL shackle below 1500 feet AGL, pull the red static line lanyard. Do NOT pull the yellow RSL which is connected to the snap shackle. This may cause serious injury or death.

Actions for Off-Drop-Zone Landings

8-61. 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 gullies, ravines, and landing uphill or downhill. 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, they cross on the high ground where traffic can be observed.

RECOVERY FROM A DRAG

8-62. 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.
- Disconnect the RSL (if not already disconnected), and pull the cutaway pillow if you cannot get to your feet or collapse the canopy because of injury or other issue,.

Chapter 9

Altimeter

This chapter provides information on the MA-10 altimeter that meets the needs and requirements for DBSL operations.

OVERVIEW

9-1. The parachutist wears the MA-10 altimeter on his left wrist. The altimeter displays the parachutist's altitude above the ground during aircraft flight and canopy flight. The altimeter also permits the DBSL parachutist to determine his altitude during an emergency situation.

9-2. 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 using an approved altimeter that is not waterproof and that has been submerged in water, it must be serviced before being used on another airborne operation.

9-3. The jumpmaster or assistant jumpmaster should carry a spare altimeter in a PDB or uniform cargo pocket for DBSL operations, and it must be easily accessible. The jumpmaster or assistant jumpmaster will not place the spare altimeter in any location that may interfere with pulling the main ripcord or 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

9-4. The MA-10 altimeter (figure 9-1) 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.

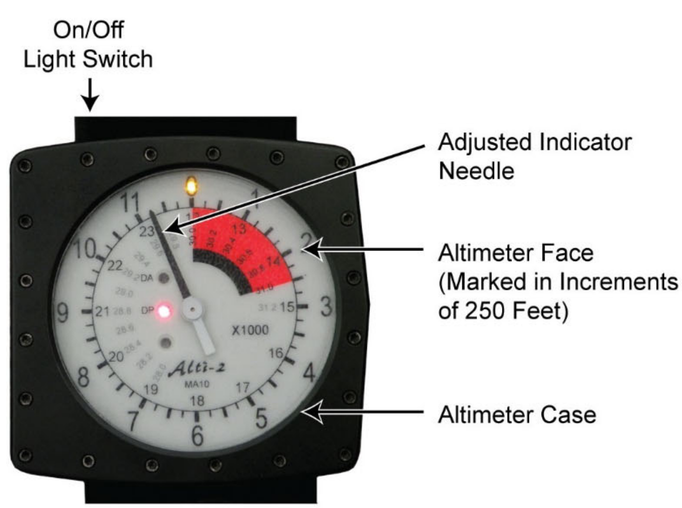


Figure 9-1. MA-10 altimeter

9-5. The MA-10 can be comfortably worn with a Velcro wrist-mounted band and 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

9-6. The MA-10 altimeter has a total of five buttons (figure 9-2) as discussed below:

- **I/O.** The needle parks at approximately 10,000 feet when the unit is off.
- **PRG.** The PRG button programs the set up 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.

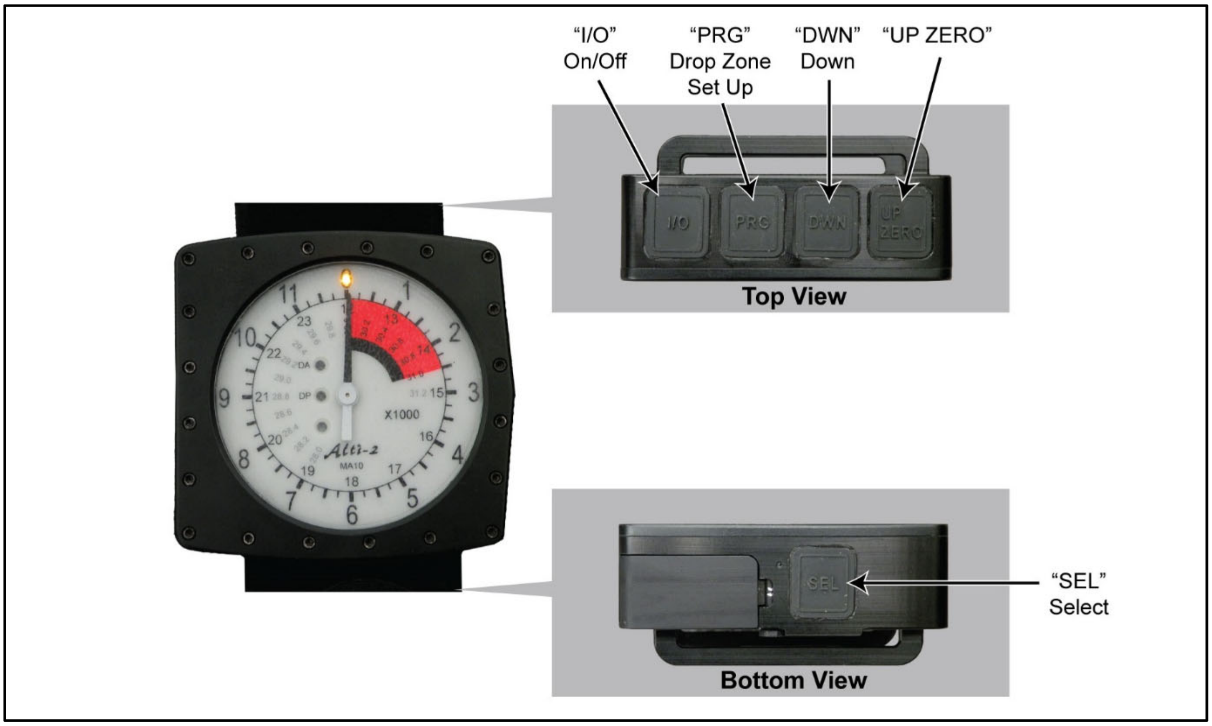


Figure 9-2. MA-10 altimeter buttons

9-7. To power on the MA-10 altimeter, press and hold the Activate Button marked "SEL" and then press the ON/OFF button marked "I/O" (figure 9-3, page 9-3). The needle will first show the battery status:

- 7 - 3 (White) = OK.
- 2.5 - 3 (Yellow) = Be ready to change battery.
- <2.5 (Red) = Change battery before next jump.

9-8. The needle will move to the current altitude or 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 the DZ altitude and the pressure have been set.

Figure 9-3. On/Off Buttons

POWER-SAVING MODE

9-9. The system will turn off the motor and backlight if the altitude is below 7,000 feet MSL and there is no significant change in altitude for a period of 30 minutes. The Power On LED at the 12'0 clock position will flash to indicate power-saving mode (figure 9-4). If altitude activity is sensed, the unit will automatically sweep the pointer one revolution and revert to full function.

Figure 9-4. Power-saving mode

BATTERY COMPARTMENT

9-10. 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 9-5 shows the instructions for replacing batteries.

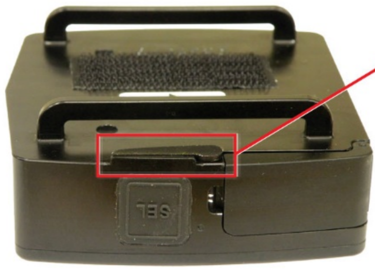
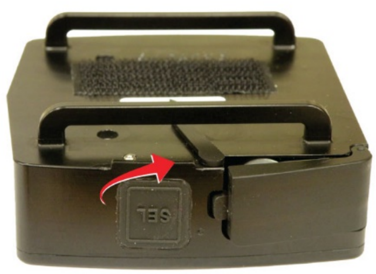
A 	**Step A.** Remove the wrist strap. Locate the battery door lever.
B 	**Step B.** Press firmly on the battery door to release pressure on the latch, and rotate latch 90 degrees past the lever lock to unlocked position. Replace batteries with two type AA lithium batteries. ***Note:*** Alkaline batteries 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 9-5. Replacing batteries in the MA-10 altimeter

MA-10 ALTIMETER SETTING METHODS

9-11. 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 by:

- Being zeroed to the current location.
- Entering (manually) the DZ offset.
- Calculating the DZ offset entering the DZ altitude and a form of barometric pressure called "altimeter setting" for the DZ.

Current Location Method

9-12. 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 9-6). Do NOT hold the "UP ZERO" button; this will cause the set altitude to increase or clear any present 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 9-6. Zeroing the MA-10 altimeter

Drop Zone Offset Method

9-13. 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 9-7, page 9-6). 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.

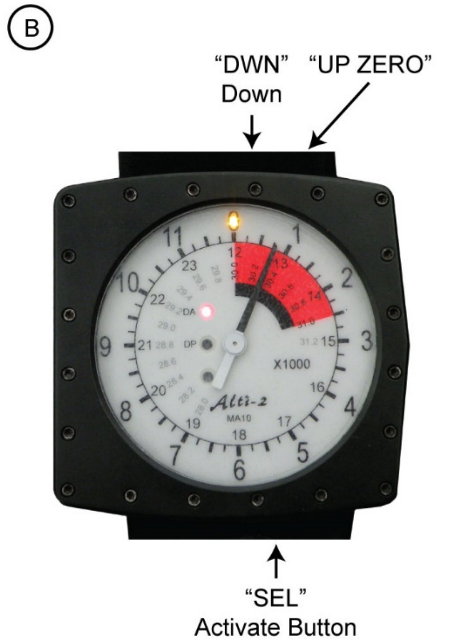
Figure 9-7. Manual offset

ALTIMETER SETTING METHOD

9-14. 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, figures 9-8 through 9-12, pages 9-6 through 9-8, 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 9-8. 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 9-9. 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 9-10. Setting the drop zone on the MA-10 (Step C)

D

"DWN" Down

"UP ZERO"

"SEL" Activate Button

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 9-11. Setting the drop zone on the MA-10 (Step D)

E

"PRG" Drop Zone Set Up

"SEL" Activate Button

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 9-12. Setting the drop zone on the MA-10 (Step E)

JUMPMASTER'S ALTIMETER CALCULATION

9-15. The primary 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 primary jumpmaster's calculations are the differences between the departure airfield and the DZ. All of the jumpmaster's calculations will be referenced from the 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

9-16. Figure 9-13, page 9-10, depicts 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 mean sea level [MSL]). In this example, the 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 field 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

9-17. Figure 9-14, page 9-10, depicts 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 field 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).

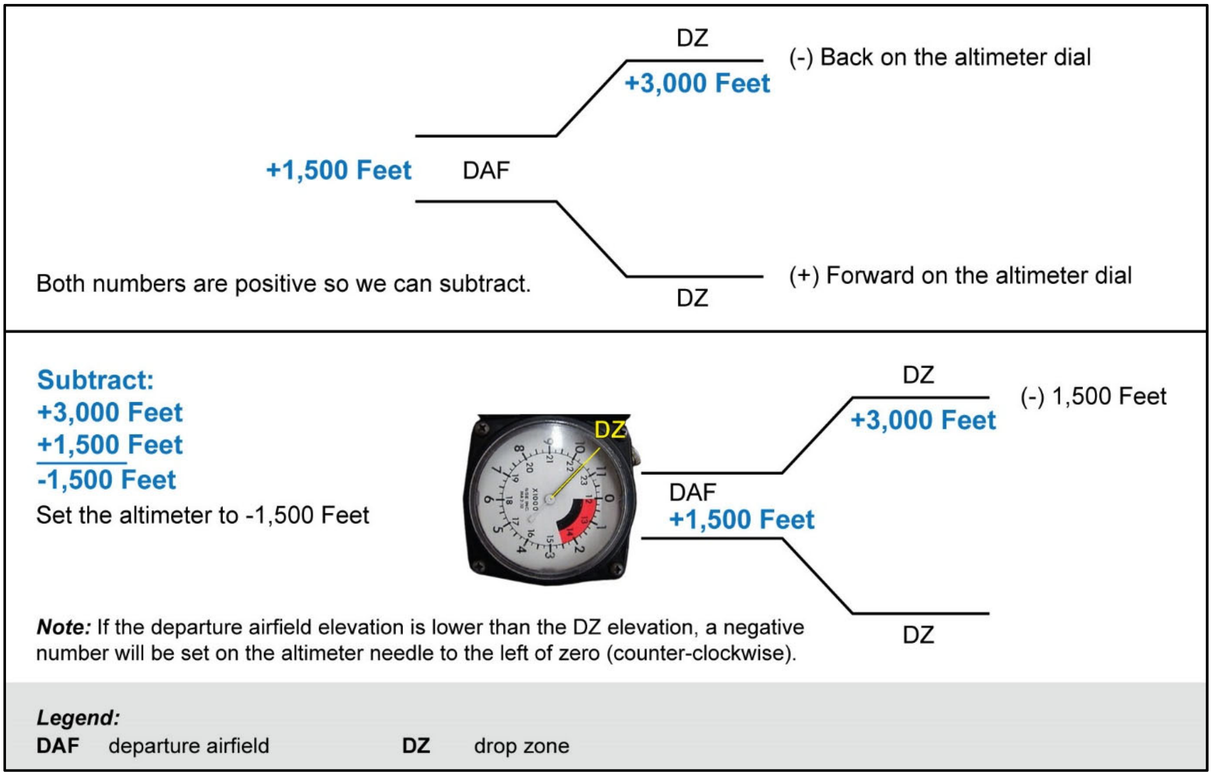


Figure 9-13. Departure airfield lower than drop zone

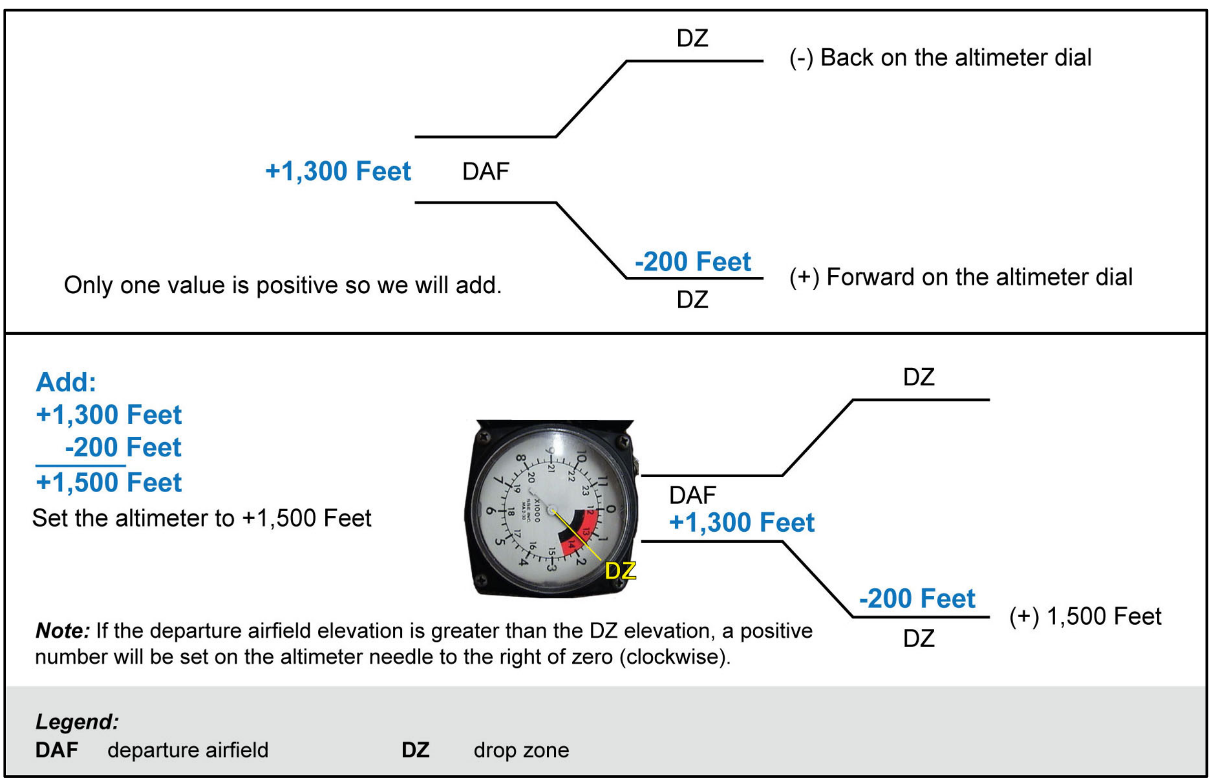


Figure 9-14. Departure airfield higher than drop zone

Chapter 10

Cybernetic Parachute Release System 2 Model 1500/35 A

This chapter details information regarding the CYPRES 2 Model 1500/35 A, an electronic device that allows for the opening of the reserve parachute.

10-1. The Military CYPRES model 1500/35 A is designed to deploy the reserve parachute in event of an emergency. 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 actuate.

WARNING

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

10-2. 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 has a clear plastic-covered window so the jumper can set the unit or check the 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.

Note: Military CYPRES 1500/35 A does not guarantee that the reserve will deploy properly, rather that the reserve closing loop is cut, thus increasing the chances dramatically that the reserve will deploy properly.

GENERAL INFORMATION ON MILITARY CYPRES 2 MODELS

10-3. Three Military CYPRES 2 models and one Expert CYPRES 2 model are being used by the Army as safety devices. When jumping in the DBSL configuration the CYPRES 2 model 1500/35 A will be used. This model is designed to activate and enable the reserve parachute to deploy in the absence of the main parachute deploying by static line when critical conditions are met for the CYPRES to activate. The Military CYPRES 2 is designed specifically for tactical application use.

WARNING

Per USASOC Regulation 350-2, all Army units will only utilize the Military CYPRES 2 in the absolute (operational) mode. All other services 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

10-4. When the parachutist arms the Military CYPRES 2 model 1500/35 A, 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 model 1500/35 A 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

10-5. The Military CYPRES 2 model 1500/35 A 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 model 1500/35 A will leave the activation window at 130 feet above the VDZ and will no longer operate.

ACTIVATION WINDOW—ABSOLUTE (OPERATIONAL) MODE

10-6. Once properly powered ON, the Military CYPRES 2 model 1500/35 A—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 model 1500/35 A will fire the release element.

MILITARY CYPRES 2 MODELS

10-7. There are three Military CYPRES 2 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. The model and preset information are found on the control unit and the processing unit.

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.

Note: Military CYPRES 2 model 1500/35 A will be used with the RA-1 ARAPS in the configuration.

10-8. 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 model names displayed on the green ON/OFF button located on the front of the control unit. The model names are also located on the back of the control unit and on the front of the processing unit. The Military CYPRES 2 models are—

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

CYPRES MODEL IDENTIFICATION

10-9. The specific models of the CYPRES 2 are only authorized for use on the specified parachute systems listed in table 10-1, page 10-4. 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. 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 below.

DANGER

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

Table 10-1. 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 MMPS
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)	1,050	35	78	115	+/- Feet. Relative	Authorized Nonstandard Parachute Systems (Javelin)

Legend:
CYPRES Cybernetic Parachute Release System
MTV-3 Sigma Vector-Military-Tandem Vector System

MILITARY CYPRES 2 MODEL 1500/35 A

10-10. On the Military CYPRES 2 Model 1500/35 A which is used for the RA-1, the control unit button (figure 10-1) is green and the markings indicate 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 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 10-1. Front of Military CYPRES 2 Model 1500/35 A control unit

COMPONENTS

10-11. The Military CYPRES 2 Model 1500/35 A, has only three components as displayed in figure 10-2. These components are the—

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

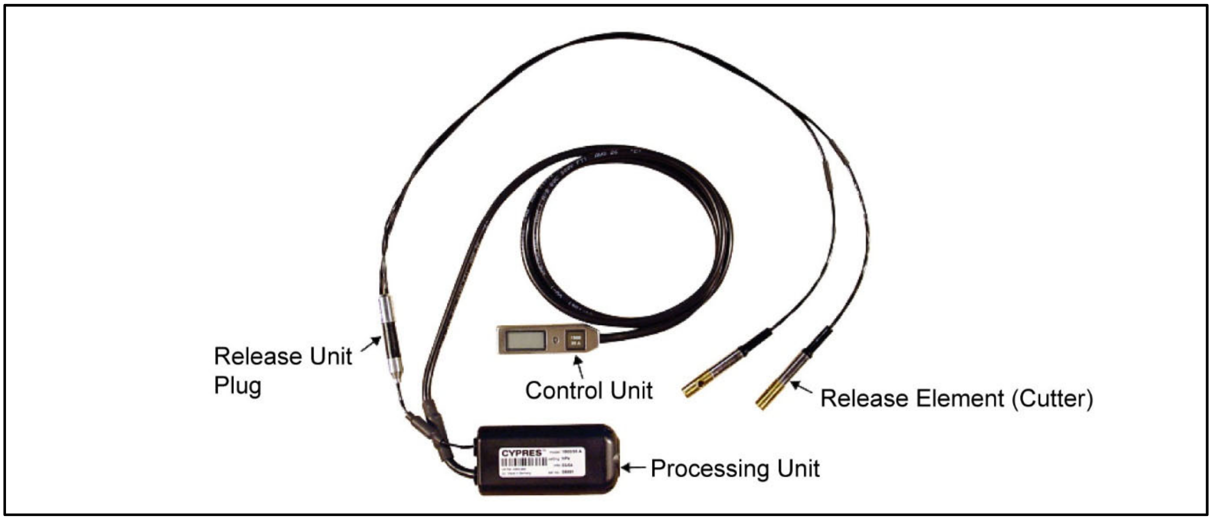


Figure 10-2. Military CYPRES 2 1500/35 A with all components

CONTROL UNIT

10-12. 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. 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 10-1, page 10-4, explains the numerical information. Figure 10-1, page 10-4 shows the front of 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 10-3, page 10-6) and on the front cover of the processing unit.

Figure 10-3. Back of Military CYPRES 2 control unit

Processing Unit

10-13. The processing unit (figure 10-4) houses the microprocessor and the battery. 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 DBSL operations. 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 makes the decision to fire. 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 cause accidental discharge of the release elements.

Figure 10-4. Military CYPRES 2 processing unit

Release Unit

10-14. Release units (figure 10-5, page 10-7) are available for one-pin or two-pin reserve parachutes. The release unit contains a propellant-actuated cutter called the release element. 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 10-5. Military CYPRES 2 release unit showing release element hole

MAINTENANCE

10-15. Inspection, installation, maintenance, and storage of the Military CYPRES 2 shall be performed by an RA-1 ARAPS pack-qualified parachute rigger.

BATTERY

10-16. 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

10-17. 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

10-18. 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 maintenance due date and the unit serial number are both easily retrievable (figure 10-6 and figure 10-7, page 10-8). 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.

10-19. 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.

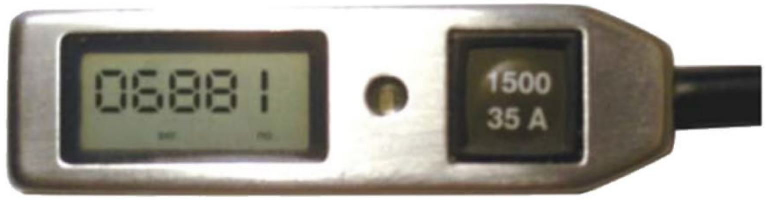


Figure 10-6. Example of Military CYPRES 2 serial number

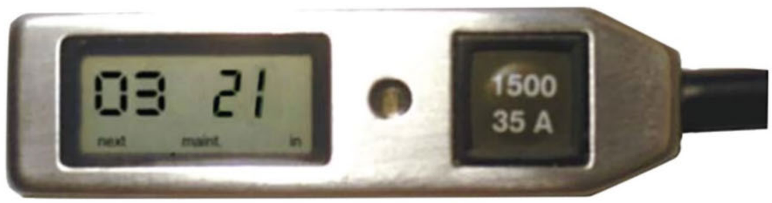


Figure 10-7. Example of next required maintenance date for Military CYPRES 2

Note: The maintenance date for the Military CYPRES 2 will be indicated with the month first, followed by the year. In figure 10-7, 03 is the month and 21 is the year.

GENERAL TERMS

10-20. The jumpmaster and parachutist should be familiar with the following terms and how each impact the performance of the Military CYPRES 2:

- **VDZ.** 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 DBSL 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 DBSL 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 (unit of measurement represented as QNH). The barometric pressure is corrected to MSL by taking the current station pressure and temperature and adjusting it to 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

10-21. The primary jumpmaster for each jump is responsible for determining that the CYPRES 2 is in the proper mode and setting. The primary 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 mode of operation.

Note: U.S. Army DBSL units will only utilize the absolute (operational) mode.

ABSOLUTE (OPERATIONAL) MODE (MILITARY CYPRES 2)

10-22. 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.

10-23. 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.

OPERATIONAL MODE

10-24. The absolute (operational) mode may be used under all conditions for DBSL 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 1500/35 A 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

10-25. The Military CYPRES 2 model 1500/35 A must be used in absolute (operational) mode for the following operating conditions:

- The Military CYPRES 2 is powered ON in flight.
- Low-level flights enroute 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.
- Departure airfield and DZ are at separate locations.
- The aircraft must be pressurized.

Rules for Using the Absolute (Operational) Mode

10-26. When the Military CYPRES 2 is used in absolute (operational) mode, all of the following apply to all DBSL operations and must be strictly adhered to:

- 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 during Military CYPRES 2 setting.
- All parachutists on the same stick will have the same DZ or 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 1500/35 A model.
- 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, and the Military CYPRES 2 setting should be recalculated. 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 pressures (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 sea level (aircraft altimeter setting [QNH]) and not the actual absolute pressure (QFE); therefore, it is necessary to convert the aircraft altimeter setting (QNH) to the actual absolute pressure (QFE) for use with the Military CYPRES 2.

Calculations for the Drop Zone in Absolute (Operational) Mode

10-27. 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 MSL).

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 DZ.

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 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).

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

10-28. In some scenarios, the jumpmaster must use a VDZ—described as a virtual line in the sky—which is a higher elevation MSL than that of the actual DZ. These scenarios include the following:

- DBSL operations with a low reserve activation altitude that have a highest release point obstacle of 200 feet or greater than the DZ elevation—
  - 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.
- DBSL operations with a high reserve activation altitude setting for a tactical operation based on SOPs.

10-29. The jumpmaster will calculate the millibar setting for a VDZ by obtaining the following information:

- Current aircraft altimeter setting (QNH) (in inches of mercury).
- The 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 opening altitude of his jumpers. Jumpers must maintain 2,000 feet (for the 1500/35 A model CYPRES) of vertical separation between the opening altitude and the reserve activation altitude.

Calculations for Unknown Setting in Absolute (Operational) Mode

10-30. 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. Additionally, 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 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.

10-31. The jumpmaster must add a safety factor into his calculations in order for the reserve to have enough altitude to fully inflate and save his jumpers' lives. To prevent activation on the low side, the jumpmaster will add 500 feet to the DZ or highest release point obstacle VDZ as a safety precaution. This new elevation is the elevation the jumpmaster will use to calculate the millibar.

10-32. 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.

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 opening altitude to mitigate the possibility of a dual canopy deployment.

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

10-33. When using the absolute (operational) mode, the jumpmaster and pilot must consider the following:

- While operating in absolute (operational) mode, the Military CYPRES 2 model 1500/35 A will arm itself as soon as the unit is 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 model 1500/35 A are powered ON. 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. Aircraft may exceed the vertical activation speed of 6,900 feet per minute for the 1500/35 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

10-34. There are two modes for the Military CYPRES 2 model 1500/35 A: default (training) mode and absolute (operational) mode. U.S. Army DBSL parachutists will only use the absolute (operational) mode.

10-35. 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

10-36. 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 10-2 explains the error codes.

Table 10-2. 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. A fingernail or a sharp object should not be used. Prolonged use of a fingernail or 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 restarted in absolute (operational) mode.

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

10-37. The jumper starts the power ON process (figure 10-8, page 10-14)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.

10-38. 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 10-8. Power ON sequence for Military CYPRES 2 in absolute (operational) mode

10-39. The jumper must watch the display during the self-test period. The display will start with 10 (figure 10-9) and then show a rapid countdown to 0▼.

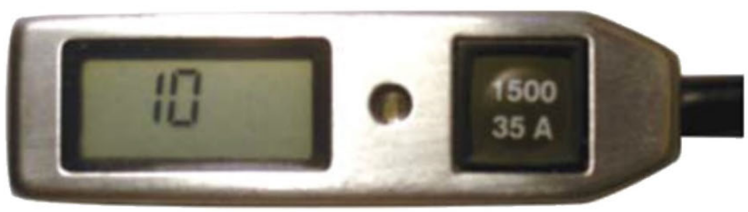


Figure 10-9. Beginning of Military CYPRES 2 self-test countdown in absolute (operational) mode

10-40. 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 10-10).

Figure 10-10. Military CYPRES 2 displaying current barometric pressure in millibars

10-41. Once the 0▼ reading is displayed (figure 10-11), the Military CYPRES 2 has passed the self-test.

Figure 10-11. Military CYPRES 2 set in absolute (operational) mode

10-42. If there is a functional deficiency detected in the Military CYPRES 2 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 10-12).

Figure 10-12. Example of Military CYPRES 2 error code

10-43. 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:

- Press the button and release to choose either 0 or 1(these numbers alternate on the display). The chosen value remains on the display (figure 10-13).

Figure 10-13. 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 10-14).

Figure 10-14. 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 10-15, page 10-16).

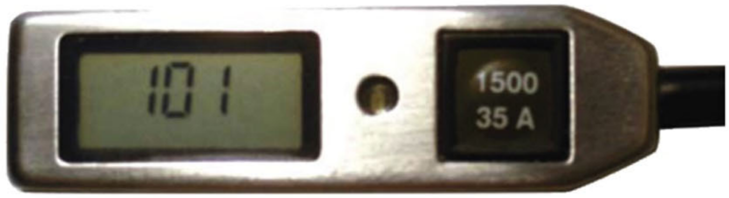


Figure 10-15. Third value of 1 chosen for millibar setting

- 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 10-16).

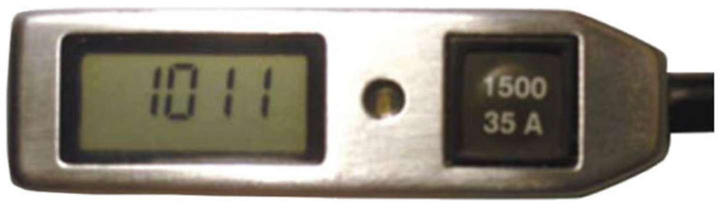


Figure 10-16. Final value chosen and Military CYPRES 2 set

10-44. To change a number that was entered incorrectly, 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.

10-45. 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 OFF PROCEDURES FOR CYPRES 2

10-46. 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.

10-47. The jumper starts the power OFF process (figure 10-17, page 10-17) 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.

10-48. When the power OFF steps are successful, the display will shut off. If the CYPRES 2 does not power OFF, the jumper should repeat the three steps.

Figure 10-17. Power OFF sequence for CYPRES 2

CAUTION

The jumper should press the control unit button with the tip of a finger. A fingernail or a sharp object should not be used. Prolonged use of a fingernail or 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.

USE OF MILITARY CYPRES 2 CALCULATORS

10-49. Two measurements are required to calculate the millibar setting for the Military CYPRES 2 in absolute (operational) mode, the—

- Altimeter setting for the intended DZ.
- MSL elevation of the DZ or VDZ.

10-50. 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, but 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/VDZ MSL elevation, he will calculate the millibar setting using an approved Military CYPRES 2 calculator. Tools authorized to use for the millibar setting calculation include the following:

- Military CYPRES absolute adjust circular calculator (whiz wheel) (figure 10-18, page 10-18).
- Military CYPRES Calculator application used with smart phone or tablet (figure 10-20, page 10-20).
- Digital Military CYPRES calculator developed by Airtec (figure 10-21, page 10-20).
- Online Military CYPRES absolute adjust model calculator http://www.ssk.us/military_calc.asp (figures 10-23 through 10-27, pages 10-22 to 10-24).
- Military CYPRES website: http://www.ssk.us/Calculator/.

WARNING

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

10-51. When on a mission with limited weather information, the aircrew can provide the altimeter setting for the DZ enroute to the drop area. 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.

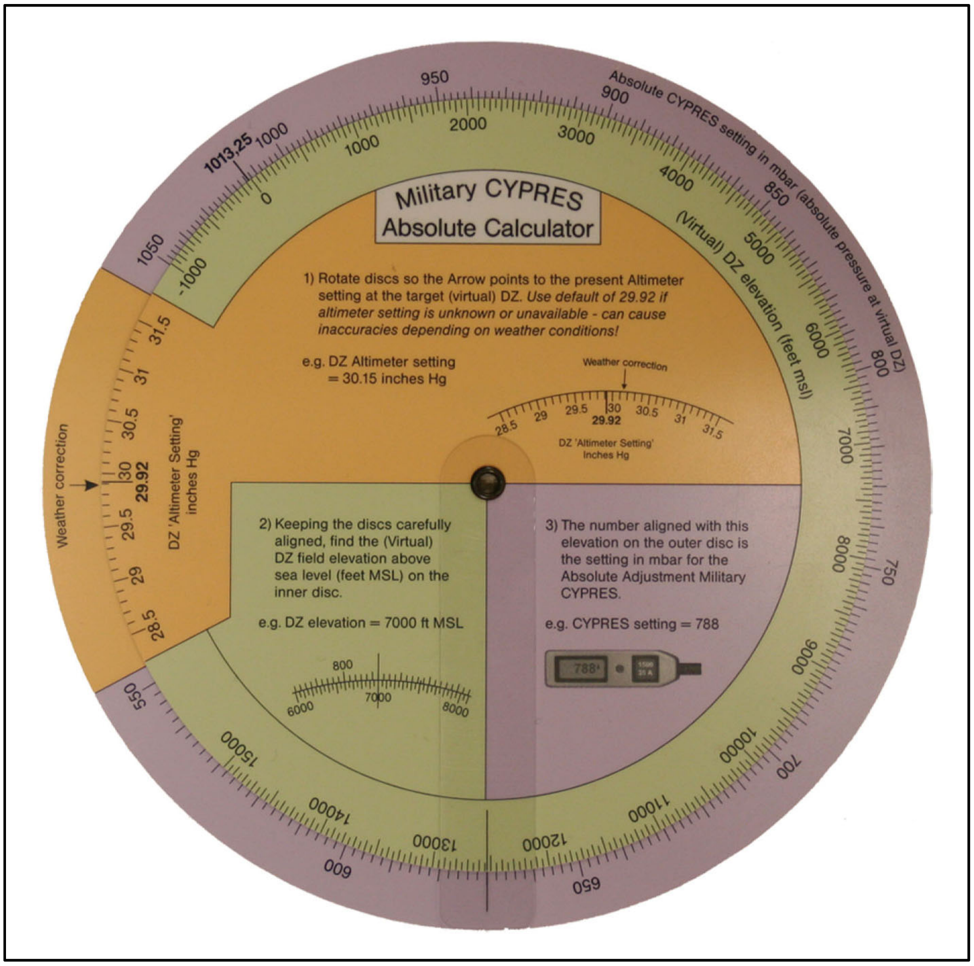


Figure 10-18. Military CYPRES absolute adjust circular calculator (whiz wheel)

USING THE MILITARY CYPRES ABSOLUTE ADJUST CIRCULAR CALCULATOR

10-52. 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 enroute to the drop area. 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 10-19 [A], page 10-19), 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 10-19 [B], page 10-19).

- 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 DZ or VDZ. (In the example in figure 10-19 [B], 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 this example, it is 787 millibars.

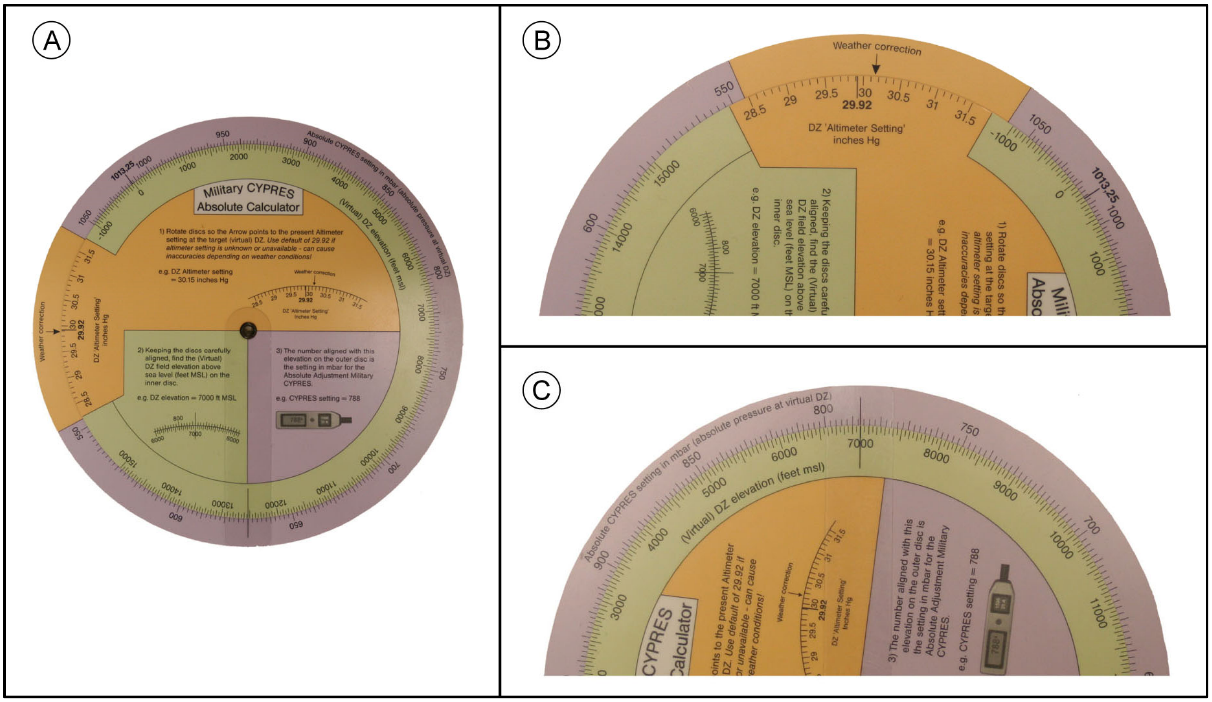


Figure 10-19. Military CYPRES absolute adjust circular calculator

USING THE MILITARY CYPRES CALCULATOR APPLICATION

10-53. The Military CYPRES calculator application is athe electronic equivalent of the Military CYPRES crcular calculator (Whiz wheel). In the event that the jumper does not want to carry or does not have access to the circular calculator, the Military CYPRES calculator application (figure 10-20, page 10-20) in your 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.

10-54. The Military CYPRES calculator application can be downloaded from the Google PlayStore or the Apple iStore for free or from the information provided at http://www.ssk.us/military_calc.asp. Users should ensure they keep the application updated with the latest version of Military CYPRES calculator application. Jumpmasters may visit the same website to use the online Military CYPRES calculator application. To utilize the application, turn on the smart phone or tablet, open the application on the smart phone or tablet, and follow these instructions:

- Enter the Altimeter Setting (in either Hg or mbar).
- Enter the Elevation at the DZ or VDZ (in either feet or meters).
- Select the Elevation Units (either in feet or meters).
- Click the Calculate button. The value for CYPRES Setting is then displayed.

Figure 10-20. Military CYPRES calculator application

USING THE MILITARY CYPRES CALCULATOR

10-55. 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 developed by Airtec (figure 10-21). 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, then they should use the Military CYPRES calculator, or go to the Military CYPRES User's Guide at http://www.ssk.us.

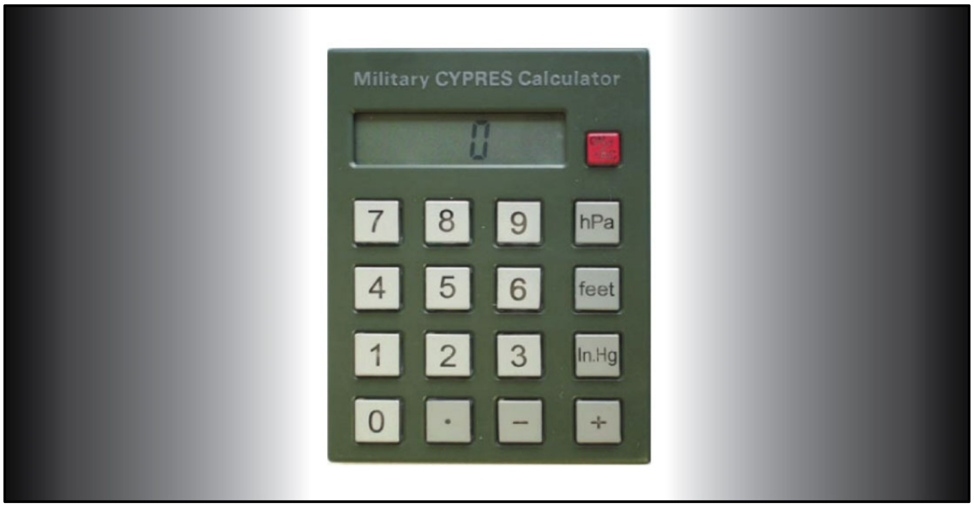


Figure 10-21. Military CYPRES calculator

10-56. Figure 10-22, page 10-21, shows the usage instructions located on the back of the Military CYPRES calculator.

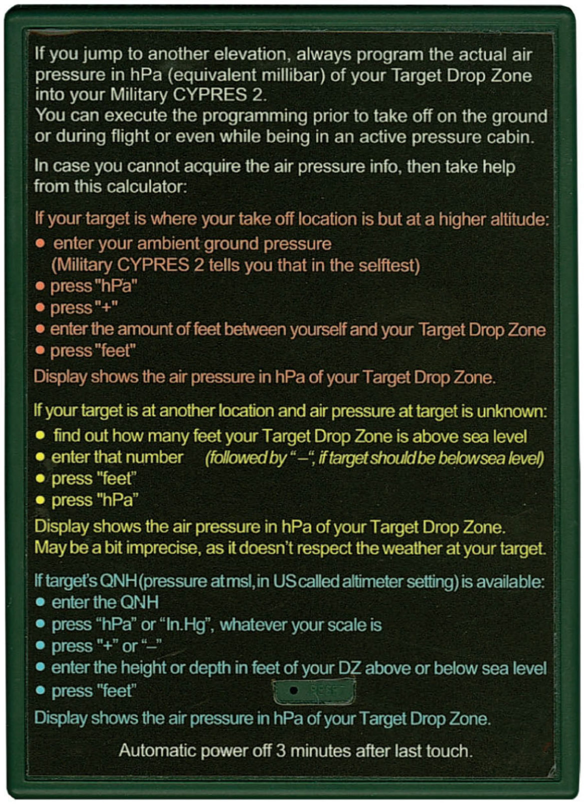


Figure 10-22. Usage instructions for the Military CYPRES calculator

Using the Online Military CYPRES Absolute Adjust Model Calculator

10-57. Parachutists may go to http://www.ssk.us/military_calc.asp and use the online Military CYPRES absolute adjust model calculator. Figures 10-23 through 10-27, pages 10-22 through 10-24, 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 utilize all of the CYPRES capabilities.

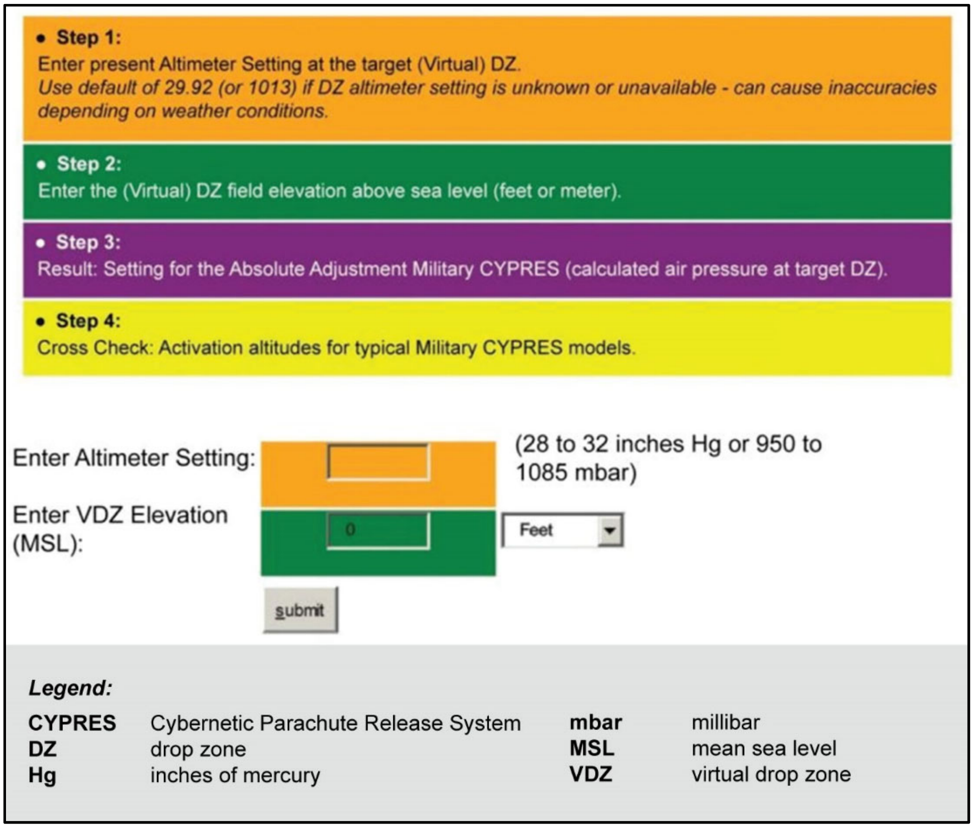


Figure 10-23. Instructions and first page of the online Military CYPRES absolute adjust model calculator

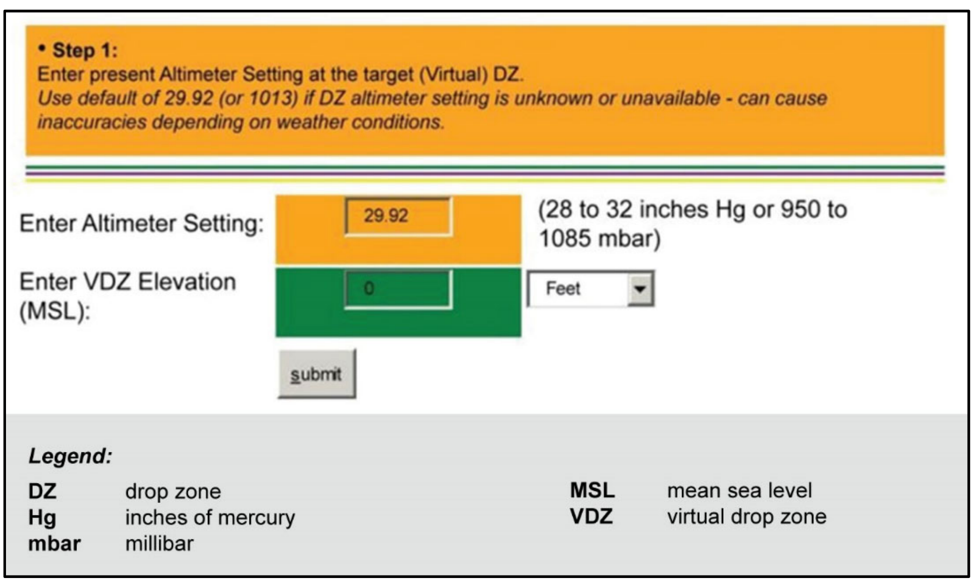


Figure 10-24. Step 1: Military CYPRES absolute adjust model calculator

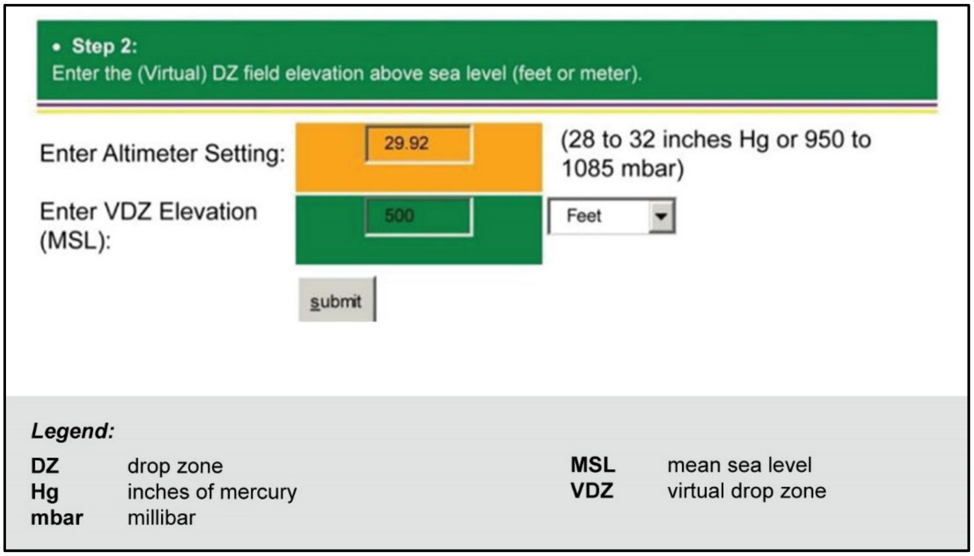


Figure 10-25. Step 2: Military CYPRES absolute adjust model calculator

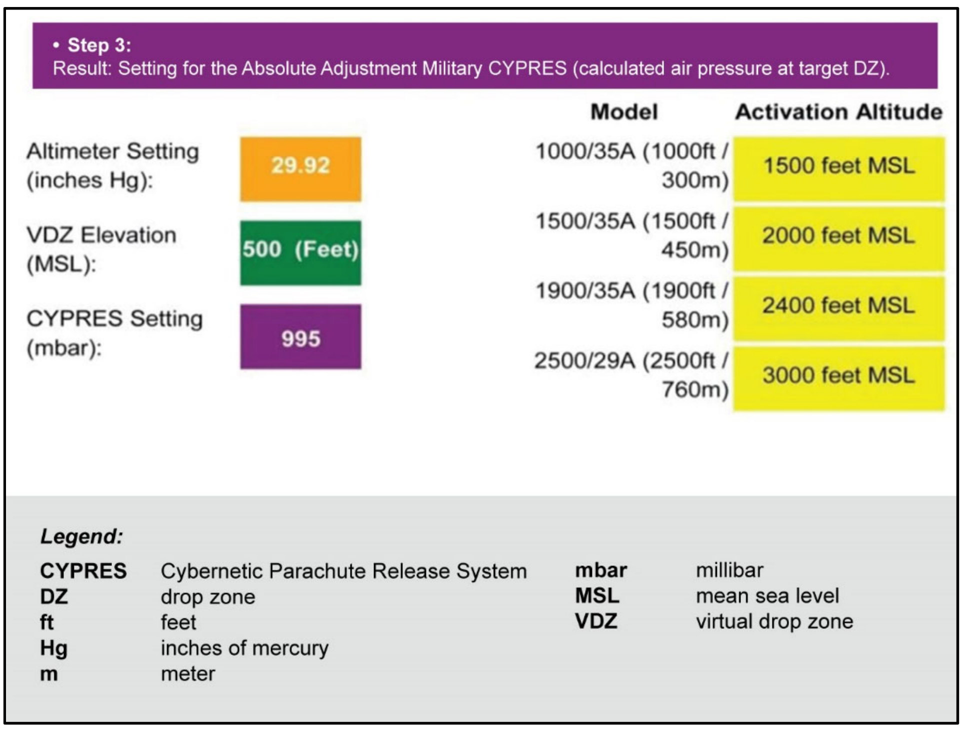


Figure 10-26. Step 3: Military CYPRES absolute adjust model calculator

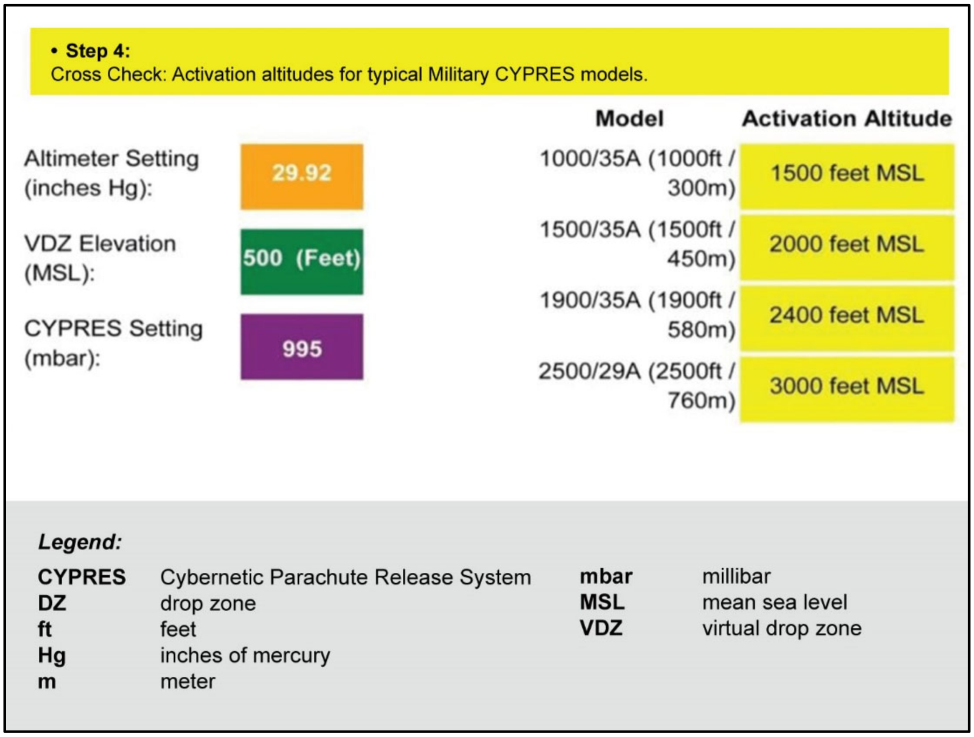
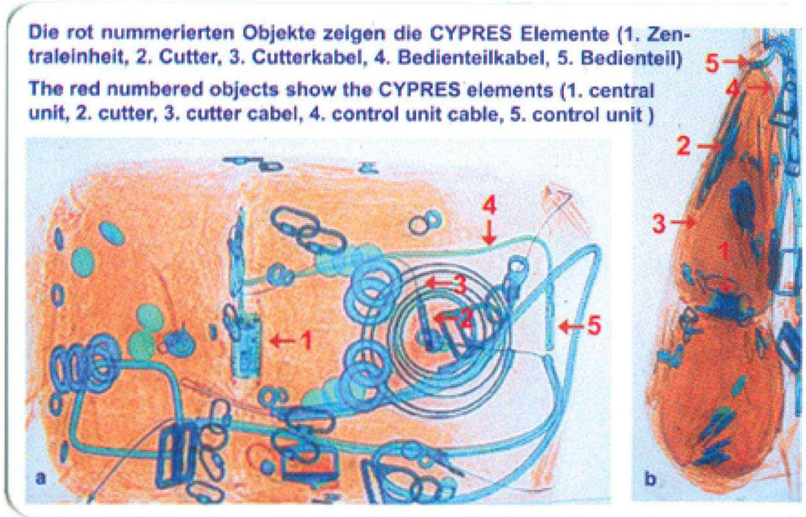


Figure 10-27. Step 4: Military CYPRES absolute adjust model calculator

MILITARY CYPRES AND COMMERCIAL AIR TRAVEL

10-58. 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 Department of Transportation and other competent agencies worldwide and are not subject to any transport restrictions. 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 10-28, page 10-25. The card shows an x-ray of a complete rig with the Military CYPRES 2. Depending on type and design of the rig, the x-ray on the security's screen may vary. Presently, the Parachute Industry Association and the United States 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 10-28. Military CYPRES 2 air travel card

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Chapter 11

Equipment and Weapon Rigging Procedures

DBSL parachutists will normally operate with individual equipment that includes clothing and equipment in keeping with the climatic conditions. In addition, each DBSL parachutist will have a free-fall parachutist's jump helmet, goggles, and altimeter. The DBSL parachutists jump and carry all detachment mission-essential equipment and supplies as individual loads. If selected items must be dropped as accompanying supplies, they pack these supplies in appropriate aerial delivery containers.

11-1. All parachute systems and combat equipment will be stored and secured on the aircraft in a manner which ensures no malfunctions or damage will be caused to the rigging and lifesaving equipment on the parachute system. Oxygen equipment (consoles) will be rigged, placed and secured in a position where it will be utilized during the DBSL operation (jumper configuration).

Note: **Aircraft with Limited Space.** Equipment will be donned by all jumpers and inspected for any rigging deficiencies by the primary jumpmaster and assistant jumpmaster before takeoff. All jumpers will ensure their equipment is properly connected before standing up and when the hand-and-arm signal to STAND UP is given.

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 their equipment is properly connected before standing up and when the hand-and-arm signal to standup is given.

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 additional equipment that will be attached to the jumper during flight will be inspected by the jumpmaster before the jumper exits the aircraft.

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

EQUIPMENT AND WEAPON PACKING CONSIDERATIONS

11-2. The parachutist can attach or wear his individual equipment and weapon in several configurations (weapons for example, exposed, placed in approved weapons containers, or 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 approved by the U.S. Army.

11-3. The parachutist packs his individual equipment in a PDB, or the medium or large combat pack. He then attaches it to the equipment rings on the parachute's main lift web. He may front- mount the combat pack using the SOF harness, single-point release; improved equipment attaching sling (spider harness); or the H-harness (modified) for DBSL operations. The parachutist will only jump the front-mounted PDB, or rucksack with equipment during DBSL operations. The parachutist must be under the RA-1 ARAPS

450-pound "all-up" total weight (to include parachutist, gear, and weight of canopy suspended below the parachute). Jumper should lower combat packs or any equipment that weighs more than 120 pounds (lbs) when landing.

11-4. The parachutist pads fragile items such as weapon sights and scopes. 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

11-5. Commanders must not overload the parachutist with equipment. The variety and weight of equipment and weapons attached to a parachutist may exceed the safe design limits of the RA-1 ARAPS or aircraft ramp maximum weight limits. Overloading can result in injury to the parachutist, parachute damage, unsafe descent rates, failure to retrieve a towed jumper, and failure to lower equipment . 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.

HOOK-PILE TAPE LOWERING LINE ASSEMBLY

11-6. The current hook-pile tape lowering line assembly consists of an 8-foot or 15-foot lowering line made of 1-inch wide tubular nylon. The 8-foot lowering line is recommended for most equipment. A 9-inch 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.

11-7. Figure 11-1, page 11-3, shows steps A through D for stowing a hook-pile tape lowering line assembly. The current hook-pile tape lowering line assembly (NSN 1670-01-067-6838) consists of—

- An 8-foot or 15-foot lowering line (the 8-foot lowering line is recommended for most equipment) made of 1-inch wide tubular nylon.
- A 9-inch by 7-inch nylon duck retainer (stow pocket) sewn to the upper end. The flaps have hook-pile tape sewn to the edges.
- A metal (parachute harness) ejector snap with 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. Additionally, it provides procedures for altering the hook-pile tape lowering line. Military occupational specialty 92R/921A (parachute rigger/airdrop system technician) 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 approximately 1 inch from the bottom of the lanyard, securing it to the lowering line and leaving 1 to 2 inches exposed at the top of the lanyard.

Note: To help prevent inadvertent or 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.

11-8. The steps for stowing a hook-pile tape lowering line assembly, (figure 11-1, page 11-3), 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 11-1 [A], page11-3).
- Place a doubled heavyweight retainer band around the center of the S-folded tubular nylon inside the container (figure 11-1 [B], page 11-3).

- Mate the hook-pile tape on the excess tubular nylon to the hook-pile tape on the bottom closing flap (figure 11-1 [C]).
- Close the top flap, encasing the folded tubular nylon (figure 11-1 [D]).
- Close off both running ends by realigning the Velcro (figure 11-1 [E]).
- Remove the yellow release lanyard or tape it with one complete wrap of masking tape. Place a doubled heavyweight retainer band (figure 11-1 [F]) around the center of the folded lowering line and a tripled heavyweight retainer band around the quick-ejector snap.

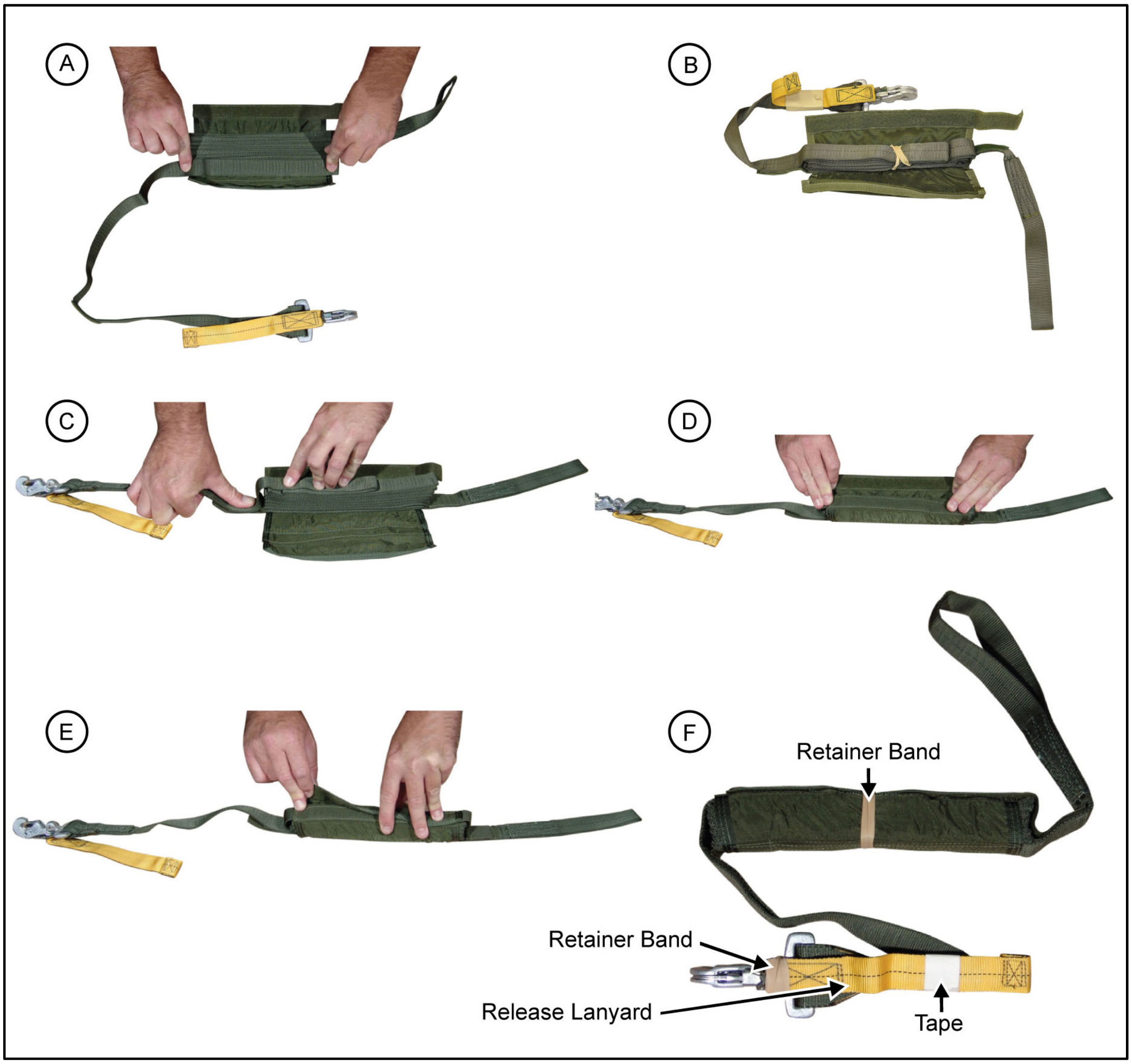


Figure 11-1. Stowing the hook-pile tape lowering line assembly

DOUBLE-BAG STATIC LINE OPERATIONS WITHOUT UTILIZING THE LOWERING LINE

11-9. If the jumper plans on not lowering his equipment during the DBSL operation, attachment of the lowering line is optional. The jumper must still have the capability to jettison his equipment during any DBSL operation; however, there are no emergency procedures that require the jumper to lower their rucksack.

Note: When jumping equipment in excess of 120lbs the lowering line should be utilized.

COMBAT PACKS AND OTHER EQUIPMENT CONTAINERS

11-10. The following paragraphs discuss the use of harnesses, equipment attachment slings, and lowering lines in preparing and rigging different packs.

SPECIAL OPERATIONS FORCES HARNESS

11-11. The SOF harness is a lightweight, adjustable, diagonal strap-designed pack harness intended for rigging a PDB or rucksack to the RA-1 harness. The SOF harness (figure 11-2) is made of nylon webbing and uses friction adapters to secure the harness straps around the load (e.g. combat pack or 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.

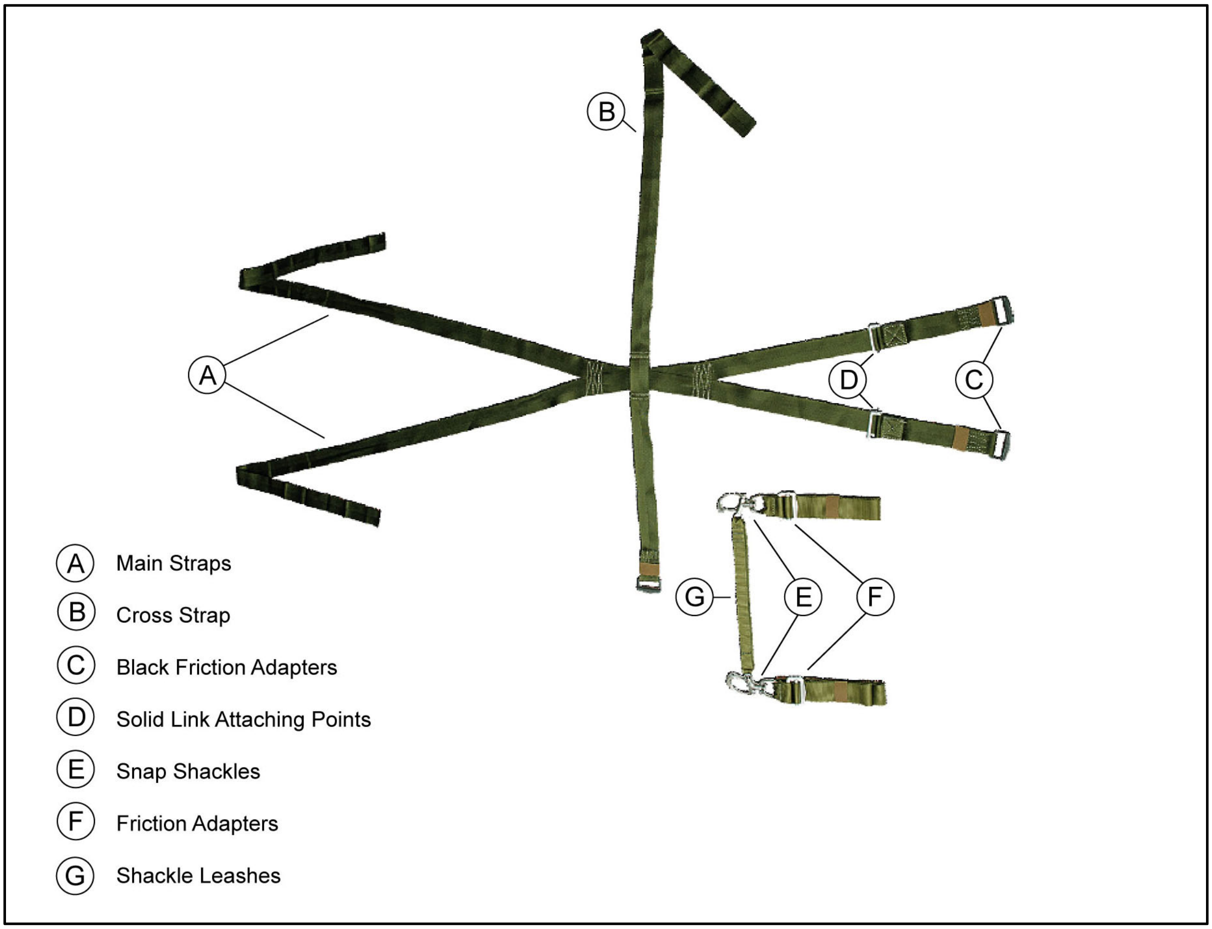


Figure 11-2. Special operations forces harness and parachute attaching straps

11-12. Parachutists step through the pack's shoulder straps to stabilize the pack to the parachutist during exit and parachute deployment. 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

11-13. Before attaching the SOF harness and PASS Straps to the combat pack, lay the harness out on a clean, flat surface on the the ground. The jumper will—

- Ensure that the SOF harness solid links are facing the ground (figure 11-3 [A], page 11-6).
- Place the pack on the harness (figure 11-3 [A], page 11-6) with pockets facing down, frame up and top of pack facing the free ends of main harness webbing. The solid link attaching points should be sticking out about 10 inches from under the pack.
- Route the cross strap (figure 11-3 [B], page 11-6) around the pack, and put the mates into respective friction adapters.
- Route the main, diagonal strap friction adapters (figure 11-3 [C], page 11-6) through webbing on bottom of the pack. The solid link attaching points should be on inside edge of waistbelt, facing out from pack.
- Route the free ends of main, diagonal straps (figure 11-3 [C and D], page 11-6) over the pack lid (through webbing on top 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 11-4, page 11-6) and adjusts cross strap around pockets and center harness.
- Tighten all straps, (figure 11-3 [D], page 11-6) 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 11-3 [D], page 11-6) in the same way as with the sinple-point release harness for a front-mounted combat pack, that is, route the loop end under crossed the diagonal straps and pass the running end through the loop. Secure the hook-pile tape lowering line to the right side of the pack.
- Attach the PASS straps (figure 11-4, page 11-6) by routing the webbing through the solid link attaching point on the harness and back into the friction adapter on attaching strap. Repeat on the other side.
- Tighten each PASS strap webbing (figure 11-4, page 11-6) to desired length and secure running end with webbing retainer or masking tape.
- Adjust snap shackle leashes to width of chest. Leave straps connected until it is time to attach the combat pack to the parachutist.

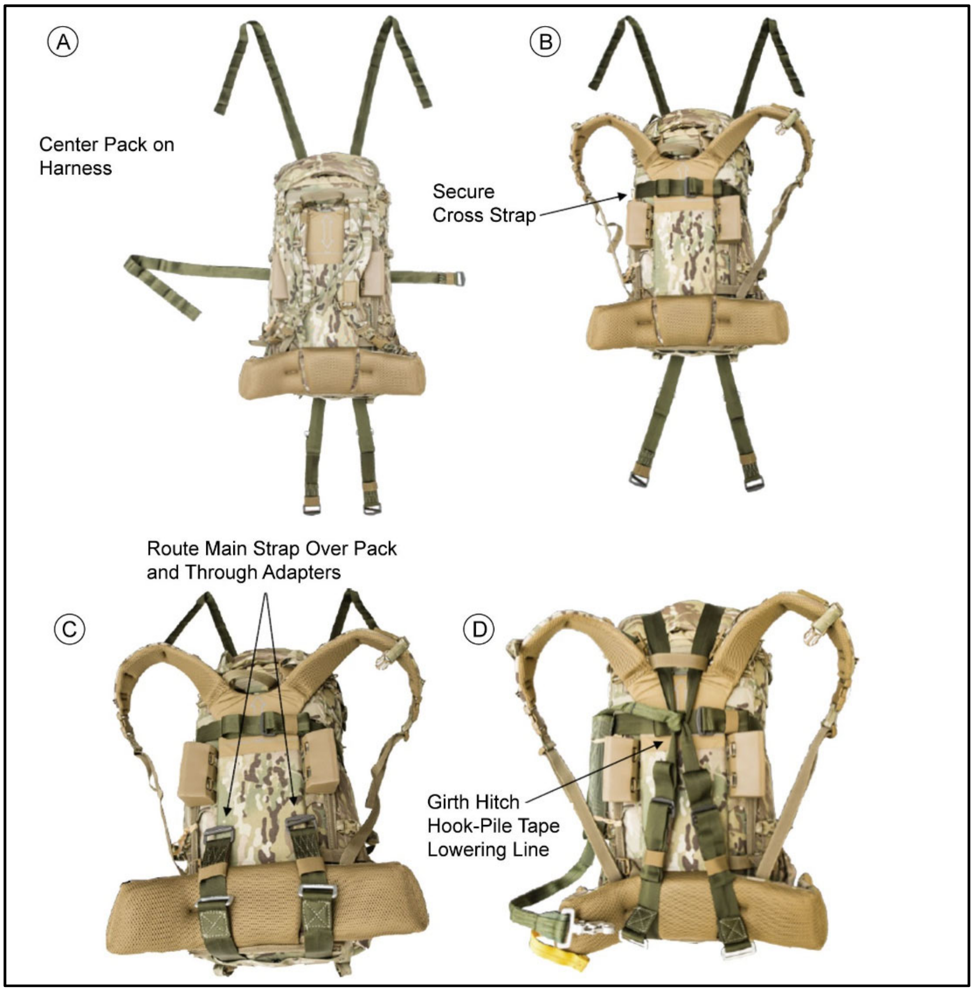


Figure 11-3. Rigging the special operations forces harness

Figure 11-4. Special operations forces harness rigged to the parachutist drop bag

CONNECTING THE SPECIAL OPERATIONS FORCES HARNESS AND COMBAT PACK TO THE JUMPER'S HARNESS

11-14. The parachutist will—

- Stand facing the rigged combat pack.
- Step through pack shoulder straps.
- Open the snap shackles by pulling on the leashes.
- Grasp the harness by the attaching straps.
- Secure the snap shackles to the equipment attachment rings on the main lift webs.
- Secure the hook-pile tape lowering line ejector snap to the outermost equipment attachment ring.

11-15. To complete attaching the SOF harness to the PDB in the BOC configuration (figure 11-5), the parachutist then—

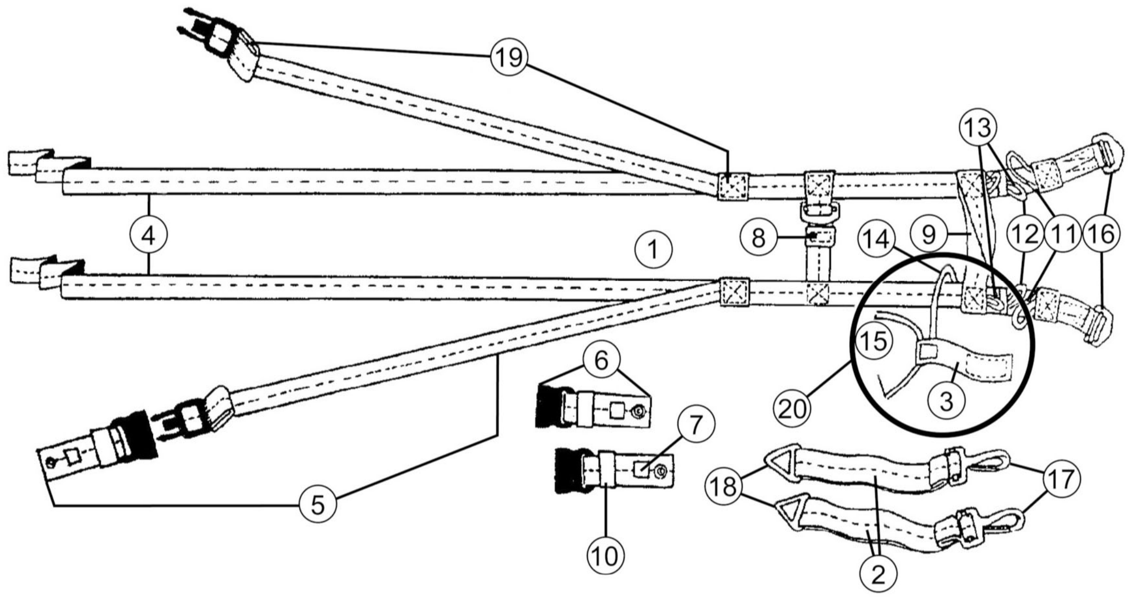
- Pulls on the free-running ends of the attaching straps to cinch pack to equipment attachment rings.
- Ensures pack is sitting level.
- Folds excess webbing and secures in webbing retainer.
- Arches chest wide to ensure leashes are properly adjusted and that shackles don't release prematurely.

Figure 11-5. Special operations forces harness attached to the parachutist drop bag in the bottom of container configuration (jumper's left, front, and right views)

> **WARNING**
>
> **The jumper will ensure the leashes are adjusted wide enough so the shackles won't release unintentionally during DBSL exit.**

HARNESS, SINGLE-POINT RELEASE

11-16. The harness, single-point release (figure 11-6) is an H-shaped 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, during exit, and during parachute deployment, it also has two adjustable leg straps 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 11-6. Harness, single-point release (NSN 1670-01-227-7992)

RIGGING THE ALL-PURPOSE LIGHTWEIGHT INDIVIDUAL CARRYING EQUIPMENT PACK WITH THE HARNESS, SINGLE-POINT RELEASE

11-17. Before attaching the harness, single-point release, to the all-purpose lightweight individual carrying equipment (ALICE) pack and Service-authorized combat packs, the release handle and adjustable D-ring attaching straps (figure 11-7, page 11-9) are attached to the harness with a single-point release.

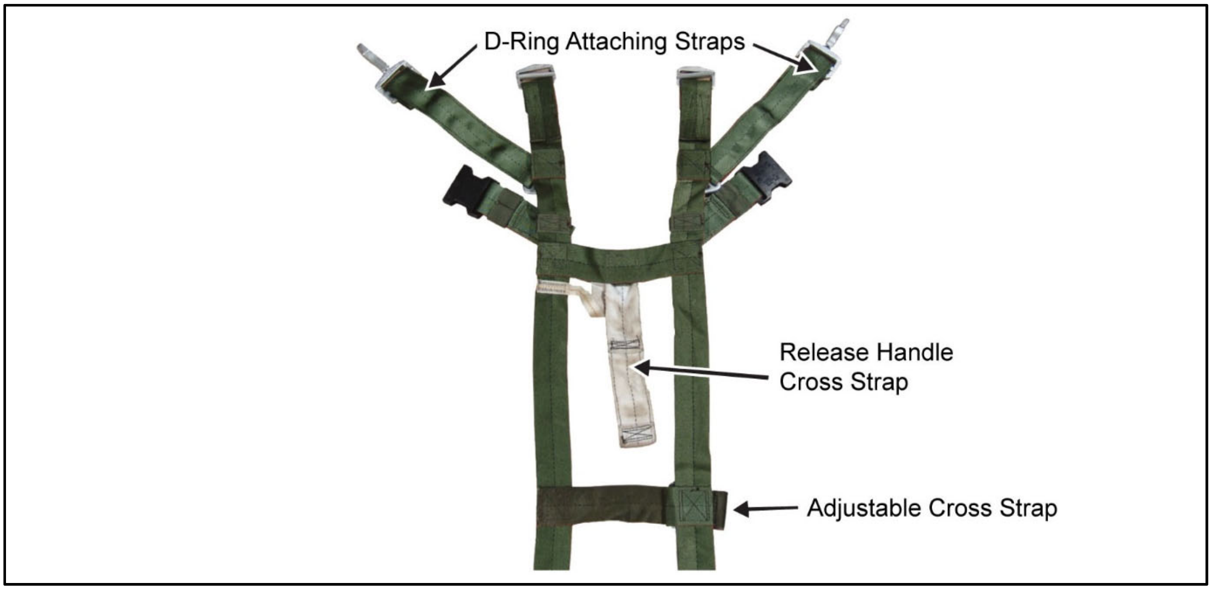


Figure 11-7. Release handle and D-ring attaching straps

Packing Procedures

11-18. When packing the combat container, the parachutist conforms to the following 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 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 exit. If using the harness, single-point release, fill the outer pockets to help 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 using the webbing retainer or masking tape.
- Dip test equipment—if conducting a water jump—to ensure positive buoyancy and that the equipment remains dry. Conduct a second dip test after the combat container is completely rigged.

Harness, Single-Point Release

11-19. 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-foot or 15-foot lowering line.

11-20. The harness, single-point release (figure 11-8, page 11-10) is an H-type design for DBSL 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.

11-21. 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, and parachute deployment. The leg straps are equipped with the male portion of the leg strap release assembly.

11-22. The harness has a single-point release assembly that simultaneously releases the load and leg straps from the parachutist and parachute harness.

Rigging Procedures

11-23. 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 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 11-8 [A]).
- Routes the green attaching loop up through the white attaching loop (figure 11-8 [A]).
- Routes the red attaching loop up through the green attaching loop (figure 11-8 [A]).
- Routes the red attaching loop through the grommet on the female portion of the leg strap release assembly. Ensures the cable loop retainer on the female portion of the leg strap release assembly is facing up (figure 11-8 [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 11-8 [B]).
- Turns the harness over so the adjustable D-ring attaching straps are on the bottom.

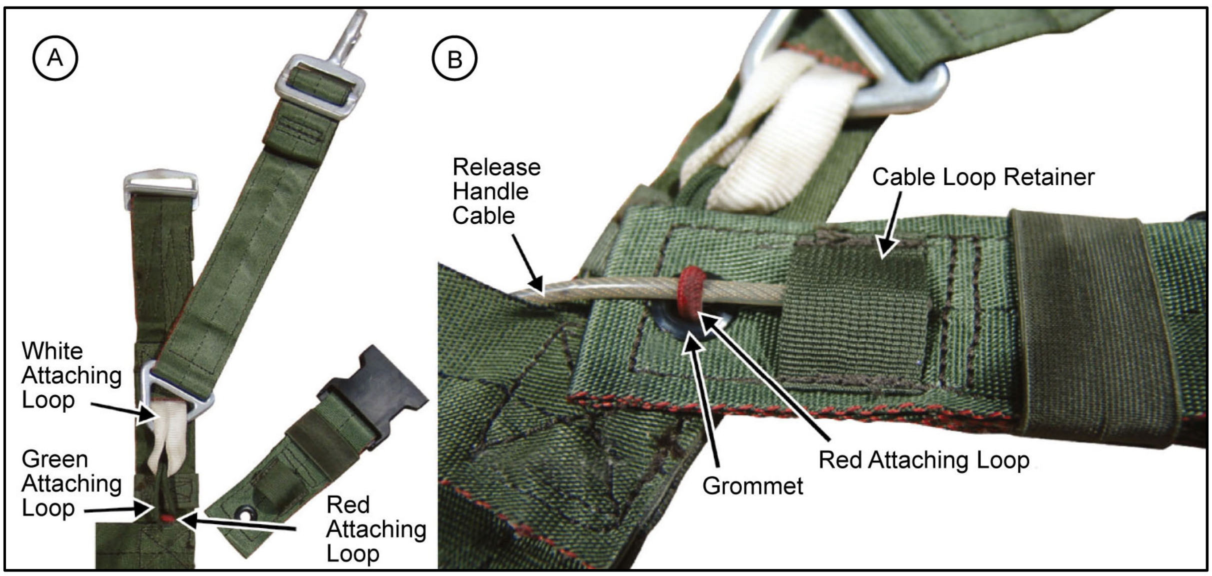


Figure 11-8. Attaching snap hooks and leg strap release assembly

- 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 11-9 [A], page 11-11).
- Ensures the top of the pack is facing the equipment retainer straps (figure 11-9 [A], page 11-11).
- Routes the equipment retainer straps under the top of the frame, crosses them on the back of the pack to form an X, and routes them underneath the frame and the backrest of the pack (figure 11-9 [B], page 11-11).

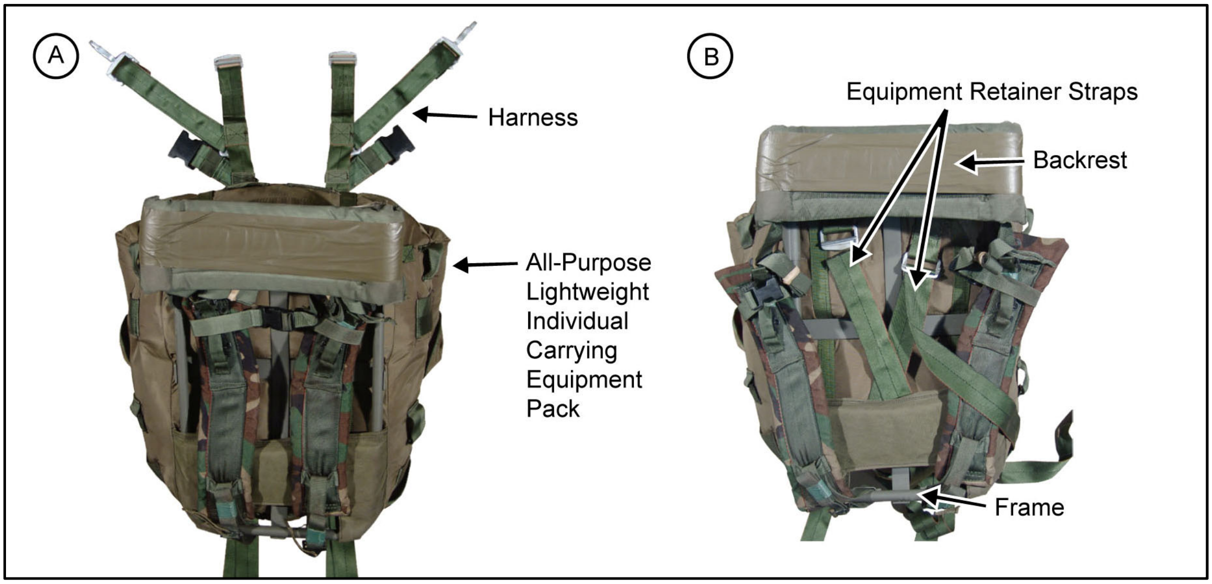


Figure 11-9. Rigging the harness, single-point release

- 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 11-10 [A]).
- Rolls the excess webbing in an S shape and secures it with retainer bands or tape (separates it from the quick-release loop, if used) (figure 11-10 [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 11-10 [B]). The harness, the single-point release, and the 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.

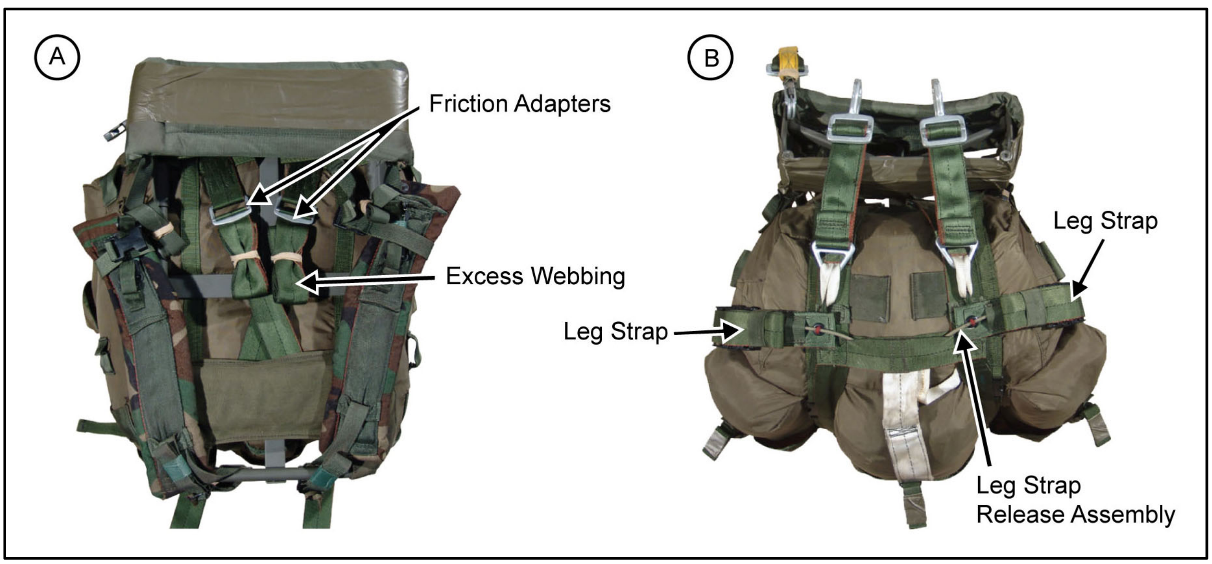


Figure 11-10. Completed rigging of the harness, single-point release

Note: Oscillation under canopy is dramatically increased when using the 15-foot hook-pile tape lowering line.

Hook-Pile Tape Lowering Line Assembly

11-24. The parachutist attaches the hook-pile tape lowering line the same way as the modified H-harness for a front-mounted combat pack (figure 11-11). The 8-foot hook-pile tape lowering line is normally used for DBSL operations.

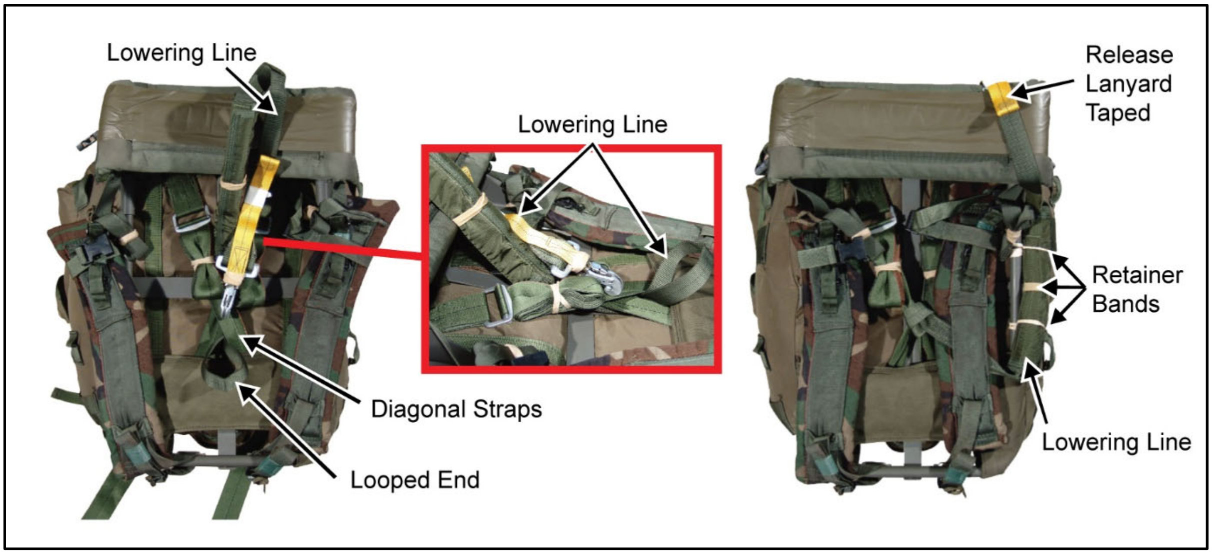


Figure 11-11. Attaching the hook-pile tape lowering line assembly

Attaching the Harness, Single-Point Release to the Parachutist for Rigged Combat Equipment

11-25. 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 their legs when using the harness, single-point release. The same sequence is followed for attaching the front-mounted combat pack using the harness, single-point release.

11-26. Parachutist performs the steps below to attach the harness, single-point release, for rigged combat equipment:

- Parachutist 1 loosens the shoulder straps of the combat pack and steps through them (if using the shoulder strap configuration). For the leg strap configuration, begin at 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 then lowering line to the right-side lowering line attachment lower equipment 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. Skip this step if using the shoulder strap configuration.
- 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 to secure it.

PARACHUTIST DROP BAG

11-27. The PDB is a fast, easy, and secure way of carrying the parachutist's rucksack and load-bearing equipment for DBSL operations. The bag opens and closes quickly so the equipment can be secured efficiently on the DZ. There are exterior pockets for water and maps so the parachutist does not have to get into 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 has a camouflage pattern, 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 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.

LOADING THE PARACHUTIST DROP BAG

11-28. 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 11-12).

Figure 11-12. Compression straps connected and tightened

11-29. After loading the bag and securing any excess webbing, the parachutist 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 the harness, single-point release. The parachutist—

- 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 white attaching loop through the triangle link.
- Threads green loop through white loop and red loop through green loop.
- Threads red loop through the grommet on the female portion of the leg strap release assembly with the cable loop retainer facing up.
- Threads release cable through red loop and into the cable loop retainer.
- Repeats the same process on the other side.

Attaching the Parachutist Drop Bag

11-30. The PDB can be attached to the front of the DBSL parachutist. The PDB attaches to the parachutist by standard quick-release connectors (figure 11-13). The equipment attachment straps are long enough for the parachutist to connect the bag to the upper large equipment rings of his parachute harness while the bag rests on the floor. The bag should be as close as possible to the equipment attachment rings when jumping the bag in front (figure 11-14 [A], page 12-15). 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 11-14 [B], page 12-15). 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.

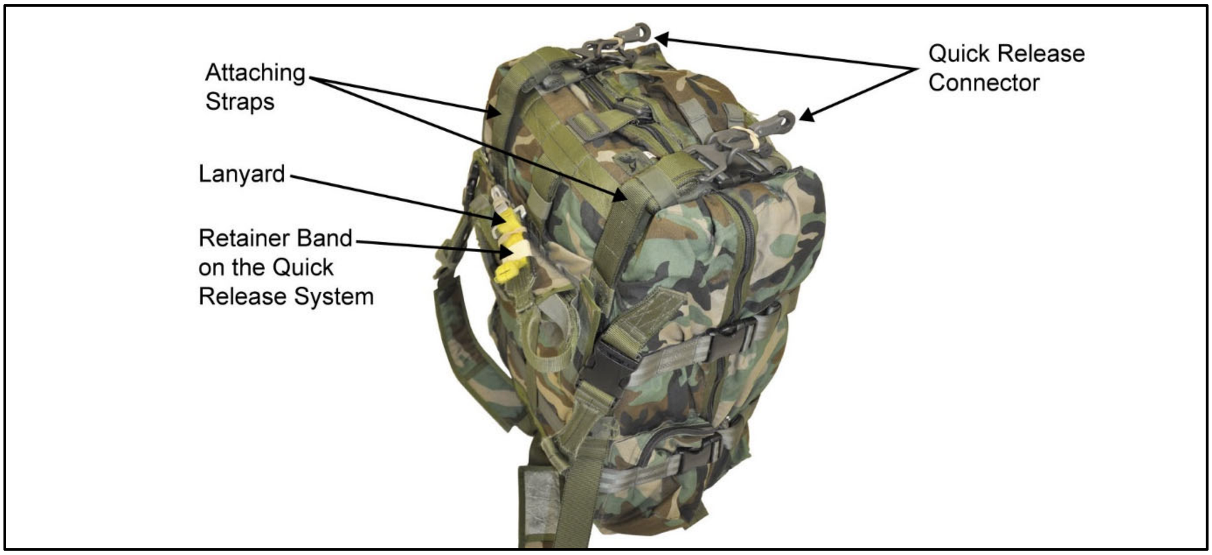


Figure 11-13. Parachutist drop bag standard quick-release connectors

Jumping the Parachutist Drop Bag

11-31. The bag is jumped in an identical manner as the standard rucksack (figure 11-15, page 11-16. 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

11-32. Once on the ground, the parachutist detaches the lowering line from the parachute. He then unbuckles all of the Fastex buckles securing 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 puts the parachute into the bag for storage or a hasty cache.

Figure 11-14. Parachutist drop bag showing the lowering line attachment point

Figure 11-15. Parachutist drop bag rigged for front-mounted jump

WEAPON-RIGGING PROCEDURES

11-33. A DBSL 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 side or center mounts the weapon with a 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 larger weapon on the left side of the parachutist. The parachutist can jump with a pistol in a shoulder holster or in an 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

11-34. The CMWH (figure 11-16) is in response to USASOC's need for a weapon harness that allows the parachutist ease of donning and doffing during DBSL operations.

Figure 11-16. Center-mounted weapon harness

WARNING

The CMWH will not be used when conducting door exits from any rotary-wing aircraft. The CMWH will only be used when conducting over-the-ramp DBSL operations.

11-35. DBSL operations have been conducted using the CMWH at the USAJFKSWCS MFF School and during user assessments by U.S. Army Special Forces Command Soldiers during DBSL training. The CMWH is manufactured using the following components:

- **Weapon Harness.** Use 1-3/4-inch nylon tape backing with pile sewed the length and 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.

11-36. 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 11-17).

Figure 11-17. Main lift web attaching points

- For 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 11-18, page 11-18).

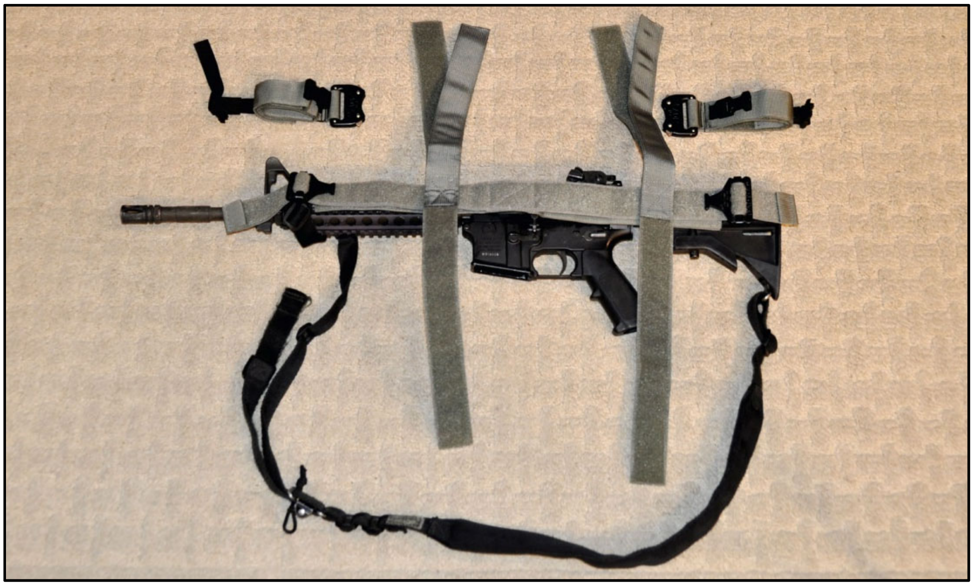


Figure 11-18. Attaching horizontal straps to the pile portion weapon harness

- Uses triple-fold hook and pile to secure the weapon harness to the weapon (figure 11-19 and figure 11-20, page 11-19).

Figure 11-19. Securing triple-fold hook and pile

Figure 11-20. Securing weapon harness to weapon

11-37. When the parachutist jumps the PDB or ALICE pack, the attaching straps (figure 11-21) are routed over the weapon and attached CMWH for additional security to the jumper.

Figure 11-21. Chest strap routed through sling secured with excess chest strap and retainer

EXPOSED WEAPONS CONSIDERATIONS

11-38. If the commander decides parachutists are to jump with weapons exposed, he must consider the increased risk of injury to the parachutist. 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 during exit.
  - 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

11-39. To prepare the M-4 carbine-series rifle for jumping (figure 11-22, page 11-21), the parachutist—

- Adjusts the sling to fit just over the shoulder and tapes the sling keeper in place.
- Pads and tapes the side-mounted bolt assist and the operating handle.
- Pads and tapes the muzzle and the sights to avoid possible entanglement with the parachute suspension lines or to avoid debris entering the weapon upon landing.
- Inserts the magazine and tapes it to the receiver, including the ejector port cover, to prevent loss of the magazine and to keep debris from entering the bolt area.
- Tapes the handguards to prevent their loss during exit and upon landing.
- Tapes 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 DBSL operations and will 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.

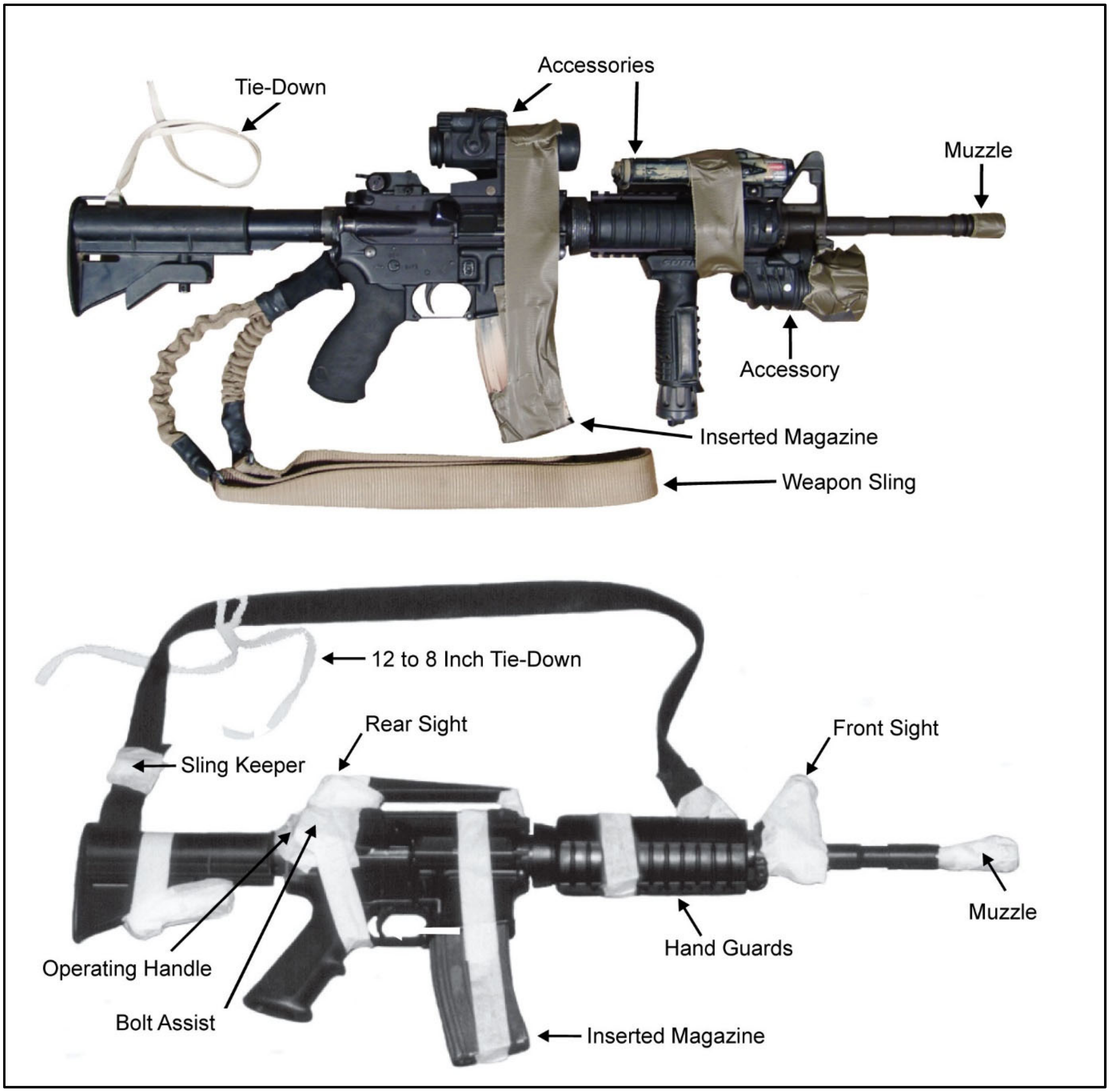


Figure 11-22. M-4 carbine-series rifles rigged for jumping

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

11-40. The parachutist should use a 12-inch 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 hitch knot.

Positioning

11-41. 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 11-23). The jumper and his buddy should then—

- Place the sling from the lower keeper (butt stock) on the outside of the weapon butt stock and over the parachutist's shoulder.
- 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.

Note: This last step (through the carrying handle) is optional do to some weapons not having a carrying handle.

Note: If optics are mounted on the weapon, they must be free and clear of the waistband.

Note: Ensure the accessory pouch is attached to the container when jumping any weapon on the left side.

- Tighten the waistband securely so that the weapon fits snugly against the parachutist's side. The parachutist then bends and arches to test the fit of the weapon.

Figure 11-23. Positioning the weapon on the parachutist

M-203 GRENADE LAUNCHER OR ENHANCED GRENADE LAUNCHER MODULE

11-42. The parachutist should prepare the M-203 grenade launcher (figure 11-24) in the same manner as he prepares the M-16 series, M-4, or SCAR carbine-series rifles. Additionally, 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 11-24. M-203 rigged for jumping

Tie-Downs

11-43. The parachutist should follow the same procedures used for the M-16 series, carbine-series rifles.

Positioning

11-44. The parachutist and his buddy should follow the same procedures used for the M-16 series, carbine-series rifles.

DUAL WEAPON RIGGING PROCEDURES

11-45. When rigging weapons on both sides of the harness, the jumper should—

- Ensure the accessory 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 weapon on the right side. If not jumping oxygen, the oxygen system pouch is not needed.
- Ensure weapons are padded to prevent injury to jumper or damage to 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 the weapon slings are routed under the main lift web of the harness on both right and left sides of the jumper and route the chest strap through the slings and secure the chest strap.
- Ensure the sling does not interfere with the main ripcord, main release ripcord (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, a fellow jumper should place the short weapon behind the oxygen bottles and against the parachutist's body. The fellow jumper 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.

M-249 AND PARA M-249 SQUAD AUTOMATIC WEAPONS

11-46. The parachutist can jump with the M-249 Para 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 fore grip of the weapon, securing the carrying handle, handguard, and bipod.

Note: The Para M-249 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

11-47. The parachutist should use a 12-inch 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 Para M-249 squad automatic weapon, he should attach the tie-down to a hard point on the rear of the weapon.

Positioning

11-48. 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 Para M-249 may be rigged with the weapon pistol grip to the parachutist's front or rear.

11-49. They 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.

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

11-50. The parachutist should not jump these fully assembled and exposed weapons while they are attached to the parachute harness during DBSL operations because of injury to the jumper or damage to the equipment on landing. The parachutist may break the weapons down and pack them inside the combat pack, or 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 Services-approved combat packs.

Other Weapons

11-51. The parachutist can rig other weapons using the methods previously described. User unit SOPs should specify ways to pack or rig similar types of weapons consistent with safety requirements. Units requiring technical help should contact USAJFKSWCS, Company B, 2d Battalion, 2nd Special Warfare Training Group, Yuma, Arizona; Defense Switched Network (DSN) 899-3626/3639.

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Chapter 12

Oxygen Safety, Equipment, and Procedures for Double-Bag Static Line Operations

DBSL 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 DBSL parachutist must be thoroughly familiar with the physiological effects of oxygen, oxygen use, and the operation of oxygen equipment.

OVERVIEW

12-1. All U.S. Army personnel participating in DBSL 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 the physiological stresses and human factor implications of modern aviation. Only essential personnel who have completed High-Altitude Parachutist Initial Training are permitted on unpressurized aircraft flying above 10,000 feet MSL.

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.

Smokeless tobacco (dip), chewing gum, food and other substances are NOT permitted in the mouth of any jumper while he is on life-support equipment.

Equipment must be kept clean and free from petroleum-based products, lubricants, hydraulic fluid and dirt. A drop of oil or lubricant coming into 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 de 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 with great force. Soldiers must only open and shut 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.

OXYGEN HANDLING AND SAFETY

12-2. 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 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. Only open and close the valves only by hand. If the valve cannot be opened and closed by hand, return the cylinder to the depot for repair.

PHYSIOLOGICAL EFFECTS OF HIGH-ALTITUDE DOUBLE-BAG STATIC LINE OPERATIONS

12-3. Most physiological effects of high-altitude DBSL 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

12-4. Sinus and ear blocks normally occur when a DBSL parachutist jumps with a head cold or some other type of upper respiratory illness. For the DBSL parachutist sinus blocks and ear blocks usually occur during aircraft pressurization, unlike the MFF jumper where the blockage could occur in free-fall descent. 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 attempt to clear blocked ears when wearing the POM.

HYPOXIA

12-5. 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, ad 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

12-6. 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 return 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 and or permanent medical disorders.

12-7. 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

12-8. 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. 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

12-9. 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 reduced 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

12-10. 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

12-11. 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.

12-12. Normally, the condition will dissipate upon descent. However, if the parachutist is incapacitated due to the condition—

- Descend the aircraft and pressurize the cabin to as close to sea level as possible.
- Evacuate the parachutist to a medical facility with a decompression chamber. A flight surgeon or aeromedical examiner will determine if compression therapy is required.

HYPERVENTILATION

12-13. 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.
- 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

12-14. Procedures for physiological and oxygen equipment-related emergencies are discussed below. Personnel should—

- Make sure the jumpmaster, oxygen safety technician, and aircraft commander (also USAF 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 communications 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.

12-15. Parachutists should be aware of the symptoms of decompression sickness and monitor themselves upon return to the ground. Some parachutists may have symptoms of decompression sickness during flight that they do not notice or that they do not report due to discomfort from the parachute and equipment worn. 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

12-16. 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 DBSL operations. The following paragraphs discuss the various forms of aviation oxygen and their associated containers.

GASEOUS OXYGEN

12-17. 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

12-18. 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

12-19. 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

12-20. 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

12-21. The lower density of oxygen at high altitudes causes many physiological problems. For this reason, DBSL parachutists and aircrews need additional oxygen. Table 12-1, page 12-6, contains USAF-established requirements for supplemental oxygen and table 12-2, page 12-7, contains U.S. Army-established requirements for supplemental oxygen for the DBSL parachutists during unpressurized flight. AFI 11-409 outlines these requirements for USAF aircraft. AR 95-1 outlines these requirements for U.S. Army aircraft. USAF 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 DBSL operations where 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 from the mission the individuals whose prebreathing was interrupted.
- Prebreathing requires the presence of sufficient USAF 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 12-2, page 12-7.

Note: Portable oxygen bottles or locally procured oxygen systems may not be used for prebreathing. Additionally, the quick-don/smoke mask is emergency equipment and is not approved for prebreathing or other parachute operations conducted at or above 13,000 feet MSL.

12-22. DBSL parachuting is physically demanding. The higher jump altitudes associated with DBSL operations expose the body to rapid pressure changes that require the use of supplemental oxygen. As a result, the DBSL parachutist must—

- Conduct no more than three prebreather sorties in a 24-hour period.
- Not conduct DBSL operations within 12 hours after a single no decompression dive and 24 hours after repetitive, multiple day or decompression diving.
- Wear a clear face shield or goggles on DBSL operations that require prebreathing or the use of oxygen.

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 12-1. Oxygen requirements and exposure limits for double-bag static line 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:

[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 12-2. Oxygen requirements and exposure limits for double-bag static line 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:

[1] Supplemental oxygen is not required for jumpers as long as the total time above 10,000 feet mean sea level (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 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

12-23. 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

12-24. The oxygen mask is designed to be worn with parachutist helmets that have bayonet lug receivers for the mask's harness assembly or by utilizing 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 aircraft's communication system.

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 DBSL parachutist while using oxygen life-support equipment.

Parachutist Oxygen Mask

12-25. 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 soft shell. 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-inch and 46-inch hose) to ensure unrestricted oxygen.

12-26. The POM provides the parachutist with a high oxygen-flow capacity to improve breathing comfort during long missions with an automatic dilution shut-off feature for when the parachutist is connected to a prebreathing console.

12-27. 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. There is a diffuser over the inhalation valve of the regulator to provide improved mixing of the oxygen in the mask. The mask allows the 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

12-28. The advanced combat helmet accessory rail connector (ACH-ARC) provides accessory direct-mounting capability for advanced combat helmet (ACH)-style ballistic helmets. Rails and accessories are secured during DBSL operations, combat movement, or tactical use. The low profile, lightweight, snag-free design of the ACH-ARC mount addition 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 12-1).

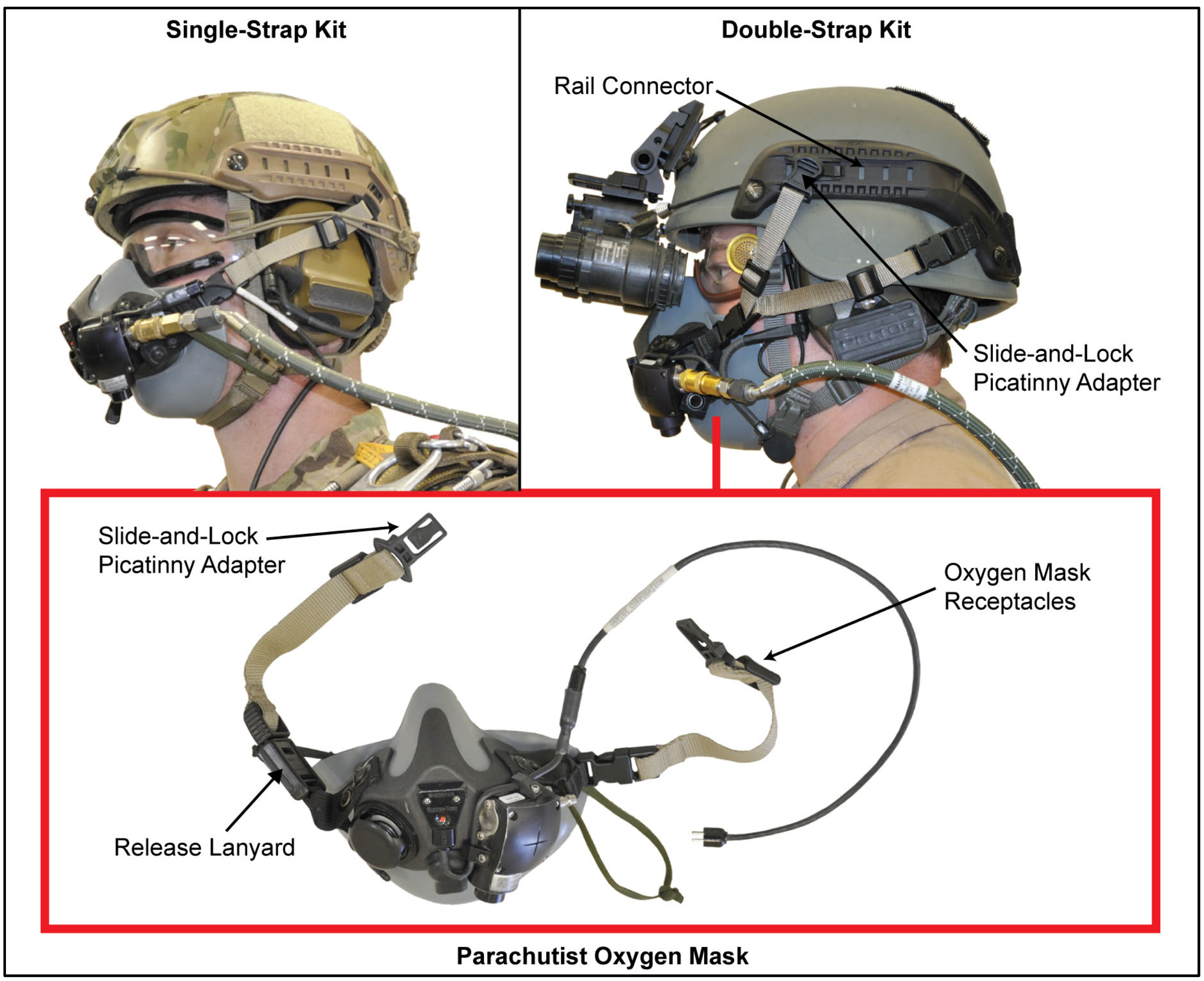


Figure 12-1. ACH-ARC with oxygen single-strap and double-strap kits

12-29. The 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 communication headset, TC-2000, and modular integrated communication 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 12-1, page 12-8) for mounting the POM.

Parachutist Oxygen Mask Securing Lanyard

12-30. The POM securing lanyard (figure 12-2) was added to keep the oxygen mask from becoming detached during exit or canopy opening. 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.

WARNING

Not all figures, pictures, or diagrams within this TC contain the POM securing lanyard. Parachutists should use the securing lanyard to keep the oxygen mask from becoming detached during exit or canopy opening.

Figure 12-2. Parachutist oxygen mask securing lanyard

12-31. 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 DBSL operations:

- DBSL 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 a DBSL operation, each parachutist and the DBSL 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 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 to ensure that they don't 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

12-32. The oxygen supply hose assembly consists of a four-pin male coupling assembly with an attached end cap, a 98-inch 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 high-altitude DBSL operations. 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.

12-33. 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 12-3, page 12-11). The POM can fully integrate with the existing Parachutist High-Altitude Oxygen System 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, namely, the outlet pressure of the prebreathing console must be adjusted, and an adapter must be incorporated into the outlet of the existing bailout system to permit the connection of the oxygen hose to the console.

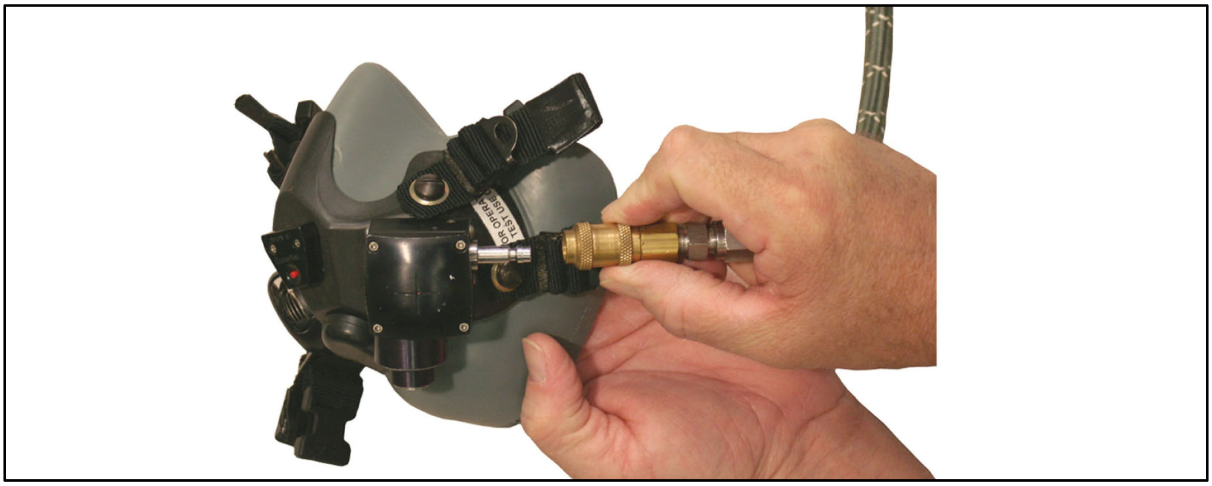


Figure 12-3. Parachutist oxygen mask and the HS-57 quick-disconnect fitting

FITTING THE NEW PARACHUTIST OXYGEN MASK WITH BAYONET CONNECTORS

12-34. A jumpmaster, parachute rigger, or oxygen technician must supervise mask fitting. When the mask fits properly (figure 12-4, page 12-12), 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, parachutists perform 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. 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 straps until a good seal is achieved.
- **Step 5.** Once this procedure is completed, have the mask inspected by a jumpmaster or oxygen technician.
- **Step 6.** After the oxygen technician checks the mask, secure any excess straps by rolling them outboard. Secure rolls with medical tape and use the securing lanyard to keep the oxygen mask from becoming detached during exit and during canopy opening (figure 12-5, page 12-12).
- **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 12-4. Properly fitted mask

Figure 12-5. 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

12-35. 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 strap retainers until a good seal is achieved.

- **Step 5.** Once this procedure is completed, have the mask inspected by a jumpmaster or 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

12-36. 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, 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

12-37. All oxygen bailout systems provide one function and that is to give the jumper the oxygen needed to safely perform the DBSL airborne 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 DBSL operations. Selection of the bailout system will need to be matched with the type of DBSL operation being performed. Currently, four systems are used for DBSL operations—

- 120-cubic-inch portable bailout oxygen system (figure 12-6 [A], page 12-14).
- Twin-50-cubic-inch portable bailout oxygen system (figure not shown).
- Twin-53-cubic-inch portable bailout oxygen system (figure 12-6 [B], page 12-14).
- Composite 3000 psi portable bailout oxygen system (figure 12-6 [C], page 12-14).

WARNING

The jumpmaster must ensure that the proper oxygen bailout system is being utilized for the altitude at which the DBSL operation is being conducted. He must also ensure that all rigging procedures are properly conducted on the oxygen bailout system being used.

12-38. As noted above, some systems are single or double bottles. All bailout oxygen systems will have an on/off lever, pressure gauge, oxygen delivery hose, and oxygen supply hose port. The oxygen delivery hose delivers oxygen to the oxygen mask. The port on the reducer assembly is used to connect to the portable OXCON. The procedures for rigging the oxygen system pouch and securing the oxygen bottles within the oxygen system pouch are also slightly different. All oxygen system pouches are secured to the container using the barrel 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 12-6. Types of portable bailout oxygen systems

TWIN-50 AND TWIN-53-CUBIC-INCH PORTABLE BAILOUT OXYGEN SYSTEM WITH PARACHUTIST OXYGEN SYSTEM ASSEMBLY

12-39. 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. 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.

12-40. 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 12-7, page 12-15), 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.

12-41. The Twin-53-cubic-inch portable bailout oxygen system assembly with the quick-disconnect oxygen hose (figure 12-7, page 12-15) provides the DBSL 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.

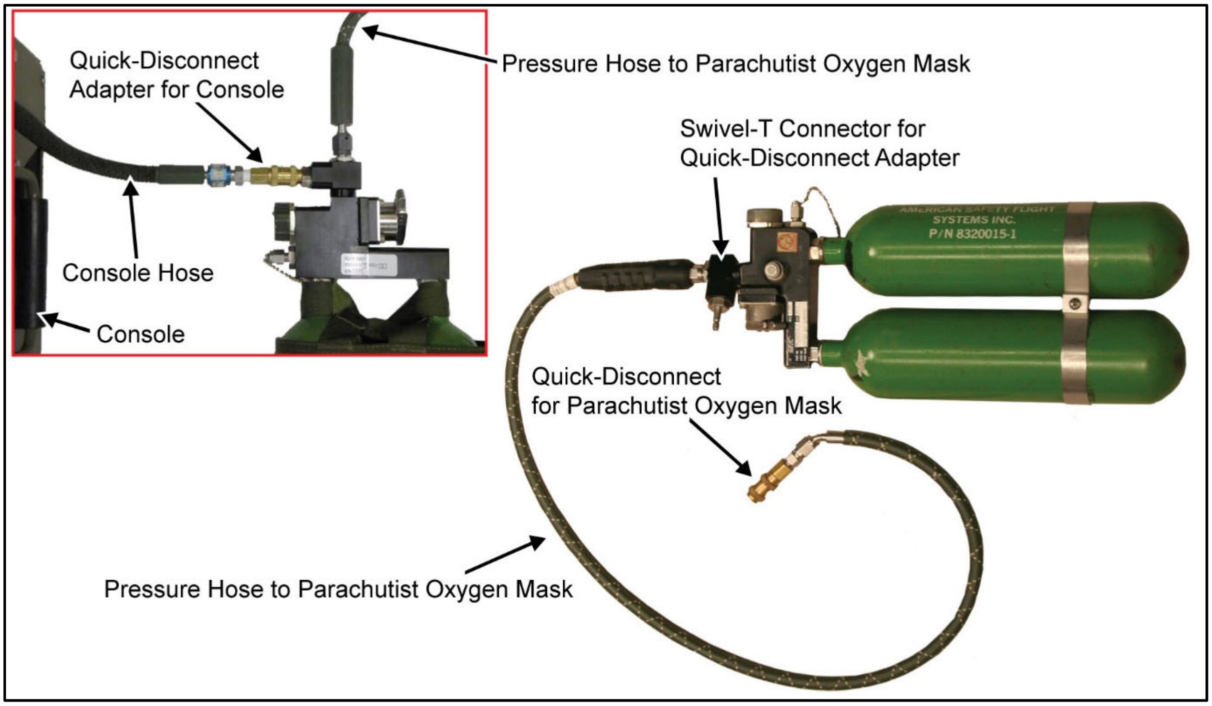


Figure 12-7. The Twin-53-cubic-inch portable bailout oxygen system with the quick-disconnect oxygen hose

12-42. 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.

12-43. 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 from 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

12-44. 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

12-45. To rig the complete POM assembly with the Twin-53-cubic-inch portable bailout oxygen system to the RA-1 ARAPS (figure 12-8, page 12-16), the jumper and assisting parachutist will execute the following steps:

- The jumper preadjusts the size of the RA-1 for ease of donning the system before adding the portable bailout oxygen system. Chapter 4 covers basic pre-adjustment of the RA-1.
- The jumper 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 rerouted away from the on/off switch. He then secures the oxygen system pouch with the 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 and is pushed on the waistband as far as it will go and secures the oxygen system pouch to the waistband.

A

Jumper pre-sizes and adjusts his RA-1, attaches the oxygen bail out 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. He secures the hook-pile straps over the regulator. He threads the waistband through the detachable pouch keepers on the front/outside of the pouch and attaches the pouch to the tube locks on the RA-1 container.

B

Jumper stands and assistant will place 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, 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 side 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 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 helmet, attaches POM, ensures 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 POM, and ensures that he can move his head in all directions and that the hose is adjusted properly.

Figure 12-8. Completed rigging of the twin-53-cubic-inch portable oxygen bailout system

- Before putting on the RA-1 ARAPS, the jumper attaches one retainer band using a girth hitch knot to the upper equipment loop on the right side of the RA-1 container. The jumper attaches another retainer band using a girth hitch knot to the top container carrying handle loop of the RA-1 (figure 12-9).

Figure 12-9. Oxygen delivery hose attached

- The jumper routes the oxygen delivery hose up and through the top attached equipment loop retainer band. He 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.
- The jumper places the RA-1 ARAPS on his back by sitting or using the buddy system.
- 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.
- The jumper attaches his leg straps.
- The jumper adjusts his horizontal adjustment straps.
- The jumper and assistant ensure 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. They ensure that the waistband is routed over the left main lift web, weapon (side mounted) and left lateral adjusting strap, then routed through the keeper on the accessory pouch and secured at the friction adapter with excess webbing rolled outboard, and finally secured with heavyweight retainer band or slack retainer.
- The assistant ensures the oxygen supply hose assembly is attached to the upper equipment loop retainer band, runs between the jumpers back and the parachute container and then, through the retainer band and finally, routed bottom to top of the container carrying handle.
- The assistant pulls the oxygen supply rigid hose assembly and quick-disconnect up behind the neck and over the jumper's left shoulder riser protective flap.
- The jumper attaches the POM to the left side of the helmet bayonet receiver or the ACH-ARC single or double-strap assembly fasteners to the corner buckle receiver on the rail system.
- The jumper attaches the POM to the quick-disconnect assembly on the oxygen delivery hose.
- The jumper secures the POM to his face and ensures his head can move freely 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 extended time under parachute canopy may 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

12-46. To rig the complete 120-cubic-inch portable bailout oxygen system and POM to the RA-1 ARAPS, the jumper and/or assisting parachutist will execute the following steps:

- The jumper preadjusts the size of the RA-1 for ease of donning the system before adding the portable bailout oxygen system. Chapter 4 covers basic pre-adjustment of the RA-1
- The jumper 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 the top keeper on the outside of the oxygen system pouch. He ensures the oxygen system pouch is on the inside of the waistband and is pushed on the waistband as far as it will go and secures to the waistband.
- Before putting the RA-1 ARAPS on, the jumper attaches one retainer band using a girth hitch knot to the upper equipment loop on the right side of the RA-1 container. He attaches another retainer band using a girth hitch knot to the top container carrying handle loop of the RA-1.
- The jumper routes the oxygen delivery hose up and through the top attached equipment loop retainer band. He 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.
- The jumper 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 jumper will then loosely secure the chest strap through the chest strap friction adapter.
- The jumper attaches leg straps.
- The jumper adjusts horizontal adjustment straps.
- The jumper and assistant ensure that 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. They ensure that the waistband is routed over the left main lift web, weapon (side mounted) and left lateral adjusting strap, then routed through the keeper on the accessory pouch and secured at the friction adapter with excess webbing rolled outboard, and finally secured with heavyweight retainer band or slack retainer.
- The assistant ensures the oxygen supply hose assembly is attached to the upper equipment loop retainer band, runs between the jumper's back and the parachute container and then, through the carrying handle retainer band and finally, routed bottom to top of the container carrying handle.
- The assistant ensures the rigid oxygen supply hose assembly and quick-disconnect runs between the jumper's back and parachute container through the bottom of the container carrying handle and out the top of the container carrying handle and oxygen supply hose is secured by a retainer band to the container handle.
- The assistant pulls the oxygen supply rigid hose assembly and quick-disconnect up behind the neck and over the jumper's left shoulder riser protective flap
- The jumper 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.
- The jumper attaches the POM to the quick-disconnect assembly on the oxygen delivery hose.
- The jumper secures the POM to his face and ensures his head can move freely 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.

Rigging the Composite 3000-psi Jump Bottle System and Parachutist Oxygen Mask to the RA-1 Advanced Ram-Air Parachute System

12-47. When wearing the POM and conducting high-altitude DBSL operations above 17,500 feet MSL, it is recommended that parachutists use an approved 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 bottle are not recommended for DBSL high-altitude operations with the RA-1 ARAPS at opening altitudes above 17,500 feet MSL.

12-48. The 3,000-pound psi (composite) jump bottle system is compatible with the POM and RA-1 ARAPS and can be filled with nearly twice the amount of oxygen as the Twin-53 or other systems mentioned above. This means that the composite jump bottle system is better able to sustain the jumper during flight when exiting between 25,000 to 17,500 feet MSL during DBSL HAHO operations.

12-49. The composite jump bottle system (figure 12-10) represents the next generation in parachutist oxygen equipment for DBSL operations. The composite jump bottle can be used with the POM and regulator assembly.

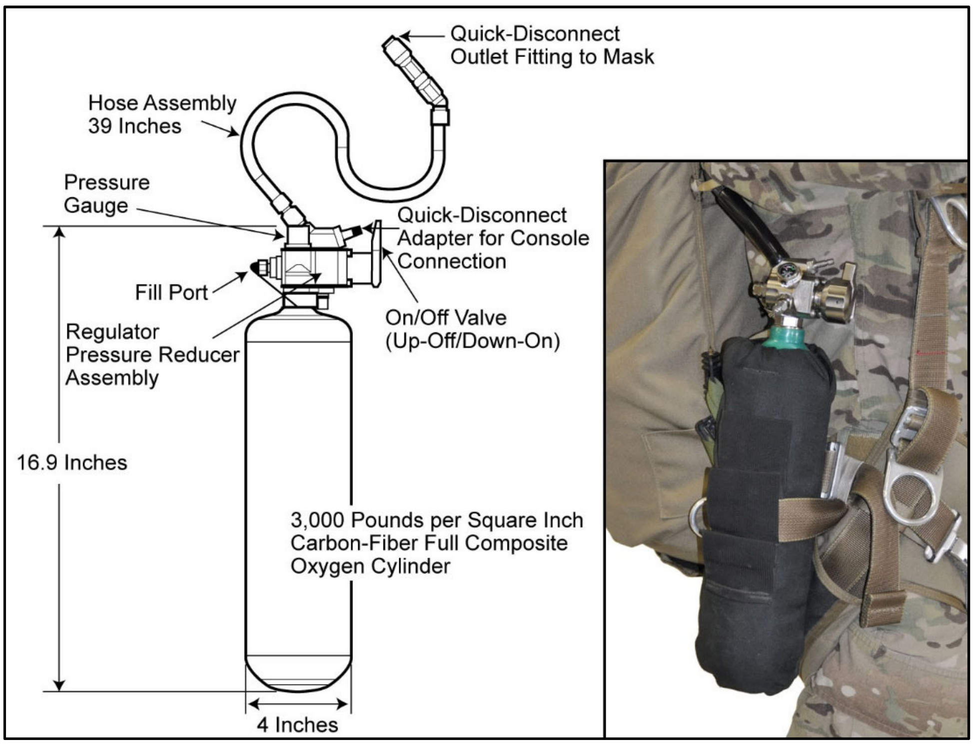


Figure 12-10. Composite 3,000 psi jump bottle system

12-50. 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.

12-51. The system consists of a lightweight inner aluminum lined carbon-fiber filled 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.

12-52. 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 DBSL parachutists. The new hose is smaller in 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.

12-53. The composite jump bottle system has a weight of 5.5 lbs (unfilled) and can be used during aircraft flight 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 at 2.8 to 3.4 bar gauge and flows up to 150 standard liters per minute.

12-54. The composite 3,000 psi bottle and oxygen system pouch are attached to the RA-1 waistband and barrel locks on the container (figure 12-11) and 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 12-11. A composite 3,000 psi bottle and pouch attached to jumper

12-55. To rig the complete composite 3,000 psi jump bottle system POM assembly to the RA-1 ARAPS, the jumper—

- Preadjusts the size of the RA-1 for ease of donning the system before adding the portable bailout oxygen system.
- Before donning the RA-1 ARAPS, he attaches one retainer band using a girth hitch knot to the upper equipment loop on the right side of the RA-1 container. The jumper attaches another retainer band using a girth hitch knot to the top container carrying handle loop of the RA-1 (figure 12-9, page 12-17).
- Places the composite oxygen cylinder into the detachable oxygen system pouch with the on/off switch to his front. He secures it 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). The jumper 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 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.
- Loosely secures the chest strap through the chest strap friction adapter then stands.
- Attaches his leg straps.
- Adjusts his horizontal adjustment straps.
- Ensures, with the help of an assistant, that 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. They ensure the waistband is routed over the left main lift web, weapon (side mounted) and

left lateral adjusting strap, then routed through the keeper on the accessory pouch and secured at the friction adapter with excess webbing rolled outboard, and finally secured with heavyweight retainer band or slack retainer.

- Verifies that the assistant parachutist ensures the rigid oxygen supply hose assembly and quick-disconnect runs between the jumper's back and parachute container.
- Verifies that the assistant parachutist pulls the oxygen supply rigid hose assembly and quick-disconnect up behind the neck and over the jumper's left shoulder.
- Attaches the POM to the left side of his 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 his head can move freely 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 jumper readjusts the slack or replaces it with a shorter oxygen delivery hose.

SIX-MAN OXYGEN CONSOLE

12-56. The portable oxygen system allows six parachutists to prebreathe 100-percent oxygen from a 1,292-cubic-inch supply. This can be used during flight on fixed-wing aircraft and helicopters as a supplemental or emergency oxygen source and it was designed as a self-contained, easy-to-operate, small, lightweight, and nearly maintenance-free oxygen system (figure 12-12, page 12-22).

Note: TM 1-1680-377-13&P-5 and TM 10-1670-329-13&P provide further information on the six-man prebreather portable oxygen system.

12-57. 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.

12-58. 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.

12-59. 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.

12-60. The six-man console 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 DBSL parachutists during HAHO 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 any pressure-demand mask and associated connectors.
- Can be refilled while being used.

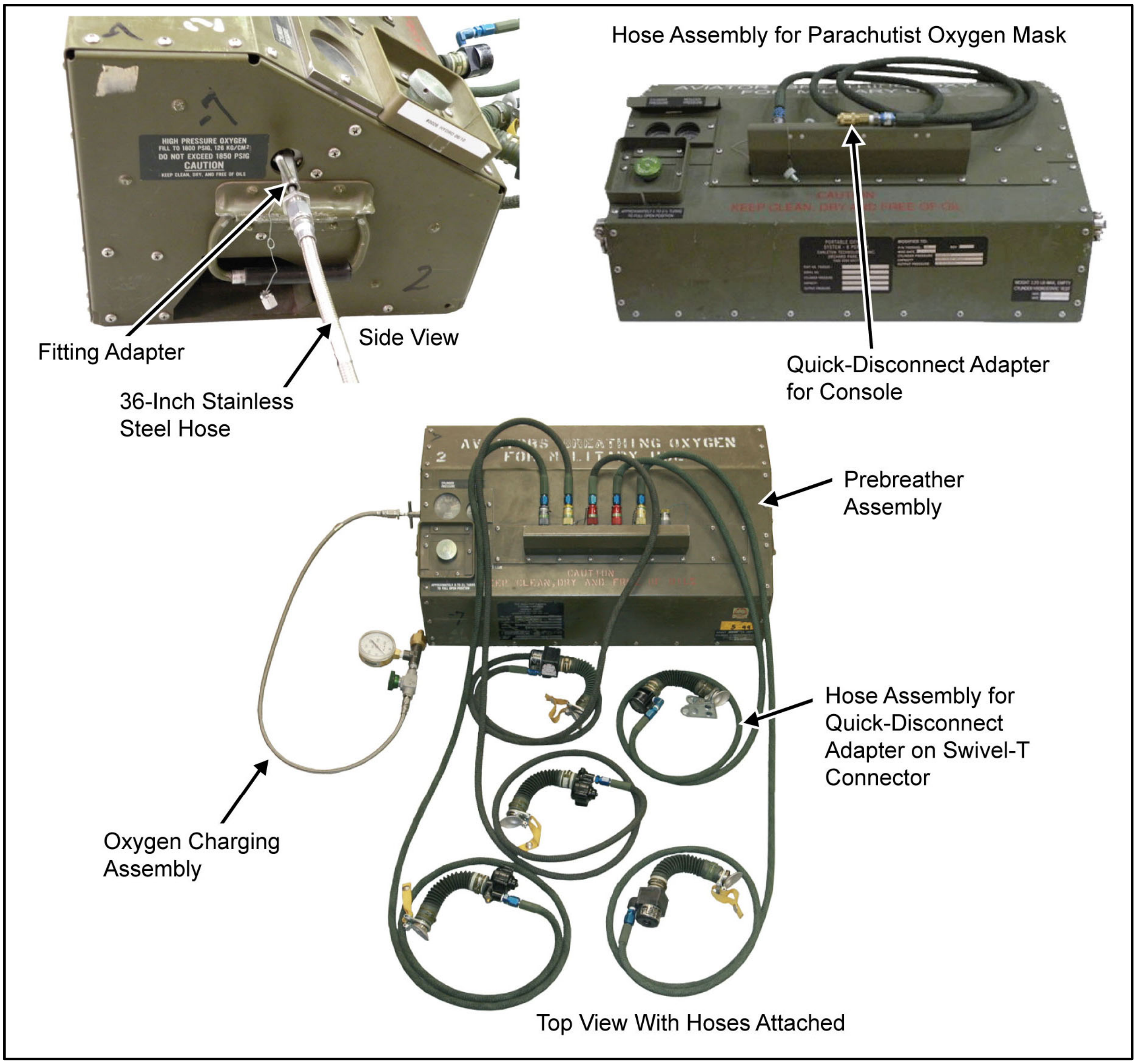


Figure 12-12. Six-man oxygen console

OXYGEN CONSOLE

12-61. 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 and worn on the right side of the parachute.

12-62. 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 that 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 12-13 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 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 required.

Note: Oxygen equipment will be rigged and placed in position (jumper configuration) where it will be used during the airborne operation.

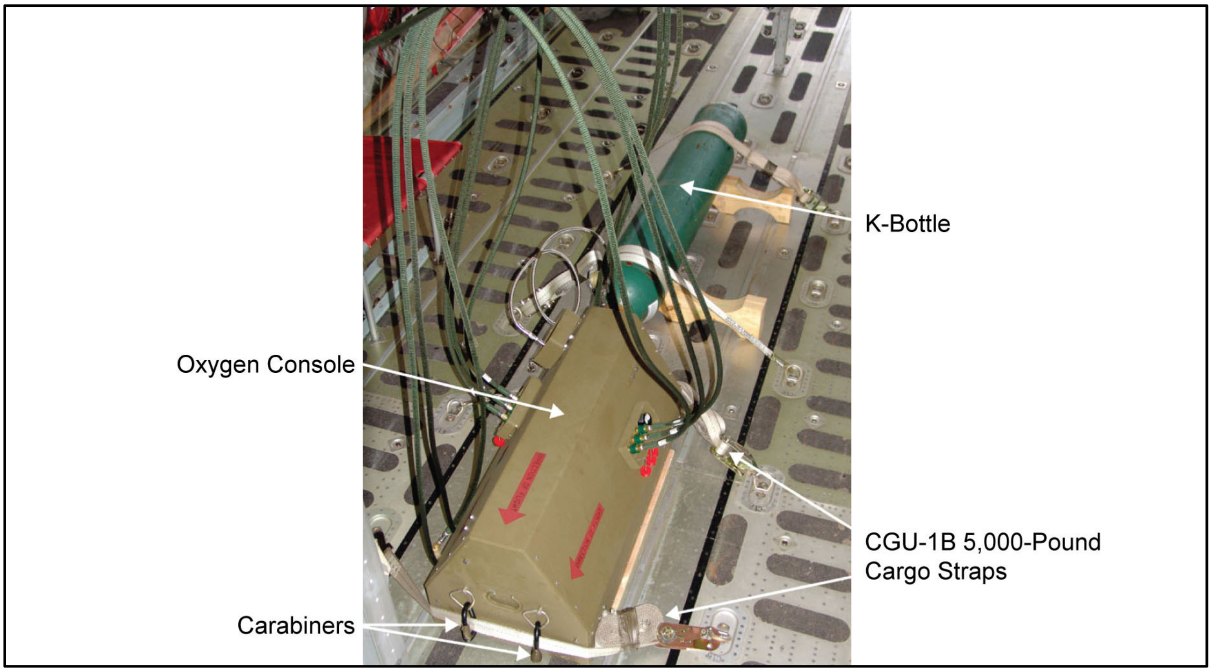


Figure 12-13. Oxygen console rigged in C-130 aircraft

12-63. 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 on 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.

12-64. To rig the OXCON on the deck of approved aircraft, the following procedures must be performed during preparation:

- 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 required.

- If supplemental K-bottles are used, ensure wooden 4x4-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-bottles and OXCONs securely looped and taped so they cannot get snagged (figure 12-14).
- Wrap the cargo strap around the K-bottle once before tightening (figure 12-15, page 12-25).

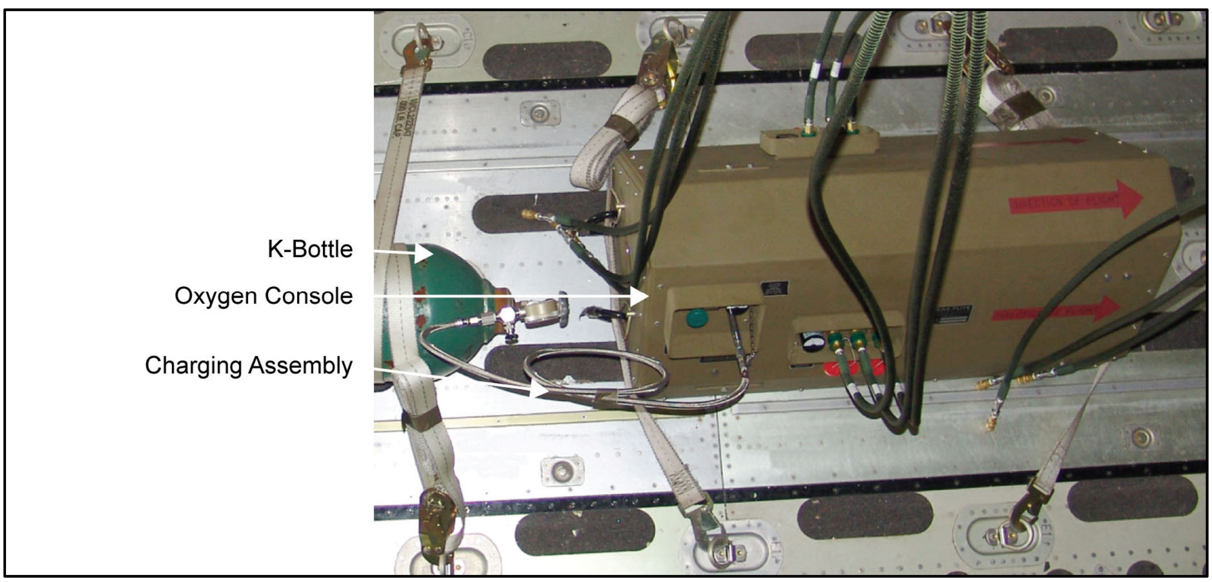


Figure 12-14. Charging assembly looped and taped out of the way of parachutists

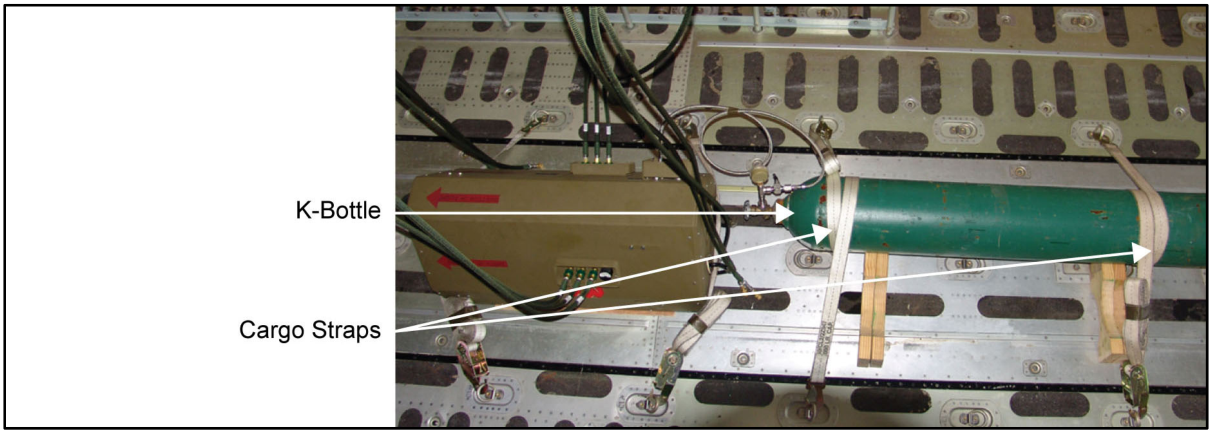


Figure 12-15. Side and top view of strap on K-bottle

PHANTOM 3,000 PSI HIGH-CAPACITY PORTABLE OXYGEN CONSOLES

12-65. The Parachutist High Altitude Next Generation Technology Oxygen Mask (PHANTOM) console is available in two configurations (figure 12-16), 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 the 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 allows the installer ease of installation when placing on the aircraft. Case attached anchoring points for securing the system inside the aircraft makes the rigging process to the aircraft anchoring points much easier. The system comes with a long main oxygen supply hose and five port quick-disconnect adaptors (figure 12-17, page 12-26) that can be stationed at different locations in front of jumper thus reducing the requirement of having to place another console near the jumper.

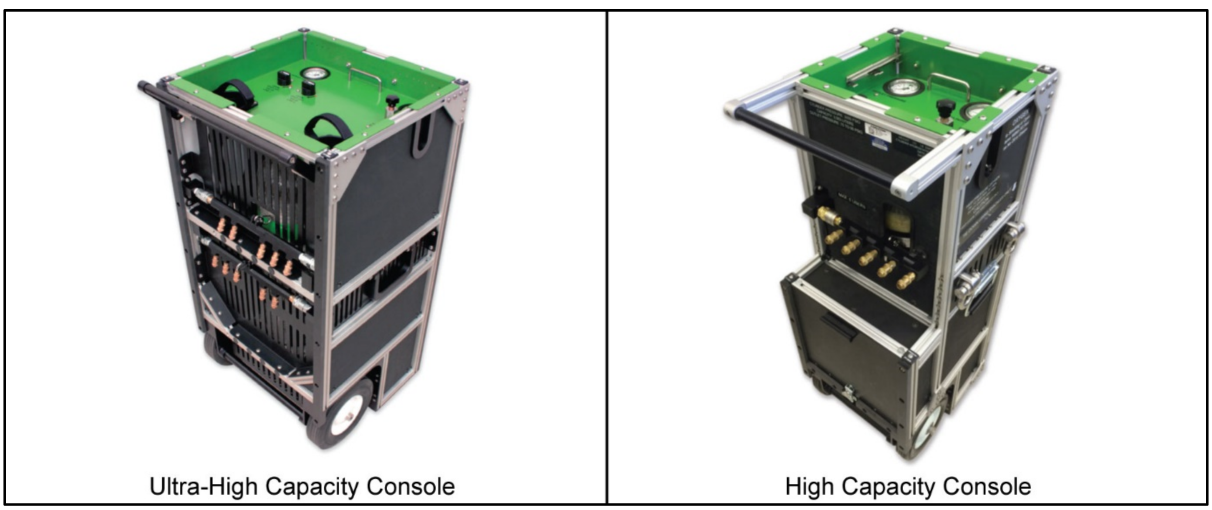


Figure 12-16. PHANTOM consoles

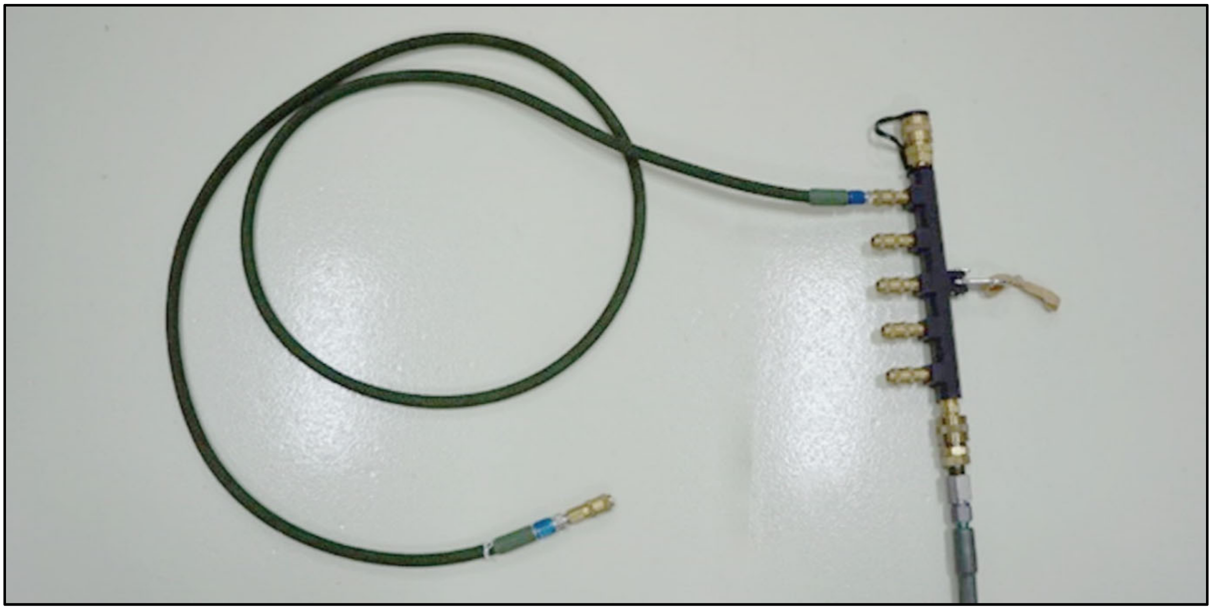


Figure 12-17. Main oxygen supply hose from console with five port adaptor and jumper oxygen supply hose

12-66. The key features of the high capacity system and the ultra-high capacity system are as follows:

- High Oxygen storage capacity to include—
  - Single cylinder: 3,600 standard liters.
  - Three cylinders: 10,800 standard liters.
- Certified to STANAG 7056 requirements for prebreathing.
- Heavy-duty wheels simplify transport.
- Standing upright orientation thereby occupying less space in 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 with additional manifolds for expanded use.

12-67. 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

12-68. 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 (for the C-17aircraft), 5,000-pound tie-down fittings (for the C-130 aircraft), or securing straps.

12-69. 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 now 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.

12-70. 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 12-18).

12-71. 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.

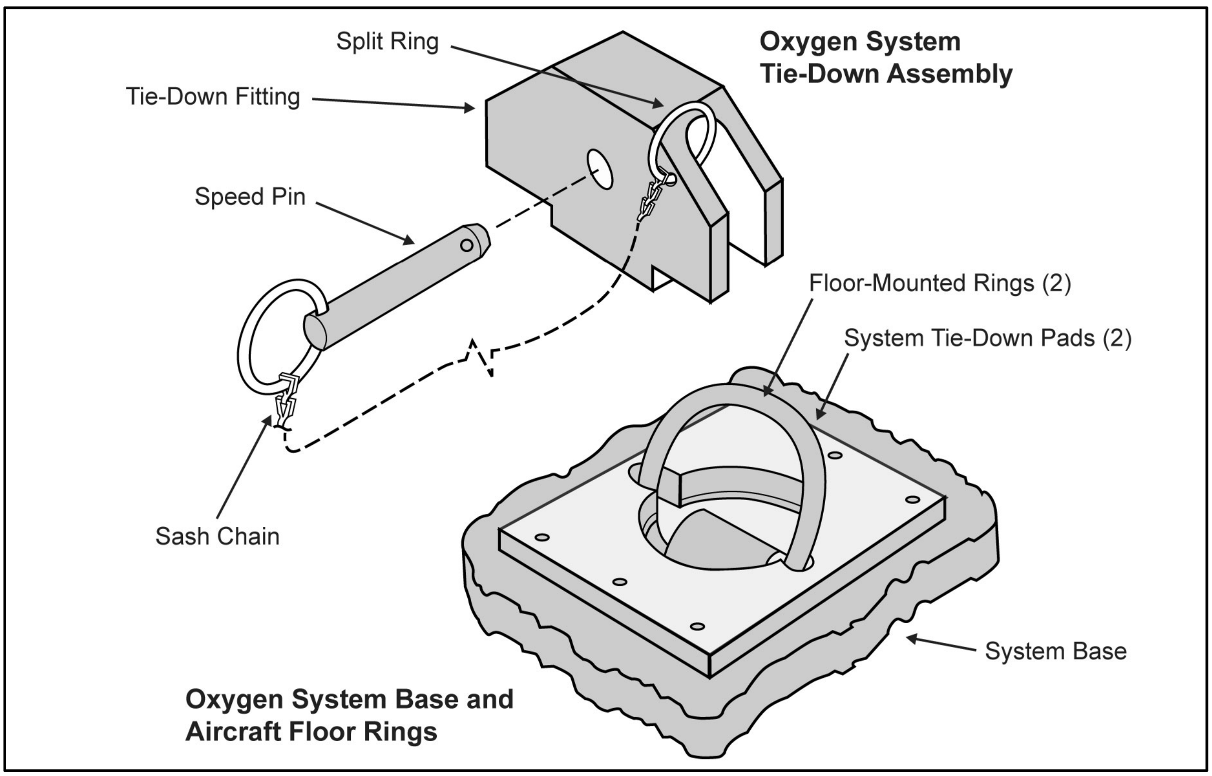


Figure 12-18. Tie-down assembly and installation components

THE PRICE CHECK

12-72. Each letter of the acronym PRICE represents an area of or a specific item of oxygen equipment that 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 particular system in use.
- **R - Regulator.** Checks everything on the particular 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 that 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

12-73. Oxygen safety personnel (parachute rigger or another DBSL jumpmaster with experience on the equipment) must be onboard each aircraft during DBSL operations using supplemental oxygen. They must have received physiological training and unit-level technical training on the oxygen systems being used. For jumps from 20,000 feet MSL or above, one USAF physiological technician per 16 jumpers will be requested with the aircraft and will be onboard for the jump. The oxygen safety personnel or the USAF physiological technician will—

- Plan for all oxygen equipment required for the mission. He will provide one additional mask of each size and one additional 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 12-19 through 12-23, pages 12-29 through 12-31).
- Supervise the transportation of prebreathers and oxygen cylinders and their installation on the aircraft.
- Issue oxygen supply hoses to each parachutist and supervise hose connection.

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 and or causing serious injury or death to the parachutist.

- Prior to the aircraft procedure signal MASK being given, fully open shutoff valves on prebreathers.
- 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 they 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 deactivates the bailout system.

WARNING

It is essential that 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 the affected 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 Allen screws and the screws are tight. • 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 12-19. Portable bailout system preflight inspection

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 12-20. 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 coming loose. • 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.

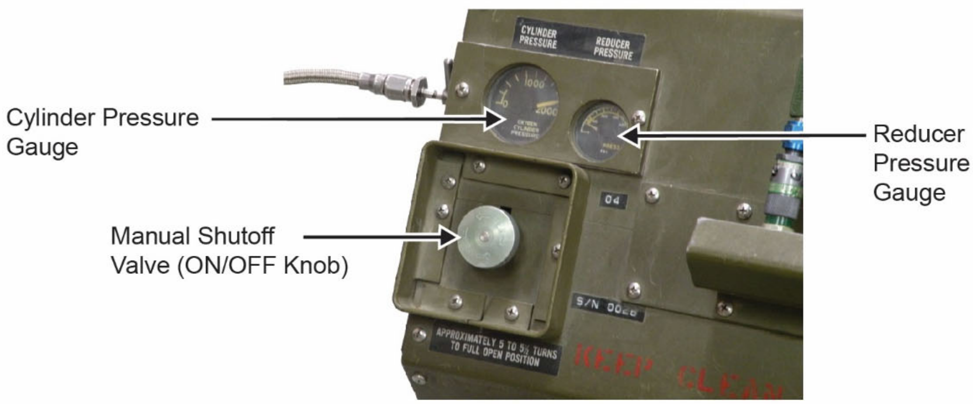
Figure 12-21. Sample prebreather preflight inspection checklist

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 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 72-inch hose, yellow connector is connected to 90-inch hose, and gray connector is connected to 98-inch hose. • Hose is tightly connected to regulator. • Regulator is not cut or cracked. • No foreign object or debris is in equalization port. • Hose and check-valve assembly is clamped to regulator, and clamp is safety-wired. • Cover is spring-loaded and seated evenly over check valve. • Check-valve is spring-loaded.

Figure 12-22. 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 12-24). • Ensure the reducer pressure gauge indicates 40 to 60 psi (figure 12-24). • Remove each disconnect plug, depress the poppet of each disconnect (figure 12-25, page 12-32), and ensure oxygen flows from each disconnect. • Close shutoff valve and ensure reducer pressure remains steady (70 psi). • Bleed off the pressure through the disconnect manifold. • Install all hose and regulator assemblies to their appropriate disconnect (figure 12-25, page 12-32). Be sure to bleed manifold pressure before attaching hose and 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 12-23. Sample prebreather preflight 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 at least 70 psi.

Figure 12-24. Pressure gauge and manual shutoff valve

WARNING

Personnel must never partially close the shutoff valve during oxygen use; it will result in a restriction of oxygen flow to the parachutist.

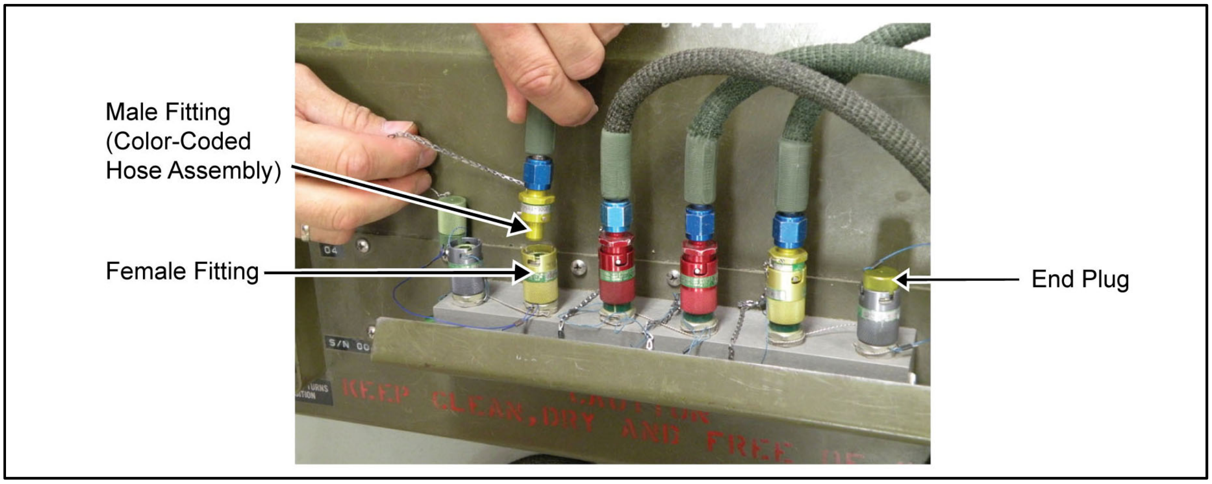


Figure 12-25. Removing end plugs and depressing poppets

12-74. 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.

12-75. 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 personnel will ensure all jumpers are disconnected from their hoses before the ramp or door is opened.

12-76. The oxygen safety personnel 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

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

12-77. The DBSL jumper must be thoroughly familiar with all signals, jump commands and required actions for each signal and command. Standardization of procedural signals and jump commands permit interoperability of all DBSL-capable units. Safety increases significantly when the jumper understands the jumpmaster's intent and the jumpmaster understands the jumper's desired response. Aircraft noise, the DBSL 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.

12-78. 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 depict the procedures used by the jumpmaster and jumpers when jumping with oxygen:

- **LOAD AIRCRAFT.** On jumpmaster's signal, load the aircraft in reverse stick order, then—
  - Wait to be seated by the oxygen safety.
  - Receive console hose from oxygen safety or physiological technician and connects to the OXCON.
- **DON HELMETS.** Don helmets and fasten seatbelts.
- **UNFASTEN SEAT BELTS.** At 1,001 feet AGL, the jumpmaster gives the command to unfasten seat belts.
- **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.** On the jumpmaster's signal, each jumper leans forward and checks CYPRES and pins.
- **MASK.** On the command, MASK, each jumper will—
  - Connect the right side oxygen fitting.
  - Ensure he has a positive oxygen flow and extend a thumb up to the center of the aircraft.
  - Hold the thumb up signal until the jumpmaster checks the entire aircraft and returns a thumb up. Follow this procedure every time the jumpmaster initiates an oxygen check.

Note: Do not remove helmets during DBSL oxygen operations. Clear goggles must be worn during oxygen jump operations. If at any time a jumper experiences oxygen related problems, he should extend his 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 go through a JMPI again.

- **STAND UP.** The jumpmaster gives this command approximately 6 minutes from TOT. Each jumper stands, faces the rear of the aircraft, and checks the CYPRES setting, pins and oxygen bottles of jumper immediately in front of him. Each jumper also visually checks the oxygen bottle of the jumper to his front to ensure that that each jumper has sufficient pressure. The gauge needle should be at 1 or above. Each jumper then passes—to the appropriate side—the static line snap hook of the jumper to his immediate front.

Note: Notify the jumpmaster, assistant jumpmaster, oxygen safety, or physiological technician of any deficiencies in oxygen pressure.

- **HOOK UP.** On the jumpmaster's command, each jumper passes the signal back. Then, he hooks up to the anchor-line cable with the gate facing the outboard side (skin) of the aircraft and acquires a high reverse bight.

Note: When using rotary-wing deck-mounted anchor line cable refer to Chapter 13.

- **CHECK STATIC LINES.** On the jumpmaster's command, each jumper passes the signal back. Then, starting with his own snap hook, traces the static line down to the reverse bight and through his hand with a thumbless grip. Next, he traces the static line of the jumper in front of him from the shoulder to the first locking stow. He ensures that there is no equipment interfering with the static line, such as, a weapon or, radio antennae. Ensure no equipment is interfering with static line, i.e. weapon, radio antennae. Finally, the last two jumpers turn and face the skin of the aircraft and check each other's static line if applicable.
- **CHECK EQUIPMENT.** The jumpmaster gives the command to check equipment, each jumper passes the signal back. All parachutists check their equipment starting at the helmet and ensure there are no sharp edges on the rim and that the chinstrap is secure. The parachutists then physically check the chest strap, main release ripcord (red cutaway pillow), reserve ripcord handle (yellow pillow), and ensure they are secure and in the proper location. Jumpers finally check the quick-ejector snap-on lowering line, quick-ejector snap-on leg straps, and equipment attaching straps.
- **SOUND OFF FOR EQUIPMENT CHECK.** On the jumpmaster's command, each jumper passes the signal back. Then, starting from the last jumper in the pass, each jumper passes a thumb up signal over the inboard shoulder of the jumper to his front. The jumpmaster receives the signal from the first jumper in the pass. Each jumper then places his right hand on the oxygen bailout bottle quick-disconnect.
- **MOVE TO THE REAR.** The jumpmaster gives this command approximately 1 minute from TOT. Each jumper passes the signal back. The oxygen safety, physiological technician, or

assistant jumpmaster will assist the jumpers in disconnecting from the console and ensure the jumpers have a positive flow of oxygen. The first jumper moves to the hinge of the ramp.

- **STAND BY.** The jumpmaster gives this command approximately 15 seconds from TOT. Each jumper responds with a thumb up signal. The first jumper moves to edge of the ramp or to jump door.
- **GO.** The jumpmaster gives this command at the release point. Jumpers exit as briefed.
- **ABORT.** The jumpmaster gives this command when release conditions are not favorable. Jumpers then back up to the hinge of the ramp and await further instructions.

12-79. After exiting, the jumper leaves the mask connected until landing. After landing the jumper turns off the oxygen bottle and disconnects the mask. He places the mask in its container and replaces the red caps on all fittings.

12-80. The following commands or signals for oxygen DBSL jumps will remain the same as for nonoxygen DBSL jumps:

- DON HELMET.
- UNFASTEN SEAT BELTS.
- EMERGENCY BAILOUT.
- TIME WARNINGS.
- WIND SPEED.
- GUESTING WINDS.
- STAND UP.
- HOOK UP.
- CHECK STATIC LINE.
- CHECK EQUIPMENT.
- SOUND OFF FOR EQUIPMENT CHECK.
- MOVE TO THE REAR.
- STAND BY.
- GO.
- ABORT.

12-81. The additional signals and commands use during DBSL oxygen jumps are described in the following paragraphs.

MASK

12-82. The jumpmaster signals MASK (figure 12-26, page 12-36) when the parachutist must begin using supplemental oxygen. Upon receiving this signal, the parachutist masks and checks to make sure the oxygen system is functioning properly.

CHECK OXYGEN

12-83. The jumpmaster signals CHECK OXYGEN (figure 12-27, page 12-36) immediately after the signal to mask and periodically after that. At a minimum, he gives it following the 20-minute and 10-minute time warnings. Upon receiving this signal, the parachutist returns the signal if everything is functioning correctly.

OXYGEN PROBLEM

12-84. If there is an oxygen problem, the parachutist extends an arm in front of his body with his hand open, palm down to indicate the OXYGEN PROBLEM signal (figure 12-28, page 12-36).

Figure 12-26. MASK signal

Figure 12-27. CHECK OXYGEN signal

Figure 12-28. OXYGEN PROBLEM signal

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Chapter 13

Double-Bag Static Line Rotary-Wing Aircraft Operations

The procedures from TC 3-21.220 were modified and adapted for inclusion in this section for rotary-wing aircraft used by SOF when jumping the RA-1 ARAPS in the DBSL configuration.

OVERVIEW

13-1. The aviation unit supporting the airdrop is responsible for preparing the aircraft for equipment and personnel airdrops to include seat and door removal (if required) and installation or rearrangement of seat belts. The installation of the field-expedient anchor line system is the jumpmaster's responsibility. Aircraft preparation is usually accomplished jointly by the crew chief and jumpmaster.

SAFETY CONSIDERATIONS

13-2. Although safety considerations for each aircraft are discussed, the requirements below apply to all Army aircraft (unless otherwise indicated).

SEATS OUT OR ALTERNATE LOADING PROCEDURES

13-3. Aircraft seats may be removed in accordance with Service directives. SOF operations with seats removed (alternate loading procedures) must be approved by the first SOF O-6 in the chain of command of the Service members at risk. (Non-SOF personnel must seek approval in accordance with their parent command's policies unless assigned, attached, or under the operational control or tactical control of a SOF commander.) Seats-out or alternate loading requests should be initiated during the planning phase of the mission. Training missions requiring seats-out or alternate loading will be approved for specific operations or exercises only; blanket approvals are not authorized. During combat operations, the waiver authority (O-6 commander or O-6 mission briefing authority/risk acceptance authority) may authorize seats-out or alternate loading for a specific period of time.

13-4. When seats-out or alternate procedures are used, aircrew and passengers must be secured by a seat belt, approved harness, approved aircrew restraint system, or individual alternate restraint. Door straps will be installed over any open aircraft entry or exit point where passengers could inadvertently fall from the aircraft. Aircraft jumpmasters will ensure that each jumper is prebriefed on when to release their restraint. Door straps on open doors will be removed at a safe altitude (usually 1000 feet AGL) to allow jumpers to exit due to an emergency situation before reaching jump altitude.

WARNING

Individual alternate restraints must be of a length and type that prevents the individual from being ejected from the aircraft during a crash or rollover situation.

WARNING

Failure to follow established standards is the leading cause of special purpose infiltration accidents or mishaps resulting in injury and death. Leaders must ensure that supervisors, at all levels, know and enforce the standards.

WARNING

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

GROUND TRAINING

13-5. Unit commanders require all personnel to participate in ground training immediately before the jump. The parachutists are shown the correct movement procedures inside the aircraft and the exit procedures. Parachutists are required to practice and demonstrate these procedures to jumpmaster's satisfaction before the jump. Different techniques are involved in jumping from rotary-wing aircraft when using the RA-1 ARAPS in the DBSL configuration; failure to conduct required ground training may result in a serious jump accident.

SPACE LIMITATIONS

13-6. The total number of parachutists and air delivery containers must conform to the weight and space limitations of the specific aircraft involved. Crowded conditions inside the cargo compartment could cause accidental activation of a reserve parachute, creating an extremely hazardous situation. During movement, the reserve ripcord handle (yellow pillow) of the reserve parachute is protected by placing the left hand and forearm over the front of the reserve ripcord handle. Crowded conditions inside these aircraft dictate that caution be used to prevent entanglement or misrouting of static lines during the parachutist's exit. Each parachutist is cautioned to watch the static line of the preceding parachutist and to observe all the static lines trailing from the lower aft corner of the cargo or personnel door. This precaution ensures that succeeding parachutists do not jump until the parachute of the preceding parachutist has deployed, and that the deployment bag has trailed to the rear of the aircraft. Due to space limitations only the jumpmaster will move behind the jumpers to conduct pin and EAAD checks.

6-SECOND COUNT

13-7. Due to the slow forward speed of helicopters and the downward rotor wash, the time interval between exit and full deployment of RA-1 ARAPS in the DBSL configuration requires the parachutist to perform a 6-second count (addressed in thousands). For example, 1,000, 2,000, and so on.

HOOKUP PROCEDURES

13-8. When using rotary-wing and small fixed-wing aircraft for airborne operations, parachutists might use different hookup procedures from the standard hookup procedures used in USAF large fixed-wing troop carrier aircraft. This difference is due to the location of the anchor cables. Also, the jumpmaster will hook up the individual jumpers when jumping the UH-60 or UH-1. Unless otherwise specified in the hookup procedures for specific aircraft, the rule is to hook the open portion of the snap hook to the front of the aircraft with all static line snap hooks facing the same direction. This permits a rapid, visual inspection before the jump and easy removal of the static lines after the jump.

STATIC LINES AND DEPLOYMENT BAGS

13-9. Static lines and deployment bags are retrieved by the jumpmaster or crew chief immediately after the last parachutist is clear. The static lines and deployment bags are secured as soon as they are retrieved inside the aircraft. If the door on the aircraft can be closed, the static lines can be removed from the anchor cable or attaching point; otherwise, the static lines are not detached until the aircraft is on the ground.

Note: Procedures for RA-1 DBSL deployment bags hung on the UH-60 rotary-wing aircraft antenna located on the left side of the aircraft (figure 13-1) will be in accordance with UH-60 aircraft crew procedures. The jumpmaster will pull in the static line slack and keep it secured until the aircraft lands, then the jumpmaster will remove the deployment bags. To mitigate the risk of entanglement, jumpmasters should consult with the aircrew to see if the aircraft antenna can be taped as depicted in figure 13-2.

Figure 13-1. Left side of UH-60 Black Hawk

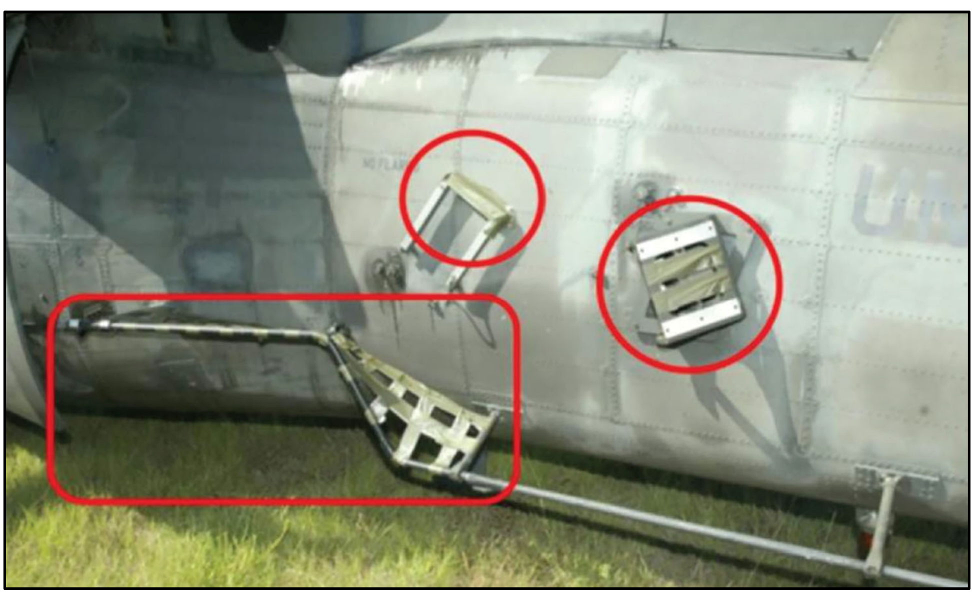

Figure 13-2. UH-60 indicating areas taped for RA-1 double-bag static line operations

UH-60 BLACK HAWK

13-10. This section will cover the jumpmaster and jumper procedures for jumping the RA-1 ARAPS in the DBSL configuration from the UH-60. Preparation, inspection, open or closed doors, anchor line system, seating and static line routing, jump procedures, jump commands and safety precautions are discussed in the following paragraphs.

13-11. The UH-60 is a twin-turbine, medium-speed, single-main-rotor helicopter. Six noncombat-equipped parachutists can jump from this aircraft. The indicated airdrop speed of the aircraft should not be less than 90 knots. The minimum jump altitude is 5,500 feet AGL when utilizing the RA-1 ARAPS configured for DBSL operations. Without detaching the static lines, the jumpmaster retrieves static lines and deployment bags, places them inside an aviator kit bag, and secures the kit bag until the aircraft has landed. The static line snap hooks are then removed from the anchor line attaching points. The UH-60 is not used for static line parachute operations with the cargo doors removed. The static line anchor line cable is never rigged to the cargo door or overhead tie-down rappelling rings since trailing deployment bags might foul the main rotor system (because of the high position in which the bags would trail).

Note: The pilot must maintain level flight and airdrop speed during deployment bag retrieval to preclude deployment bag entanglement with the cargo doors.

PREPARATION AND INSPECTION

13-12. To prepare the UH-60A for jumping, the jumpmaster prepares and inspects the UH-60A by—

- Locking both cargo doors in the open position (figure 13-3).

Figure 13-3. UH-60A compartment prepared for jumping

Note: For arctic or other cold-weather operations or during flights of long duration, the aircraft doors may be closed and locked. Door opening in flight must be coordinated between the supporting aviation unit and airborne units for the jump.

- Taping cargo floor troop seat and tying-down fitting wells in front of the cargo doors.
- Taping sharp edges and tying-down fitting wells on the cargo floor and door jambs that could cut or fray static lines or snag parachutists' equipment.
- Taping the weather stripping on cargo doors below the door catch (figure 13-4, page 13-5).
- Taping the entire trail edge of the door.

Figure 13-4. UH-60A door edge padded and taped

Note: Tape must not interfere with closing, locking, unlocking, or opening cargo doors in flight. If the weather stripping below the cargo door catch is missing, pad the door edge with felt and tape in place. Padding must not preclude closing the cargo doors.

MODIFIED ANCHOR LINE SYSTEM

13-13. Install a floor-mounted anchor line system using a modified stabilized body extraction system anchoring strap assembly made from type XXVI nylon webbing (NSN 1670-00-999-3544, TM 10-1670-262-12&P). To modify the stabilized body, remove two of the connector snaps (leaving four) and add two D-rings (NSN 1670-00-360-0466). The cotton buffers may be locally manufactured. To install a floor-mounted anchor line system—

- Install four snap hooks with safety wires and eight D-rings with cotton buffers on the anchor web loop, with the snap hooks and D-rings facing out in the following order. The configuration should be like this, as demonstrated in figure 13-5, page 13-6:
  - One snap hook.
  - Four D-rings.
  - Two snap hooks.
  - Four D-rings.
  - One snap hook.
- Insert about 30 inches of the web loop (running end) into the quick-fit adapter to secure the loop.
- Center the anchor line system on the cargo floor with the quick-fit adapter to the rear. Attach the snap hooks to tie-down fittings 3B, 3C, 4B, and 4C (figure 13-5, page 13-6). Insert the safety wires and tape the snap hooks.
- Center the quick-fit adapter between tie-down fittings 4B and 4C, and tighten the web loop by pulling on the loop running end. Secure the web loop running end with an overhand knot. Fold and tape excess webbing to the web loop.

SAFETY BELT INSTALLATION

13-14. Install three floor-mounted safety belts as follows:

- Attach an 86-inch-long (extended) safety belt to forward tie-down fittings 1A and 1D.
- Attach a 112-inch-long (extended) safety belt to tie-down fittings 1A and 5A, left door.
- Attach a 112-inch-long (extended) safety belt to tie-down fittings 1D and 5C, right door.

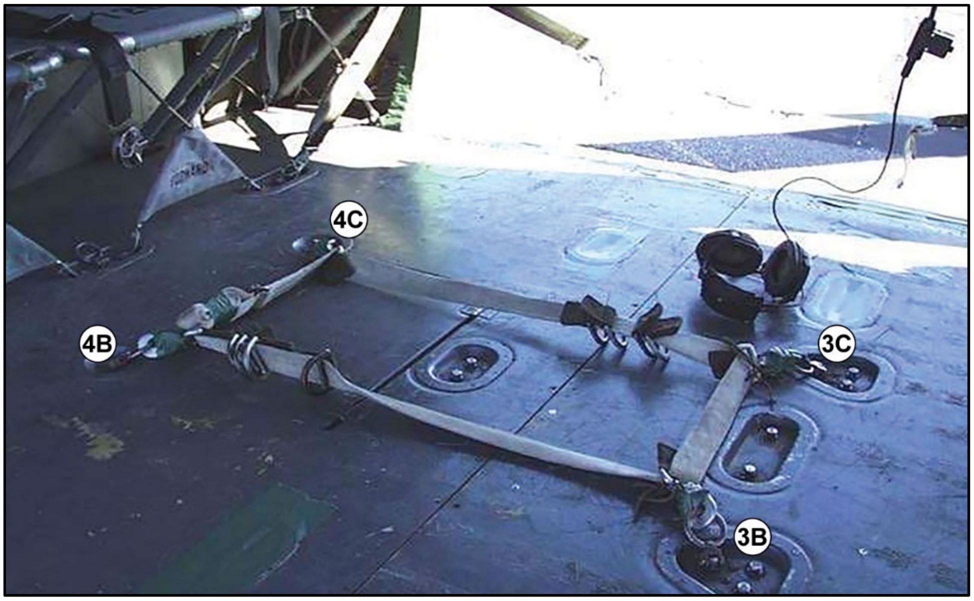

Figure 13-5. UH-60A modified anchor line secured to floor

13-15. Ensure that a serviceable safety harness is available for the jumpmaster (and the crew chief, when required). The jumpmaster's safety line is attached to tie-down fitting 5B. The crew chief's safety line is attached to tie-down fitting 1A or 1D, as required. If safety harnesses are not available, a backpack-type parachute may be used.

Note: Attach a standard safety belt to tie-down fittings 5A and 5C for the jumpmaster. (This is necessary only if a seat has not been left for the jumpmaster.)

Note: The UH-60A cargo compartment configuration and floor tie-down fitting pattern preclude use of standard (individual) safety belts. Therefore, parachutists are restrained in groups of two and three, using modified safety belts.

INSPECTION

13-16. Before loading, the jumpmaster and pilot, or pilot's representative, jointly inspect the aircraft to ensure the following:

- All loose objects in the cargo compartment are removed or secured forward.
- Sharp edges and tie-down fitting wells on the cargo floor and doorjambs (or anything that could cut or fray static lines or snag the parachutists' equipment) are padded and taped.

Note: Door catches and handles should not be taped.

- Cargo doors are locked in the open position and cleared for closing, depending on mission requirements.
- The anchor line system is complete, serviceable, and properly installed.
- Three serviceable safety belts (modified) are installed on the cargo floor.
- A headset or helmet and intercom jack for the jumpmaster are available and operational, and the intercom extension cord is secured overhead (figure 13-6, page 13-7) and out of the way of jumpers.
- Safety harnesses and backpack-type emergency parachutes are available for the jumpmaster and the crew chief, as required.

Figure 13-6. Intercom system secured

LOADING TECHNIQUES AND SEATING CONFIGURATION

WARNING

Do not approach the aircraft directly from the front because the lowest arc of the turning rotor blades occurs at that point.

13-17. Due to space limitations inside the UH-60 Black Hawk helicopter, the maximum number of DBSL rigged jumpers per lift is six parachutists. DBSL operations from the UH–60 are limited to administrative non-tactical or oxygen slick (oxygen mask with bailout bottle) parachutist configurations. Personnel are organized into a stick of six parachutists. They approach the aircraft from the left or right side at a 90-degree angle in reverse order: numbers 6, 5, 4, 3, 2, 1 (figure 13-7, page 13-8).

13-18. Number 6, followed by numbers 5 and 4, enter the left door on command from the static jumpmaster. Numbers 3, 2, and 1 enter the right door on command from the static jumpmaster. They are seated and hooked up by the jumpmaster in reverse numerical sequence, beginning with parachutist number 6, as they enter the aircraft. The open portion of universal static line snap hooks (figure 13-8, page 13-8) face the front of the aircraft.

13-19. The static lines of the parachutists, seated in the left and right doors, are routed directly behind them and down to the anchor line.

13-20. The jumpmaster ensures that any excess static line is stowed in the pack tray retainer band.

Note: To preclude binding during exit, excess static lines of numbers 1, 2, 3, 4, 5, and 6 are stowed through the static line slack retainer on the parachutist's container.

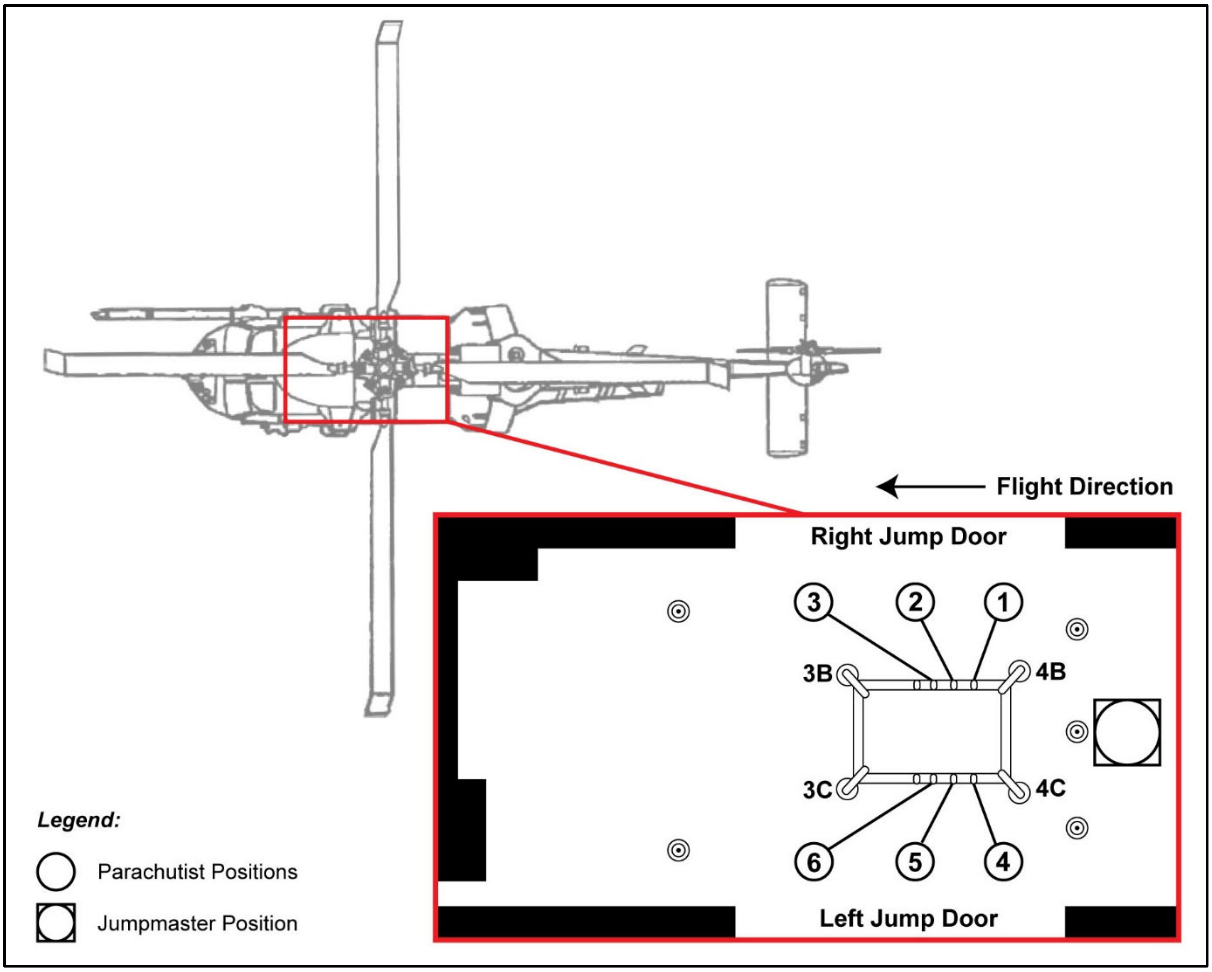

Figure 13-7. UH-60 seating and static line routing

Figure 13-8. Proper universal static line snap hook and static line routing

13-21. When the jumpmaster commands FASTEN SAFETY BELTS /DOOR STRAPS, parachutists do the following:

- Numbers 4 and 6 pass the running ends of their safety belt to number 5, who fastens the belt and removes excess slack.
- Numbers 1 and 3 pass the running ends of their safety belt to number 2, who fastens the belt and removes excess slack.

13-22. The jumpmaster inspects all safety belts to ensure that they are securely fastened and properly fitted. He is seated aft with his safety belt fastened for lift-off and landing. (One seat should have been left in place for the jumpmaster.)

JUMP PROCEDURES

13-23. If the cargo doors are to be closed en route to the DZ, the jumpmaster and crew chief brief numbers 3 and 6 on door opening procedures before loading. At 6 minutes before the drop, the pilot notifies the jumpmaster to open the cargo doors. The jumpmaster directs numbers 3 and 6 to open the doors. The jumpmaster ensures that the cargo doors are opened and locked in place. If the cargo doors will remain open during the jump at 3,000 feet AGL before the drop, the pilot or crew chief will notify the jumpmaster to give the command to release and secure the cargo door straps.

Note: To control risk during airborne operations from the UH-60 Black Hawk helicopter using the RA-1 in DBSL mode, the minimum aircraft speed at the time of parachutist exit should be 90 knots indicated airspeed (KIAs) with a minimum exit altitude of 3,500 feet AGL and a minimum exit dispersion time of four-seconds between jumper exits.

JUMP COMMANDS

13-24. The jumpmaster issues the following commands:

- **DON HELMETS AND FASTEN SAFETY OR DOOR STRAPS.** This command is given prior to take-off. During training jumpers will be given a 20-minute time warning. This time warning can be given at a later time on extended flights prior to the airborne operation.
- **UNFASTEN SAFETY OR DOOR STRAPS.** The jumpmaster gives this command upon reaching an altitude of 3,000 feet AGL or when the flight crew chief indicates that it is safe to do so.

Note: Safety belts or door straps are removed when directed by the jumpmaster. They are released by center jumpers numbered 2 and 5 and passed to the right and left to be stowed. The running ends are stowed forward and aft to clear the static lines and the exit path.

- **CHECK STATIC LINES.** The jumpmaster gives the command to check static lines. This procedure is different from fixed-wing aircraft. The jumpmaster will check the routing of all static lines (from pack trays to anchor cable) to ensure they are correctly routed and hooked up. The jumpmaster ensures excess static line is stowed through the slack retainer on the container each of jumper numbered 1 through 6.
- **CHECK EQUIPMENT.** The jumpmaster gives the command to check equipment, each jumper passes the signal back. All parachutists check their equipment starting at the helmet and ensure there are no sharp edges on the rim and that the chinstrap is secure. The parachutists then physically check the chest strap, main release ripcord (red cutaway pillow), reserve ripcord handle (yellow pillow), and ensure they are secure and in the proper location. Jumpers finally check the quick-ejector snap-on lowering line, quick-ejector snap-on leg straps, and equipment attaching straps.
- **SOUND OFF FOR EQUIPMENT CHECK.** The jumpmaster gives the command sound off for equipment check. Jumper number 1 indicates the status of his equipment with a hand signal (thumbs up) to the jumpmaster. The remaining parachutists do the same as jumper number 1, in numerical order. The jumpmaster acknowledges each jumper by touching his knuckles to each

jumper's fist. Once the jumper feels the jumpmaster's fist on his, he will drop his hand back down. If any jumper is experiencing a problem with his equipment he extends arm out and places his thumb down and holds it until the jumpmaster corrects the problem.

- **10 MINUTES.** The jumpmaster gives jumpers the command 10 minutes followed by winds (wind speed). Each jumper will have their pins and CYPRES checked by the jumpmaster. The jumpmaster will tap each jumper on the shoulder when completed.
- **1 MINUTE.** The jumpmaster gives this command approximately 1 minute out. Jumpers should keep their eyes on the jumpmaster.
- **STAND BY.** The jumpmaster gives this command approximately 15 seconds out. The jumpmaster ensures that all parachutists hear and understand this command. (The jumpmaster gives the hand-and-arm signal "STAND BY" by placing his arm to his side, hand in a fist with thumb extended upward, bringing the arm with thumb extended upward to above head level). Jumpers numbered 1 through 6 assume door positions by placing both hands, palms down, on the cargo floor, grasping the edge of the fuselage or deck and with their feet together outside of the cargo compartment. Each jumper must then look at the jumpmaster for his next command.
- **GO.** The jumpmaster gives this command by an oral GO and a sharp tap on the rear of each parachutist's helmet. The jumper will assume a pike exit body position (Chapter 6, figure 6-4, page 6-7) immediately after exiting the aircraft by vigorously pushing away from the aircraft, pivoting his body to present his back to the relative wind, by bending forward at the waist, eyes and head up on the horizon, bringing feet and knees together, placing his elbows at his sides with his hands gripping his cargo pockets. He maintains the pike position for 6 seconds throughout canopy deployment. After parachute deployment the parachutist should check his canopy and gain canopy control. The jumpmaster gives a minimum of a 4-second delay between jumpers. The jump sequence is in numerical order: 1 through 6. As soon as the parachutist numbered 3 clears the door, the parachutists numbered 4, through 6 repeat the sequence in the left door.

Note: Due to rotor wash effects from the UH-60 Black Hawk helicopter on a deploying RA-1 main canopy, the jumper must exit the helicopter using a pike body position. The pike position consists of the jumper placing his elbows at his side with his hands gripping his cargo pockets. The jumper bends his body slightly at his waist and keeps his feet and knees together. The jumper will assume the pike position immediately after exiting the aircraft and then hold the pike position for 6 seconds. After the six second count, the jumper should check his canopy and gain canopy control.

- **ABORT.** The jumpmaster signals to abort by keeping his hands to his side, lowering his head and shaking his head from side to side. The jumpmaster will either command jumpers to standby or fasten seat belts. If the jumpmaster gives the command to FASTEN SEAT BELTS, jumpers move out of the door position and fasten seat belts. Jumpers must keep their eyes on the jumpmaster for commands.

SAFETY PRECAUTIONS

13-25. Safety precautions on the UH-60 are as follows:

- **Jumpmaster.** The static jumpmaster wears a safety harness that is attached to the aft cargo floor tie-down fitting (5B). Backpack-type emergency parachutes may be used if a safety harness is not available. The jumpmaster is equipped with a headset or flight helmet that allows direct communications with the aircraft crew. The jumpmaster retrieves static lines and deployment bags, places them inside an aviator kit bag, and secures the kit bag until the aircraft has landed. The static line snap hooks are then removed from the anchor line attaching points. The UH-60 is not used for static line parachute operations with the cargo doors removed. The static line anchor line cable is never rigged to the cargo door or overhead tie-down rappelling rings, since trailing deployment bags might foul the main rotor system (because of the high position in which the bags would trail). The jumpmaster does not jump from this aircraft. The jumpmaster wears a safety harness.
- **Equipment.** Parachutists cannot wear combat equipment when jumping this aircraft. The center-mounted weapon harness should not be worn for door exit positions on rotary-wing aircraft. Equipment prescribed in TB 43-0001-80 can be worn by parachutists when jumping this aircraft.

SAFETY BELT MODIFICATION

13-26. The UH-60 cargo compartment floor configuration does not provide a specific design of tie-down fittings for restraining personnel seated on the cargo floor. The safety belts used for restraining personnel are part of the troop seat assembly and are removed when conducting parachute operations.

13-27. Using the cargo floor tie-down fittings, the three modified C-3A troop-type safety belts (figure 13-9) restrain parachutists in groups of two and three by a single safety belt.

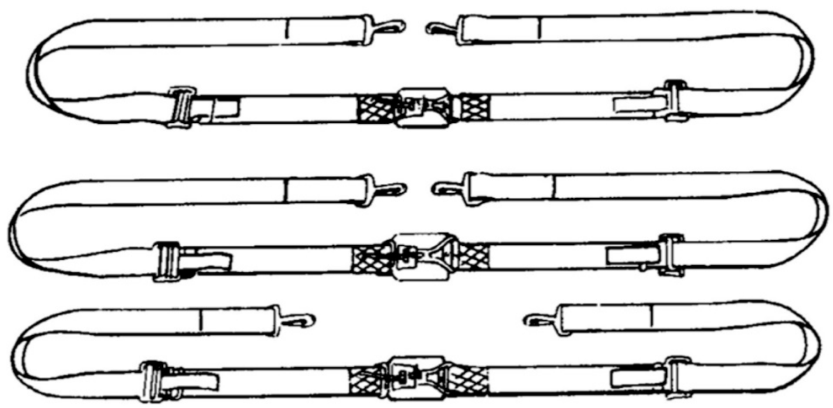

Figure 13-9. Modified C-3A troop safety belts

13-28. Two safety belts, 112 inches long and adjustable to 86 inches, restrain parachutists numbered 1 through 3 and 4 through 6, who are seated in the left and right cargo doors.

UH-60 AIRCRAFT EMERGENCIES

13-29. Although 98 percent of airborne emergencies take place after the jumper has exited the aircraft, there are a few emergencies that can take place aboard the aircraft while it is in-flight, to include take-off and landing. It is imperative that jumpers keep their eyes on the jumpmaster at all times while aboard an aircraft. Parachutists should learn the locations of emergency exits and how to open them and should secure all loose items that could be tossed around and injure the parachutists. The procedures established by this publication in response to emergency situations when jumping the UH-60 are proven to be the most successful when jumping the RA-1 ARAPS in the DBSL configuration.

UH-60 Rotary-Wing Crash Landing (0 to 3,000 Feet AGL)

13-30. In the event of an aircraft in-flight emergency between 0 and 3,000 feet AGL, RA-1 equipped parachutists rigged for DBSL will assume a crash position and land with the aircraft. Jumpers will—

- Assume the emergency landing position.
- Sit back and bring their legs into aircraft. They will lie as close to the floor as possible. The safety belt or door strap should still be secured at this altitude. If not, jumpers will reattach and secure the safety belt or door strap.
- Wait for the aircraft and rotary blades to come to a complete stop.
- Disconnect the static line, exit, and assemble upwind, in a safe direction indicated by the jumpmaster, crew chief, or senior jumper.
- Conduct a head count, administer first aid, and signal for help.

UH-60 Rotary-Wing Emergency Bailout (3,001 Feet AGL and Above)

13-31. In the event of an aircraft in-flight emergency at 3,001 feet AGL or above, the following will happen:

- 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.
- If time permits, the jumpmaster will give the jump commands.
- Jumpers will exit on the jumpmaster's command in a good DBSL pike exit position.
- Once under canopy, jumpers will attempt to land with other jumpers and assemble for a head count.

Premature Parachute Deployment Inside UH-60 Rotary-Wing Aircraft

13-32. In the event a main parachute container opens or a reserve parachute prematurely deploys inside the aircraft, the first person to notice will shout, "PILOT CHUTE" and attempt to contain the open container, pilot chute, or parachute. Follow these procedures in the event of a premature deployment:

- Notify the jumpmaster, jumpers, crew chief, and pilot immediately.
- Jumpmaster and jumpers will attempt to contain parachute immediately.
- If parachute is contained, aircraft will land and jumper will be taken off aircraft.
- If parachute exits aircraft (main or reserve), the jumper must exit the aircraft immediately.
- If reserve parachute is pulled outside the aircraft, the jumper will have a dual deployment during opening due to the universal static line snap hook being attached to the aircraft when exiting.

Note: If at any time the pilot chute or parachute gets outside the aircraft, the jumper must exit immediately.

CAUTION

Jumpers must exercise caution with the static line during an emergency situation where a jumper must exit the aircraft out of order to due to the premature deployment of the reserve or main canopy exiting the aircraft.

Altimeter Failure Inside the UH-60 Aircraft

13-33. The jumper will get the attention of the jumpmaster. The jumpmaster will replace the altimeter with the spare altimeter. If an altimeter is not available, the jumper will be moved to the front of the aircraft and he will sit and fasten his seat belt. He will not jump.

Note: The jumper directly impacted by the altimeter failure can exit the aircraft in an emergency situation.

Equipment Malfunction Inside the UH-60 Aircraft

13-34. The jumper will get the attention of the jumpmaster. The jumpmaster will correct the malfunction or will make the determination for the jumper to land with the aircraft.

JUMPER EMERGENCIES DURING ROTARY-WING EXIT (UH-60)

13-35. The following paragraphs detail the jumper emergencies that may occur during a rotary-wing exit from the UH-60 aircraft.

Broken Static Line

13-36. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Broken Anchor Line Cable

13-37. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Failure to Hook Up

13-38. The jumper will maintain a good DBSL pike exit body position. After a 6-second count he will immediately pull the reserve ripcord handle for total malfunction.

Jumper in Tow by Static Line (UH-60)

13-39. Follow the procedures below in the event of a towed jumper.

Conscious Jumper

13-40. In the event of a towed jumper on a rotary-wing aircraft, the jumpmaster will prevent any other jumpers from exiting and will notify the pilot. The towed parachutist will transition from the DBSL pike exit position to a tight body position, protecting the reserve ripcord handle. The jumpmaster will ensure the jumper is securely attached to the aircraft and will not break free during descent. If the jumper is not securely attached (hung by equipment), the jumpmaster will attempt to shake or cut him free. If the jumper feels himself falling free, he will start his 6-second count and attempt to gain a DBSL pike body position. At the end of the 6-second count the jumper will look up at his canopy and verify that it has opened. If the jumper's canopy has failed to open he will immediately pull the reserve ripcord handle. If the jumper is positively attached to the aircraft, the aircraft will slowly descend to the DZ and come to a hover, and the jumper will be freed from the aircraft. These procedures will be covered during prejump training.

Note: For combat operations or areas the rotary-wing aircraft cannot descend, the jumpmaster may cut the static line. This will be briefed prior to the airborne operation.

Unconscious Jumper

13-41. The jumpmaster will notify the pilot. The jumpmaster will attempt to secure or retrieve the jumper into the aircraft. If unsuccessful, the aircraft will slowly descend to the DZ and the jumpmaster will free the jumper from the aircraft.

Jumper in Tow by Equipment

13-42. Whether the jumper is conscious or unconscious, the jumpmaster will attempt to free or cut his equipment free and the jumper's main parachute will deploy. The jumper maintains a tight DBSL pike exit body position. As the jumper feels himself falling free, he will start his 6-second count maintaining a good DBSL pike exit body position.

Lost or Broken Goggles

13-43. The jumper will maintain a good DBSL pike exit body position. After the canopy deploys and jumper has control, if possible he will put the broken goggles over his eyes.

Lost Altimeter or Broken Altimeter (Under Canopy)

13-44. The jumper will maintain altitude awareness under canopy by observing other jumpers and deploying when they do. If no other jumpers can be observed, the jumper waves off and deploys his main parachute.

Note: All cutaway procedures, parachutist postopening procedures, controllability checks, malfunction procedures, canopy entanglement procedures, and parachutist emergency landing procedures will remain the same when jumping the RA-1 ARAPS in the DBSL configuration, whether jumping from fixed-wing or rotary-wing aircraft.

UH-1H IROQUOIS AND OR UH-1N HUEY

13-45. The Army's UH-1H is powered by a single-gas turbine engine; the U.S. Marine Corps UH-1N has two gas turbine engines. Up to six noncombat-equipped parachutists can jump from the UH-1H or UH-1N, consistent with weight limitations. The indicated airspeed of the aircraft during jumps is 90 knots. The RA-1 ARAPS minimum drop altitude in the DBSL configuration is 5,500 feet AGL. After the last parachutist has cleared the aircraft, the static lines are retrieved inside the aircraft and secured in an aviator kit bag or secured by a safety belt to the aircraft floor. The static line snap hooks are not removed from the anchor line cable until the aircraft lands. The jumpmaster is a static jumpmaster. (The jumpmaster will not jump.)

PREPARATION AND INSPECTION

13-46. The following details the steps and equipment used to ready the UH-1 (both UH-1H and UH-1N) for jumping:

- **Preparation.** Prepare and inspect the UH-1 as follows:
  - Lock both cargo compartment doors in the open position. If the doors cannot be locked, they must be removed.
  - Remove all troop seats except one seat on each side (located to the rear of the pilot and copilot seats). Adjust these two seats so they face the rear of the aircraft.
  - Inspect the door and frame to ensure that there are no sharp edges that could cut or fray static lines. If there any edges determined to be hazardous, take corrective action before the parachuting exercise.
  - Under field conditions, pad and tape the door and frame to preclude a mission abort. Otherwise, return the aircraft to maintenance for correction of the deficiency.
  - Attach safety belts to the tie-down rings on each side of the compartment for floor-seated parachutists.
  - Unscrew—by hand—the door gunner or crew chief foot-operated radio switch before jumping. Tape the exposed radio switch wires to prevent an electrical short (figure 13-10, page 13-15). Pad and tape the switch if it is not removed. Pad the ground-handling wheel-mount brackets on both landing skids with cellulose wadding, then tape them. Some aviation units have fabricated special covers that may be used to cover the wheel-mount brackets.

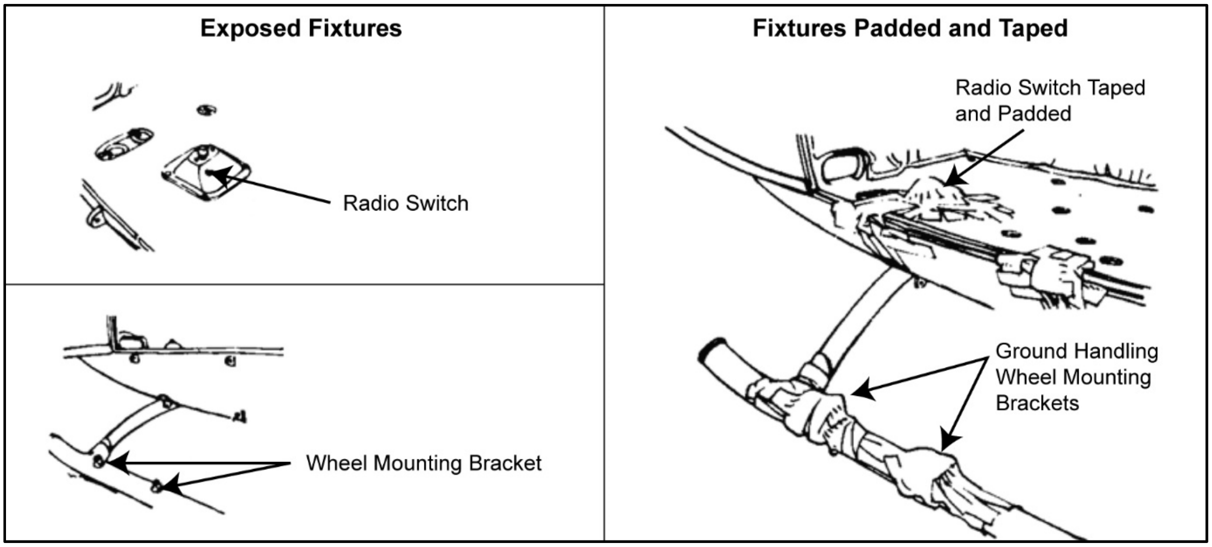

Figure 13-10. UH-1 exposed fixtures padded

- **Anchor Line Systems.** With the UH-1 aircraft, two anchor line systems are available for airdrop of personnel (figure 13-11). They are the standard overhead system and the expedient system. The expedient system (modified stabilized body strap or Type XXVI nylon webbing anchor line cable assembly) consists of a nylon A-7A strap, four D-rings, and four connector snaps—(TM 10-1670-298-23&P authorized the fabrication of the modified stabilized body strap or Type XXVI nylon webbing strap from Type XIII nylon webbing. Nylon modified stabilized body straps or Type XXVI nylon webbing must be used with cotton buffers on the D-rings and connector snaps.

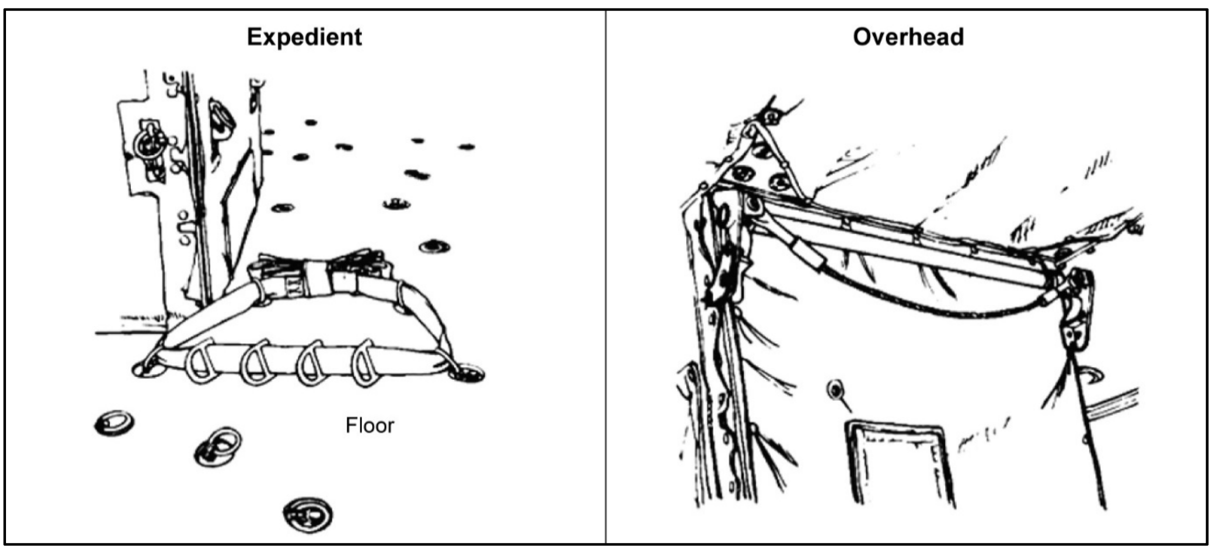

Figure 13-11. UH-1 anchor line system

- **Anchor Line Assembly Installation.** An anchor line assembly is installed on each side of the aircraft. It can be installed quickly by means of four tie-down rings located on the floor on the right and left sides of the aircraft compartment. The modified stabilized body strap or Type XXVI nylon webbing strap is threaded through the D-rings, which are used for attachment of the static line snap hooks. Follow these procedures for the left and right doors:
  - **Left Door.** For the left door, attach one connector snap on the modified stabilized body strap or Type XXVI nylon webbing strap to tie-down ring number G2. Connect the strap to tie-down ring number F4. Four D-rings are on the strap with the round part of the rings facing outboard

(of aircraft). Then, connect the strap to tie-down ring number K3 and tie-down ring number J4. Secure the free end of the strap to the strap fastener, and tape any excess between tie-down rings number J4 and number G2. Safety wire all connector snaps.

  - **Right Door.** The same procedures apply to the right door as the left. The exception is, attach the A-7A strap to tie-down ring number G1, then to F2. Four D-rings are on the strap with the round part of the rings facing outboard (of aircraft). Secure the free end of the strap to tie-down rings number K2 and J3, and secure the strap fastener. Tape the excess strap between tie-down rings number J3 and number G1.

- **Inspection.** Before enplaning, the jumpmaster and pilot or pilot's representative jointly inspect the aircraft to determine the following:
  - All protruding objects near the cargo compartment doors are removed or taped.
  - The lower right and left aft edges of both the cargo compartment doors are padded and taped.
  - The anchor line cable or field-expedient anchor line system is secure, serviceable, and properly installed.
  - A safety belt is available for each parachutist.
  - A headset is available for the jumpmaster to effect coordination among the jumpmaster, the pilot, and the ground crew.

LOADING TECHNIQUES AND SEATING CONFIGURATION

13-47. Due to space limitations inside the UH-1 helicopter the maximum number of DBSL rigged jumpers per lift is six parachutists. DBSL operations from the UH–1 are limited to administrative non-tactical or oxygen slick (oxygen mask with bailout bottle) parachutist configurations. During loading, jumpers should not approach directly from the front or sides—but at a 45-degree angle to the nose of the aircraft. Jumpers numbered 1 through 3 enter the cargo compartment through the right door, are hooked up by the jumpmaster in numerical order, and seat themselves (figure 13-12 and figure 13-13, page 13-17). Jumpers numbered 4 through 6 enter the cargo compartment through the left door, are hooked up by the jumpmaster in numerical order, and seat themselves. The jumpmaster ensures excess static line is stowed as he hooks up each parachutist.

Note: The open portion of the static line snap hook faces the front of the aircraft. For flights less than 25 minutes long, jumpers may sit in the door with their feet outside the cargo compartment.

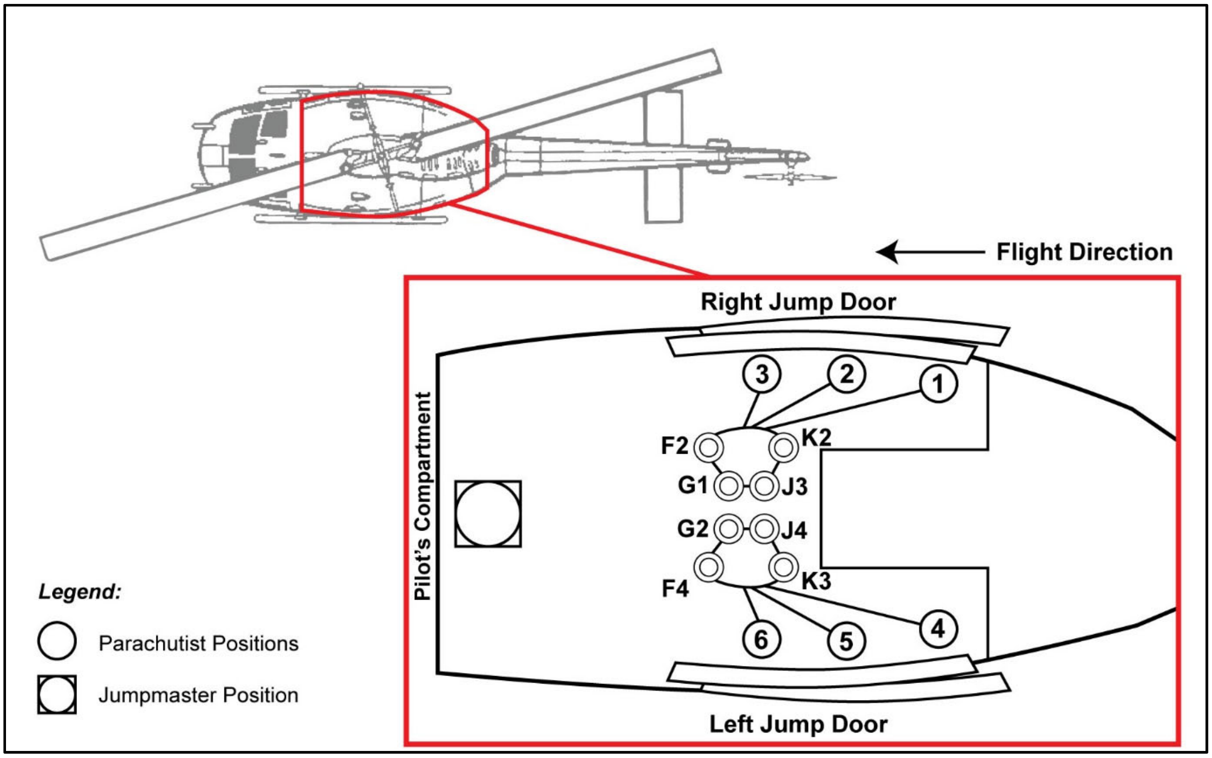

Figure 13-12. UH-1 seating configuration, expedient anchor line system

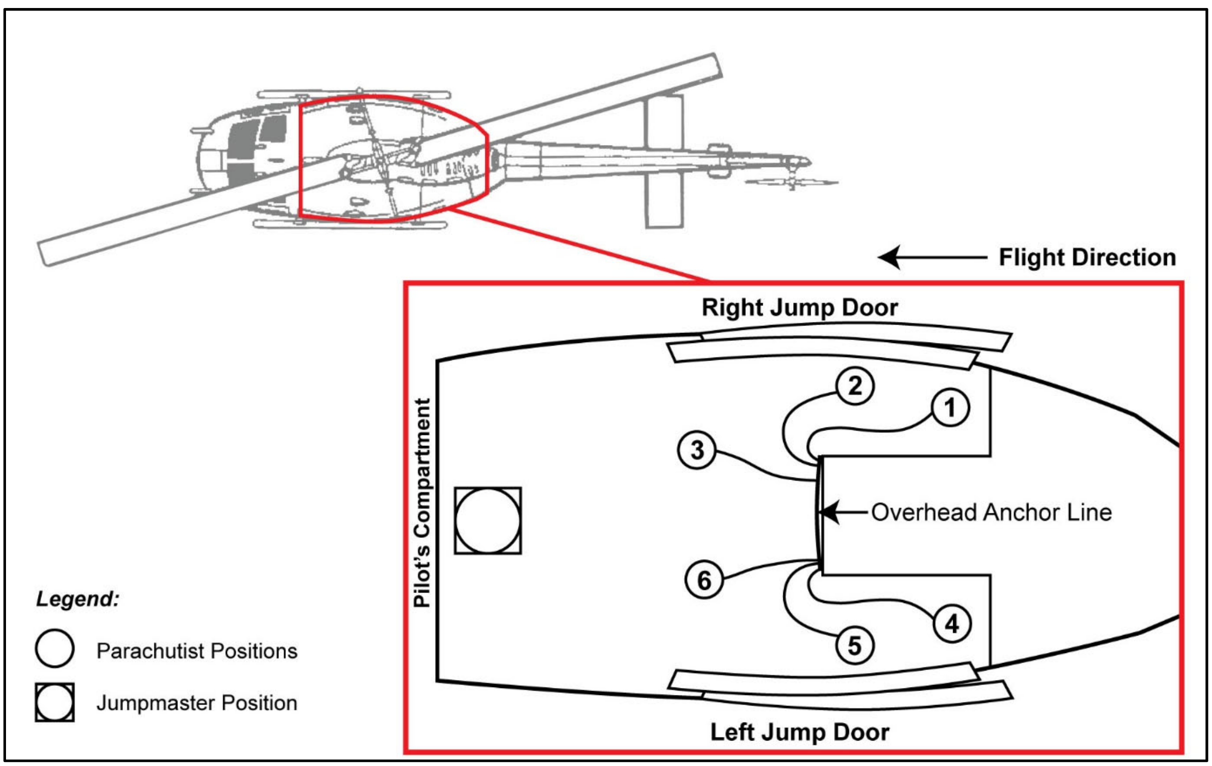

Figure 13-13. UH-1 seating configuration, overhead anchor line system

JUMP COMMANDS

13-48. The jumpmaster issues the following commands:

- **DON HELMETS AND FASTEN SAFETY BELTS or DOOR STRAPS.** This command is given prior to take-off. During training jumpers will be given a 20-minute time warning. This time warning can be given at a later time on extended flights prior to the airborne operation.
- **UNFASTEN SAFETY BELTS or DOOR STRAPS.** The jumpmaster gives this command upon reaching an altitude of 3,000 feet AGL or when the flight crew chief indicates that it is safe to do so.

Note: Safety belts or door straps are removed when directed by the jumpmaster. They are released by jumpers numbered 2 and 5. The running ends are stowed forward and aft to clear the static lines and the exit path.

- **CHECK STATIC LINES.** The jumpmaster gives the command to check static lines. This procedure is different from the one associated with a fixed-wing aircraft. The jumpmaster will check the routing of all static lines (from pack trays to anchor cable) to ensure they are correctly routed and hooked up. The jumpmaster ensures excess static line is stowed through the slack retainer on the container of each jumper numbered 1 through 6.
- **CHECK EQUIPMENT.** The jumpmaster gives the command to check equipment, each jumper passes the signal back. All parachutists check their equipment starting at the helmet and ensure there are no sharp edges on the rim and that the chinstrap is secure. The parachutists then physically check the chest strap, main release ripcord (red cutaway pillow), reserve ripcord handle (yellow pillow), and ensure they are secure and in the proper location. Jumpers finally check the quick-ejector snap-on lowering line, quick-ejector snap-on leg straps, and equipment attaching straps.
- **SOUND OFF FOR EQUIPMENT CHECK.** The jumpmaster gives the command to sound off for equipment check. Jumper number 1 indicates the status of his equipment with a hand signal (thumbs up) to the jumpmaster. The remaining parachutists do the same as jumper number 1 in numerical order. The jumpmaster acknowledges each jumper by touching his knuckles to each jumper's fist. Once the jumper feels the jumpmaster's fist on his, he will drop his hand back down. If any jumper is experiencing a problem with his equipment, he extends his arm out and places his thumb down and holds it until the jumpmaster corrects the problem.
- **10 MINUTES.** The jumpmaster give jumpers the command 10 minutes followed by winds (wind speed). Each jumper will have their pins and CYPRES checked by the jumpmaster. The jumpmaster will tap each jumper on the shoulder when completed.
- **1 MINUTE.** The jumpmaster gives this command approximately 1 minute out. Jumpers should keep their eyes on the jumpmaster.
- **STAND BY.** The jumpmaster gives this command approximately 15 seconds out. The jumpmaster ensures that all parachutists hear and understand this command. (The jumpmaster gives the STAND BY hand-and-arm signal by placing his arm to his side, hand in a fist with thumb extended upward, bringing the arm with thumb extended upward to above head level.) Jumpers numbered 1 through 6 assume door positions by placing both hands, palms down on the cargo floor, grasping the edge of the fuselage or deck and with their feet together outside the cargo compartment. Each jumper must then look at the jumpmaster for his next command.
- **GO.** The jumpmaster gives this command by an oral GO and a sharp tap on the rear of each parachutist's helmet. The jumper will assume a pike exit body position (Chapter 6, Figure 6-3, page 6-6) immediately after exiting the aircraft by vigorously pushing away from the aircraft, pivoting his body to present his back to the relative wind, by bending forward at the waist, eyes and head up on the horizon, bringing feet and knees together, placing his elbows at his sides with his hands gripping his cargo pockets. He maintains the pike position for 6 seconds throughout canopy deployment. After parachute deployment the parachutist should check his canopy and gain canopy control. The jumpmaster gives a minimum of a 4-second delay between jumpers. The jump sequence is in numerical order: 1 through 6. As soon as

the parachutist numbered 3 clears the door, the parachutists numbered 4, through 6 repeat the sequence in the left door.

- **ABORT.** The jumpmaster signals to abort by keeping his hands to his side, lowering his head and shaking his head from side to side. The jumpmaster will either command jumpers to standby or fasten seat belts. If the jumpmaster gives the command to FASTEN SEAT BELTS, jumpers move out of the door position and fasten seat belts. Jumpers must keep their eyes on the jumpmaster for commands.

SAFETY PRECAUTIONS

13-49. Safety precautions on the UH-1 are as follows:

- **Parachutists.** During movement inside the aircraft, the parachutist protects the ripcord grip. Crowded conditions inside the cargo compartment and the open doors on both sides of the fuselage pose a hazardous situation regarding accidental activation of the reserve parachute.
- **Jumpmaster.** The jumpmaster ensures all parachutists remain secured by their safety belts or door straps until he gives the command to unfasten safety belts or door straps. The jumpmaster prevents (or corrects) excessive static line from flopping about the aircraft. The jumpmaster—without detaching the static lines—retrieves static lines and deployment bags, places them inside an aviator kit bag, and secures the kit bag until the aircraft has landed. The static line snap hooks are then removed from the anchor line attaching points.
- **Equipment.** Parachutists cannot wear combat equipment when jumping this aircraft when utilizing the RA-1 ARAPS in the DBSL configuration.

CAUTION

The CMWH should not be worn for door exit positions on rotary-wing aircraft. Equipment prescribed in TB 43-0001-80 can be worn by parachutists when jumping this aircraft.

UH-1 AIRCRAFT EMERGENCIES

13-50. Although 98 percent of airborne emergencies take place after the jumper has exited the aircraft, there are a few emergencies that can take place aboard the aircraft while it is in-flight, to include take-off and landing. It is imperative that jumpers keep their eyes on the jumpmaster at all times while aboard an aircraft. Parachutists should learn the locations of emergency exits and how to open them and secure all loose items that could be tossed around and injure the parachutists. The procedures established by this publication in response to emergency situations when jumping the UH-1 are proven to be the most successful when jumping the RA-1 ARAPS in the DBSL configuration.

UH-1 Rotary-Wing Crash Landing (0 to 3,000 Feet AGL)

13-51. In the event of an aircraft in-flight emergency between 0 and 3,000 feet AGL, RA-1 equipped parachutists rigged for DBSL will assume a crash position and land with the aircraft. Jumpers will—

- Assume the emergency landing position.
- Sit back, bring their legs into aircraft. Jumpers will lie as close to the floor as possible. The safety belt or door strap should still be secured at this altitude. If not, they will reattach and secure the safety belt or door strap.
- Wait for the aircraft and rotary blades to come to a complete stop.
- Disconnect the static line, exit, and assemble upwind, in a safe direction indicated by the jumpmaster, crew chief, or senior jumper.
- Conduct a head count, administer first aid, and signal for help.

UH-1 Rotary-Wing Emergency Bailout (3,001 Feet AGL and Above)

13-52. In the event of an aircraft in-flight emergency at 3,001 feet AGL and above, the following will happen:

- 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.
- If time permits, he will give jump commands.
- Jumpers will exit on the jumpmaster's command in a good DBSL pike exit body position.
- Once under canopy, jumpers will complete the canopy controllability check and attempt to land with other jumpers.
- Jumpers will assemble for a head count.

Premature Deployment Inside the UH-1 Aircraft

13-53. In the event a main parachute container opens or reserve parachute prematurely deploys inside the aircraft, the first person to notice will shout, "PILOT CHUTE" and attempt to contain the open container, pilot chute, or parachute. In the event of a premature deployment, follow these procedures:

- Notify the jumpmaster, jumpers, crew chief, and pilot immediately.
- Jumpmaster and jumpers will attempt to contain parachute immediately.
- If parachute is contained, aircraft will land and jumper will be taken off aircraft.
- If parachute exits aircraft (main or reserve), jumper must exit the aircraft immediately.
- If reserve parachute chute is pulled outside the aircraft, the jumper will have a dual deployment during opening due to the universal static line snap hook being attached to the aircraft when exiting.

Note: If at any time the pilot chute or parachute gets outside the aircraft, the jumper must exit immediately.

CAUTION

Jumpers must exercise caution with the static line during an emergency situation where a jumper must exit the aircraft out of order to due to the premature deployment of the reserve or main canopy exiting the aircraft.

Altimeter Failure Inside the UH-1 Aircraft

13-54. The jumper will get the attention of the jumpmaster. The jumpmaster will replace the altimeter with the spare altimeter. If an altimeter is not available, the jumper will be moved to the front of the aircraft and he will sit and fasten his seat belt. He will not jump.

Note: The jumper directly impacted by the altimeter failure can exit the aircraft in an emergency situation.

Equipment Malfunction Inside the UH-1 Aircraft

13-55. The jumper will get the attention of the jumpmaster. The jumpmaster will correct the malfunction or will make the determination for the jumper to land with the aircraft.

Jumper Emergencies During Rotary-Wing Exit (UH-1)

13-56. The following paragraphs detail the jumper emergencies that may occur during a rotary-wing exit from a UH-1 aircraft.

Broken Static Line

13-57. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Broken Anchor Line Cable

13-58. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Failure to Hook Up

13-59. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will immediately pull the reserve ripcord handle for total malfunction.

Jumper in Tow by Static Line

13-60. Follow the procedures below in the event of a towed jumper.

Conscious Jumper

13-61. In the event of a towed jumper on a rotary-wing aircraft, the jumpmaster will prevent any other jumpers from exiting and will notify the pilot. The towed parachutist will transition from the DBSL pike exit body position to a tight body position, protecting the reserve ripcord handle. The jumpmaster will ensure the jumper is securely attached to the aircraft and will not break free during descent. If the jumper is not securely attached (hung by equipment), the jumpmaster will attempt to shake or cut him free. If the jumper feels himself falling free, he will start his 6-second count and attempt to gain a DBSL pike exit body exit position. At the end of the 6-second count, the jumper will look up at his canopy and verify that it has opened. If the jumper's canopy has failed to open, he will immediately pull the reserve ripcord handle. If the jumper is positively attached to the aircraft, the aircraft will slowly descend to the DZ and come to a hover, and the jumper will be freed from the aircraft. These procedures will be covered during prejump training.

> ***Note:*** For combat operations or areas where the rotary-wing aircraft cannot descend, the jumpmaster may cut the static line. This will be briefed prior to the airborne operation.

Unconscious Jumper

13-62. The jumpmaster will notify the pilot. The jumpmaster will attempt to secure or retrieve the jumper into aircraft. If unsuccessful, the aircraft will slowly descend to the DZ and the jumpmaster will free the jumper from the aircraft.

Jumper in Tow by Equipment

13-63. Whether the jumper is conscious or unconscious, the jumpmaster will attempt to free or cut his equipment free and the jumper's main parachute will deploy. The jumper maintains a tight DBSL pike exit body exit position. As the jumper feels himself falling free, he will start his 6-second count maintaining a good DBSL pike exit body position.

Lost or Broken Goggles

13-64. The jumper will maintain a good DBSL pike exit body position. After the canopy deploys and the jumper has control, if possible he will put the goggles over eyes.

Lost Altimeter or Broken Altimeter Under Canopy

13-65. The jumper will maintain altitude awareness on descent. He will check the rate of descent with other parachutists and deploy when they do. If no other jumper can be observed, he will wave off and deploy his main parachute.

> ***Note:*** All cutaway procedures, parachutist postopening procedures, controllability checks, malfunction procedures, canopy entanglement procedures, and parachutist emergency landing procedures will remain the same when jumping the RA-1 ARAPS in the DBSL configuration, whether jumping from fixed-wing or rotary-wing aircraft.

MH-47 CHINOOK

13-66. The MH-47 is a tandem-rotor, medium-transport helicopter. Twenty-eight combat-equipped parachutists can jump from this aircraft. The jumpmaster may be a jumping jumpmaster or a static jumpmaster. Aircraft safety requires that the speed during jumps is not less than 90 knots and not more than 110 knots, with 90 knots being optimum speed. No special preparation is required if the aircraft has skis. Minimum jump altitude is 3,500 feet AGL when jumping 90 to 110 knots. After the last parachutist has cleared the aircraft, the static lines are retrieved (using the static line retriever) inside the aircraft and secured in an aviator kit bag.

> ***Note*:** The RA-1 in the DBSL configuration can be jumped with combat equipment from the MH-47.

PREPARATION AND INSPECTION

13-67. The jumpmaster prepares and inspects the MH-47 as follows:

- **Preparation.** The following steps prepare the MH-47 for jumping:
  - Install safety belts for each parachutist and extend all the way out to ensure positive hookup while seated.
  - Secure the permanently installed anchor line cable to the attachment points on the starboard side of the aircraft.
  - Incline the ramp for personnel parachute drops during flight.

> ***Note:*** The best incline is 3 degrees below the horizontal. Scribe marks may be placed on the ramp to show this degree of incline.

- **Inspection.** Before enplaning, the jumpmaster and the pilot, or pilot's representative, jointly inspect the aircraft to ensure—
  - Troop seats can be easily lifted and secured before jumping.
  - The ramp is clean and free of oil and water.
  - Seats are securely fastened in the down position.
  - Sufficient seat belts are available.
  - The anchor line cable is not frayed or worn and is secured to the attachment points (figures13-14 and figure 13-15, page 13-23).
  - The crew chief's headphones are available and function properly.

Figure 13-14. Forward anchor line cable (attachment)

Figure 13-15. Rear anchor line cable (attachment)

SEATING CONFIGURATION

13-68. The odd-numbered jumpers are seated on the starboard side, and the even-numbered jumpers are seated on the port side (figure 13-16, page 13-24).

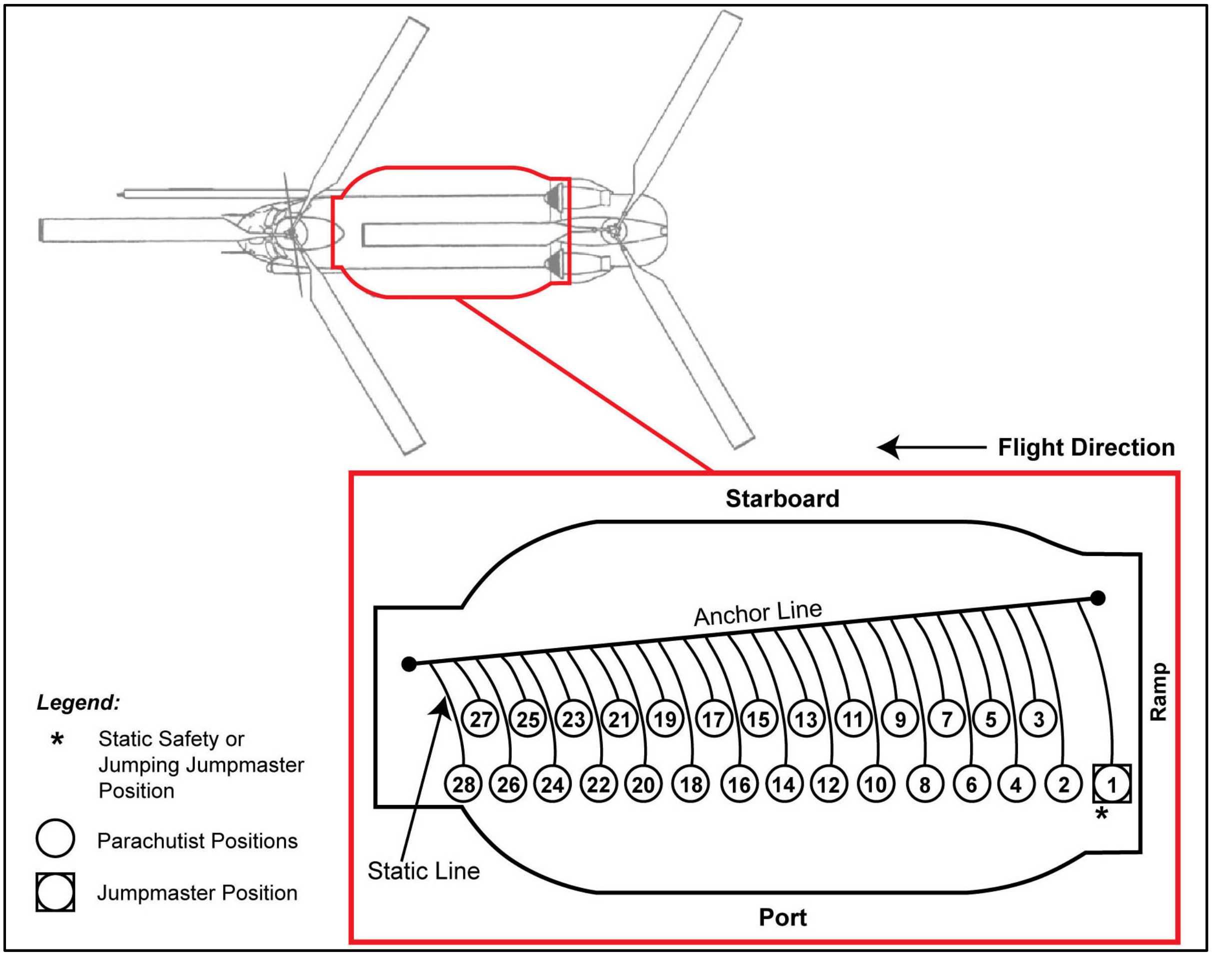

Figure 13-16. MH-47 seating configuration

JUMP PROCEDURES

13-69. When jumping from the MH-47 aircraft (rotary-wing) in the DBSL configuration, the jumpmaster will follow the same procedures outlined in Chapter 5 for jumping from a fixed-wing aircraft in the DBSL configuration.

JUMP COMMANDS

13-70. When jumping from the MH-47 aircraft (rotary-wing) in the DBSL configuration, the jumpmaster will utilize the same commands as outlined in Chapter 5 for jumping from a fixed-wing aircraft in the DBSL configuration.

Note: The jumpmaster or safety controls the flow from his position on the port side near the ramp hinge. Less than a 1-second interval between parachutists may result in entanglement of parachutists and static lines.

13-71. The jumpmaster issues the following commands:

- **LOAD AIRCRAFT.** On jumpmaster's signal, jumpers load the aircraft in reverse stick order.
- **DON HELMETS.** Jumpers don helmets and fasten seat belts. The jumpmaster gives this command prior to take-off. During training the jumpmaster will give the jumpers a 20-minute time warning. The jumpmaster may give this time warning at a later time on extended flights prior to the airborne operation.

- **UNFASTEN SEAT BELTS.** On the jumpmaster's command, jumpers unfasten seat belts. The jumpmaster gives this command upon reaching an altitude of 3,000 feet AGL or when the flight crew chief indicates that it is safe to do so. The jumpmaster may direct the jumpers to remove their helmets at his discretion.
- **20 MINUTES.** When the jumpmaster issues this warning all parachutists must be awake and keep their eyes on the jumpmaster.
- **10 MINUTES.** When the jumpmaster issues this warning, all parachutists must keep their eyes on the jumpmaster and must don helmets if they were removed.
- **WINDS.** The jumpmaster updates the parachutists on the wind speed from the DZ, expressed in knots.
- **CYPRES/PIN CHECK.** On the jumpmaster's signal, the jumpers lean forward and either the jumpmaster or assistant jumpmaster checks each CYPRES and its pin.
- **STAND UP.** The jumpmaster gives this command approximately 6 minutes from TOT. Each jumper passes the signal back, stands and faces the rear of the aircraft, and checks the CYPRES setting and pin of the jumper in front of him. Then he passes static line snap-hook of the jumper to his front to the appropriate side.
- **HOOK UP.** On the jumpmaster's signal, the parachutists pass the signal back, hook up to the anchor-line cable with the gate facing the skin of aircraft, and acquire a high reverse bight.
- **CHECK STATIC LINES.** The jumpmaster gives the command to check static lines. The parachutist passes the signal back, then starting with his own snap hook, traces the static line down to the reverse bight and through his hand with a thumbless grip. Next, he traces the static line of the jumper to his front from the shoulder to the first locking stow. He ensures no equipment is interfering with static line, such as, weapon, radio antennae. Last 2 jumpers turn to face the skin of the aircraft and check each other's static line if applicable.
- **CHECK EQUIPMENT.** The jumpmaster gives the command to check equipment. The jumper passes the signal back, then check all points of attachment:
  - Chinstrap.
  - Chest strap.
  - Quick-ejector snap-on lowering line.
  - Quick-ejector snap-on leg straps.
  - Equipment attaching straps.

  He then checks the location and seating of the release and reserve handles (pillows) and ensures that his goggles are down.
- **SOUND OFF FOR EQUIPMENT CHECK.** On the jumpmaster's signal, each jumper passes the signal back. Then starting from the last jumper in the pass, each jumper passes a thumb up, over the inboard shoulder of the jumper to his front. The jumpmaster receives the signal from the first jumper in the pass.

Note: If at any time a jumper experiences an equipment related problem, proper procedure requires that he extend his arm; thumb down, toward the center of the aircraft.

- **MOVE TO THE REAR.** The jumpmaster gives this command approximately 1 minute from TOT. Each parachutist passes the signal back, then the first jumper moves to the hinge of the ramp.
- **STAND BY.** The jumpmaster gives this command approximately 15 seconds out from TOT. Each jumper responds with a thumbs-up signal. The first jumper moves to the edge of ramp.

- **GO.** The jumpmaster gives this command at the release point. Jumpers exit as briefed.

Note: The command FOLLOW ME (Chapter 5, figure 5-17) can also be used when the jumpmaster is jumping and leading the stick out of the aircraft. The safety will control the jumpmaster's static line and the static line of all proceeding jumpers.

- **ABORT.** The jumpmaster gives this command when release conditions are not favorable. Jumpers then back up to the hinge of the ramp and await further instructions.

SAFETY PRECAUTIONS

13-72. Safety precautions on the MH-47 are as follows:

- **Parachutists.** Parachutists ensure that seats are secured in the up position with seat legs rotated inside the seats. Parachutists will exit from the center of the ramp in a good DBSL exit position. When following internal drop loads, parachutists exit between the ramp roller conveyor sections, staying as close to the center section of the ramp as possible. The parachutists jumping after external load drops, who are forward of the open floor hatch, remain clear of the opening until the load leaves the aircraft and the hatch is closed by the crew chief.
- **Jumpmaster.** The jumpmaster or safety personnel ensure that parachutists are hooked up consecutive number ordering from 1 through 28. If the jumpmaster does not jump, he wears a safety harness or back-up emergency parachute. He checks each parachutist after the parachutist hook ups and the jumpmaster controls the flow of parachutists. When an external load is delivered, the jumpmaster ensures the external load is clear and the aircraft has accelerated to a safe airdrop speed before dropping cargo bundles from the aircraft and before permitting parachutists to exit.
- **Safety Personnel.** If the jumpmaster jumps, one nonjumping safety is required; the safety wears an emergency parachute.
- **Equipment.** When cargo bundles are delivered, jumpmasters use 15-foot breakaway static lines with cargo parachutes. The ramp roller conveyor section is installed on the starboard side of the ramp and is used to help eject the bundles from the cargo ramp. The parachutists numbered 1 and 2 push the bundles out.

MH-47 AIRCRAFT EMERGENCIES

13-73. Although 98 percent of airborne emergencies take place after the jumper has exited the aircraft, there are a few emergencies that can take place aboard the aircraft while it is in-flight, to include take-off and landing. It is imperative that you keep your eyes on the jumpmaster at all times while aboard an aircraft. Parachutists should learn the locations of emergency exits and how to open them and secure all loose items that could be tossed around and injure parachutists. The procedures established by this publication in response to emergency situations when jumping the MH-47 are proven to be the most successful when jumping the RA-1 ARAPS in the DBSL configuration.

MH-47 Rotary-Wing Crash Landing (0 to 1,000 Feet AGL)

13-74. In the event of an in-flight emergency between takeoff and 1,000 feet AGL, jumpers will—

- Assume the emergency landing position. Jumpers will place their heads between their legs and cradle their heads with their forearms and hands. The safety or seat belt should still be secured at this altitude. If not, jumpers will reattach and secure safety or seat belt.
- Wait for the aircraft and rotary blades to come to a complete stop after landing.
- Disconnect the safety or seat belt, exit and assemble upwind in a safe direction indicated by the jumpmaster, crew chief, or senior jumper.
- Conduct a head count, administer first aid, and signal for help.

MH-47 Rotary-Wing Emergency Bailout (1, 001 to 3,000 Feet AGL)

13-75. In the event of an emergency bailout between 1,001 and 3,000 feet AGL, the following will happen:

- 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 place a clinched fist by his reserve ripcord and thrust his arm out to the side.
- Jumpers will not crowd toward the tail of the aircraft, as that may cause the pilot to lose control.
- Jumpers will exit single file on the jumpmaster's command in a DBSL rotary-wing pike exit body position.
- Upon clearing the aircraft, jumpers will pull the reserve ripcord handle immediately.
- Once under canopy, jumpers will complete the canopy controllability check and attempt to land with the other jumpers.
- Jumpers will assemble for a head count.

MH-47 Rotary-Wing Emergency Bailout (3,001 Feet AGL and Above)

13-76. In the event of an emergency bailout at 3,001 feet AGL and above, the following will happen:

- The jumpmaster will give the emergency bailout signal.
- Jumpers will stand up, hook up, and exit on the jumpmaster's command.
- Jumpers will not crowd toward the tail of the aircraft, as that may cause the pilot to lose control.
- If time does not permit, the jumpmaster will place a clenched fist by his reserve ripcord and thrust his arm out to the side. Jumpers will—
  - Exit on the jumpmaster's command, clear the aircraft, and pull the reserve ripcord handle immediately.
  - Complete the canopy controllability check and attempt to land with other jumpers.
  - Assemble for a head count.
- If time permits the jumpmaster will give jump commands. Jumpers will—
  - Exit the aircraft in a good DBSL rotary-wing pike exit body position.
  - Complete the canopy controllability check and attempt to land with other jumpers.
  - Assemble for a head count.

Premature Deployment Inside the MH-47 Aircraft

13-77. In the event that a main parachute container opens or reserve parachute prematurely deploys inside the aircraft, the first person to notice will shout, "PILOT CHUTE" and attempt to contain the open container, pilot chute, or parachute.

13-78. Follow these procedures in the event of a premature deployment inside the MH-47 aircraft:

- Notify the jumpmaster and other jumpers immediately to ensure the ramp and or doors remain closed.
- Move the affected jumper to a forward safe location inside the aircraft.
- If the main container is open, cut away the main and place it inside a kit bag.
- The affected jumper keeps his harness and reserve on, sits with seat belt fastened, and lands with the aircraft.
- If the reserve pilot chute is deployed, the affected jumper removes his parachute, places it in his kit bag, sits with seat belt fastened, and lands with the aircraft.

Note: If at any time the pilot chute or parachute gets outside the aircraft, the jumper must exit immediately.

Altimeter Failure Inside the MH-47 Aircraft

13-79. The jumper will get the attention of the jumpmaster. The jumpmaster will replace the altimeter with the spare altimeter. If an altimeter is not available, the jumper will be moved to the front of the aircraft, seated and fasten his seat belt. He will not jump.

Note: The jumper directly impacted by the altimeter failure can exit the aircraft in an emergency situation.

Equipment Malfunction Inside the MH-47 Aircraft

13-80. The jumper will get the attention of the jumpmaster. The jumpmaster will correct the malfunction or make the determination for the jumper to land with the aircraft.

JUMPER EMERGENCIES DURING ROTARY-WING EXIT (MH-47)

13-81. The following paragraphs detail the prescribed procedures for emergencies during a rotary-wing exit from the MH-47.

Broken Static Line

13-82. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Broken Anchor Line Cable

13-83. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will verify that there is no main parachute deployment, and he will immediately pull the reserve ripcord handle for total malfunction.

Failure to Hook Up

13-84. The jumper will maintain a good DBSL pike exit body position. After a 6-second count, he will immediately pull the reserve ripcord handle for total malfunction.

Jumper in Tow by Static Line (MH-47)

13-85. A jumper may either be conscious or unconscious when in tow by his static line. When a jumper is in tow by his static line the jumpmaster and or the jumper will follow the procedures detailed in the following paragraphs.

Conscious Jumper

13-86. In the event of a towed jumper on a MH-47 rotary-wing aircraft, the jumpmaster will prevent any other jumpers from exiting and will notify the pilot. The towed parachutist will transition from the DBSL pike exit position to a tight body position, protecting the reserve ripcord handle. The safety or static jumpmaster and crew chief will use the retrieval system, if available, to pull the towed jumper back into the aircraft. If the jumper is attached by his equipment, the jumpmaster will attempt to shake or cut him free. The jumpmaster should ensure that the assistant jumpmaster and aircrew have an operational retrieval system and that they are capable of using the retrieval system. If the aircraft does not have a retrieval system, the jumpmaster will ensure the jumper is securely attached to the aircraft and will not break free during aircraft descent.

13-87. If the jumper feels himself falling free, he will start his 6-second count and attempt to gain a DBSL exit body position. At the end of the 6-second count, the jumper will look up at his canopy and verify that it has opened. If the jumper's canopy has failed to open, he will immediately pull the reserve ripcord handle. If the jumper is positively attached to the aircraft, the aircraft will slowly descend to the

DZ and come to a hover, and the jumper will be freed from the aircraft. These procedures will be covered during prejump training.

> ***Note:*** A towed jumper must ensure that he conducts a 6-second count after being cut away to prevent from having a dual deployment of his main and reserve parachute.
>
> ***Note:*** For combat operations or in areas where the rotary-wing aircraft cannot descend, the jumpmaster may cut the static line. This will be briefed prior to the airborne operation.

Unconscious Jumper

13-88. The jumpmaster will notify the pilot. The jumpmaster will attempt to secure or retrieve the jumper inside the aircraft. If unsuccessful, the aircraft will slowly descend to the DZ, and the jumpmaster will free the jumper from the aircraft.

Jumper in Tow by Equipment

13-89. Whether the jumper is conscious or unconscious, the jumpmaster will attempt to free or cut his equipment free and the jumper's main parachute will deploy. The jumper will maintain a tight DBSL pike exit body position. As the jumper feels himself falling free, he will start his 6-second count and maintain a good DBSL pike exit position.

Lost or Broken Goggles

13-90. The jumper will maintain a good DBSL pike exit position. After the canopy deploys and the jumper has control, if possible, he will put the broken goggles over eyes.

Lost Altimeter or Broken Altimeter Under Canopy

13-91. The jumper will maintain altitude awareness on descent by observing other jumpers.

> ***Note:*** All cutaway procedures, parachutist postopening procedures, controllability checks, malfunction procedures, canopy entanglement procedures, and parachutist emergency landing procedures will remain the same when jumping the RA-1 ARAPS in the DBSL configuration, whether jumping from fixed-wing or rotary-wing aircraft.

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Chapter 14

Drop Zone Operations

This chapter outlines the basic selection criteria, markings, and procedures used in support of DBSL 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.

OVERVIEW

14-1. A DZ is any designated area where personnel and equipment may be delivered by means of parachute or free drop. DZs for DBSL operations are selected during premission planning using all available intelligence sources. DZs are selected by the ground unit commander and are located 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

14-2. The airborne commander designates key personnel for each DBSL operation. The airborne commander gives the designated primary jumpmaster control over and responsibility for all airborne personnel and their associated equipment onboard a jump aircraft. These key personnel are the—

- Primary Jumpmaster.
- Assistant Jumpmaster.
- Safety Personnel.
- Departure Airfield Control Officer.
- DZ Safety Officer or DZ Support Team Leader.
- Malfunction Officer.
- Oxygen Safety Personnel (when required).

14-3. The qualifications and responsibilities of DZ support personnel are listed in the paragraphs below.

> ***Note:*** USASOC Regulation 350-2 and TC 3-21.220 include further discussion of responsibilities during airborne operations.

JOINT DROP ZONE RESPONSIBILITIES

14-4. DZ size and selection are the joint responsibility of the air component commander and the supported force commander. The supporting air unit is responsible for airdrop accuracy and safety of flight.

14-5. 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. AFI 13-217 has additional information.

> ***Note:*** The jumpmaster will determine the minimum size DZ based on the number of personnel to be dropped, jumper proficiency, and the prevailing winds.

14-6. If the selected DZ is not in the Assault Zone Availability Report, the unit must complete the survey request in full 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—

- 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 or 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 or agency must be attached to the request.
- 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.

DROP ZONE SELECTION CRITERIA

14-7. 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 are—
  - Method of insertion (DBSL high-altitude or low altitude).
  - 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 has 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 DBSL DZs according to AFI 13-217. The jumpmaster will determine the minimum size of a DBSL 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 (DZ 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 hill's steepness 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 on this entanglement of trees and branches as the parachute carries jumper forward on landing.
  - **Ice.** There is a higher probability of injury occurring if a jumper breaks through ice. The situation will likely be more serious if bodies of water went undetected due to snowy landscape. There is a possibility of more jumpers being needed to assist with recovery and medical attention, taking away from conducting mission.
  - **Water.** Landing in water could require additional equipment and personnel to recover lost and damaged equipment. Recovery time could take away from mission. Parachutist flotation device will be worn if there is a water obstacle located within 1,000 meters from any edge of the DZ that has a depth of four feet.
  - **Rocky Ground.** Large outcroppings can be notorious for blocking wind. Landings could be rough. There is a possibility of more jumpers 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. This assessment must include, as a minimum, 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 or escape headings, or remove inexperienced jumpers from the stick. If possible, power lines should be marked with visual markings (lights, smoke, or visual signals-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

14-8. A DZ survey is required for all airdrop training missions involving U.S. personnel and equipment. Completing the DZ survey process involves 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. 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. The using unit is defined as the unit whose personnel or equipment are being airdropped.

14-9. The DZ survey review process involves the following steps:

- **Step 1.** The surveyor or DBSL jumpmaster (Air Force Form 3823, Item 4a) physically surveys the DZ and completes the ground portion of Air Force Form 3823. Once completed, Air Force Form 3823 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 Air Force Form 3823 is complete, accurate, and meets the criteria for planned airborne operations.
- **Step 2.** The using unit forwards the survey to the USAF 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.

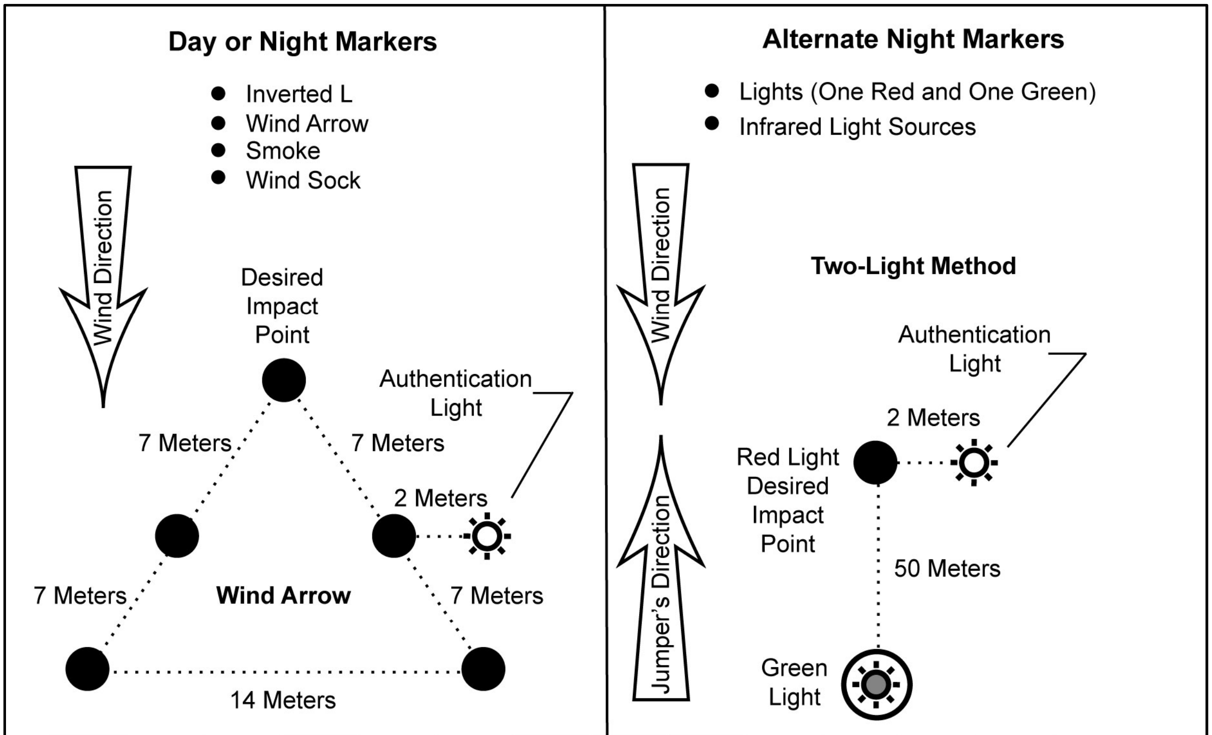
14-10. The Zone Availability Report is a comprehensive listing of approved assault zones available for use by the Department of Defense. Use of the Zone Availability Report will expedite mission planning, enhance safety, and avoid duplication of surveys. Information contained in the Zone Availability 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).

DOUBLE-BAG STATIC LINE DROP ZONE MARKINGS

14-11. DBSL infiltrations usually take place on blind DZs because of the general ineffectiveness of visual markings when viewed from and extended distances (DBSL high altitude). DZ identification is normally by location in relation to major terrain features.

14-12. 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. Approved markers include the wind sock, wind streamer, wind blade, wind arrow, smoke, two-light method (one red and one green), wind "T," and infrared light source.

14-13. There are several types of wind socks (figure 14-2, page 14-5) that are used on airfields and DZs for DBSL. Normally, a wind sock is what is seen on airfields for aircraft but can assist jumpers as well in determining the direction and velocity (somewhat) of the wind. Wind socks come in 5-knot, 10-knot, 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. Double-bag static line drop zone markings

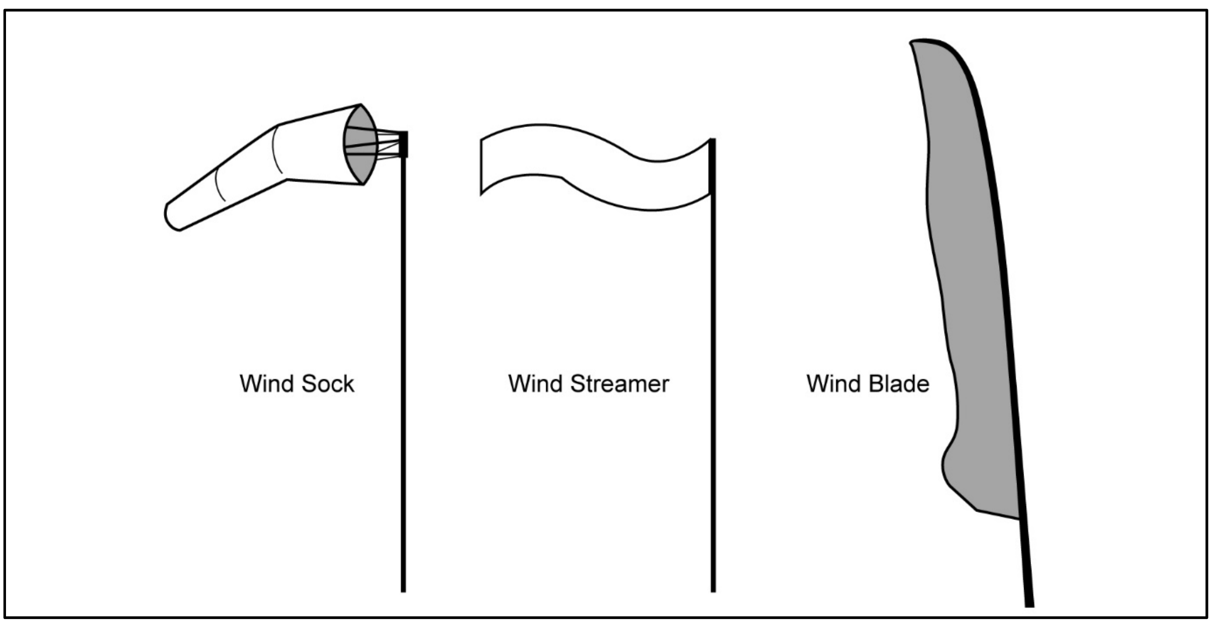


Figure 14-2. Examples of wind socks

14-14. For DBSL 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 DBSL 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 Drop Zone at the MFF School in Yuma, Arizona.

NONSTANDARD DROP ZONE MARKINGS

14-15. 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.

14-16. 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.

14-17. The two DZ marking systems commonly used during DBSL 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

14-18. 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. For additional information on water DZs reference Appendix I.

> ***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

14-19. 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 DBSL airdrops, the beacons will be placed on the point of impact (AFI 13-217).

HIGH-ALTITUDE RELEASE POINT AND DROP ZONE DETECTION

14-20. The high altitude release point location is identified in relation to major terrain features. Appendix H 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 where 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 Global Positioning System (GPS) with portable terminals.

AIRCRAFT OR HIGH-ALTITUDE HIGH-OPENING TEAM IDENTIFICATION

14-21. In air-to-ground identification, the aircraft or DBSL team identifies itself to the reception committee by arriving in the objective area within the specified time limit. The aircraft or DBSL team also identifies itself by approaching at the designated drop altitude and track of the aircraft approach heading.

14-22. 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 using the proper authentication code signal.

AUTHENTICATION SYSTEM

14-23. There is no standard authentication system for unconventional warfare reception operations. During mission planning, the commanders agree on the authentication system they will use. Signal operation instructions prescribe the authentication procedures.

14-24. 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 positioning and turn-on and turn-off times during mission planning.

Detachments conducting DBSL operations during special reconnaissance missions are not going to have the opportunity, in most cases, of being assisted by a reception committee or lighted DZ during the infiltration. This type of operation will take additional planning and rehearsals on the detachment’s part. 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 detachment and 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 for the RA-1 in DBSL parachute configuration.

Note: 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 left to right.

Note: All references to right or left are the jumper's right or left, unless otherwise indicated.

Note: The JMPI sequence for DBSL is similar to the JMPI sequence for MFF. Some steps will be skipped from the sequence and some added. Jumpmasters must ensure all steps for the DBSL configuration are covered.

Note: Sections within this appendix cover the JMPI sequence for the RA-1 when jumping in the DBSL configuration for administrative non-tactical, combat equipment, and oxygen.

WARNING

There may be changes to the JMPI procedures as new equipment and procedures are developed. Jumpmasters must ensure that they are using the latest JMPI procedures taught at the USAJFKSWCS Military Free-Fall School when conducting JMPIs.

ADMINISTRATIVE NONTACTICAL JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR DOUBLE-BAG STATIC LINE OPERATIONS

A-1. Figure A-1, pages A-1 through A-8, describes the JMPI sequence of the RA-1 with the Military CYPRES and ACH-ARC with Head-Loc retention system for administrative, nontactical jumps.

Inspection sequence of the RA-1 parachute system with the Military CYPRES and ACH fitted with Accessory Rail Connector Kit and Head-Loc Retention 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 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.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps

(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 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. 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 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) Leaving your left hand in place, use your right hand to grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn, ensuring it rotates freely and is not elongated. Grasp the medium ring, give it a 1⁄4-turn, ensuring 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. Use your left hand to 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. Use your thumbs and 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 DBSL configuration, skip to step 11. There will be no main ripcord handle present.

(9) Use your left hand to 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, pin it back with your left thumb. Use your right index finger to inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. Use your right index finger to trace the hook-pile tape of the main canopy release handle, ensuring it is at least 50-percent mated.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

(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.

Key Words: "PROPER FIT"

(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 inboard 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 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"

(16) Leave your left hand in place. Your right hand becomes the working hand. Use the right index finger to ensure 2 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 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) Use your right hand to open 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.

(19) Leaving your right hand in place, use your left hand to 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 tee locking loop is not twisted over the top of the cable. With your thumbs, lift the outside edge of the riser. CHECK 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"

(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 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 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 to expose 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 to expose 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 that colors with respect to the sizing and stitching on the main lift webs match. If they do not, the jumpmaster will ensure they do before continuing the inspection.

Key Words: "I SEE GREEN" (or whatever color is visible)

Key Words: "CORRECT" or "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, use your right hand to seek out the lateral adjustment strap and ensure 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 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 for no twists. When you encounter the excess rolled and stowed portion of the waistband, give it a 1⁄4-turn outward and inspect behind 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. Once you encounter the friction adapter, insert your left hand, palm facing out in an overhand motion. Sweep the friction adapter with your left or right thumb, inspecting for proper routing. Continue to inspect the waistband until your left hand meets the left main 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. 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, use your right hand to seek out the lateral adjustment strap and ensure 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 to ensure that 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. 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 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 and 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 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 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 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 there are no twists. Inspect excess webbing, making sure it is rolled inboard and stowed properly with a heavyweight retainer 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 jumper's leg strap. Trace with your left hand along the leg strap, inspecting and ensuring there are no twists until you reach the saddle, or until your hand stops between the jumper's legs.

Note: For DBSL, ensure that the saddle strap modification is in place.

(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, ensuring 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, "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 its 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 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.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

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 heavy weight retainer band to ensure it is properly attached to the wrist strap.

Key Words: "TAP, SNAP, JUMPER TURN"

Instruct the jumper, "JUMPER, TURN."

(44) **ACH (Rear) with Head-Loc Retention System and ARC.** Once the jumper turns 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. Use the working hand to 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, are flush with the outer rim, and 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) Use your right index finger to find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current DBSL operation.

Key Words: "1500/35 A, CORRECT" or "2500/29 A, INCORRECT"

(48) Use your right index finger to find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

Key Words: "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 predetermined millibar 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"

(50) Grasp the reserve flap with both hands and lift up to expose the reserve components.

(51) Use either hand to find the reserve ripcord cable as it 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, 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 the pin to make sure it is not shouldered inside the grommet, it is not bent, and it is inserted into the protective sleeve. Inspect the CYPRES closing loop of the reserve (white Dyneema material loop) for frays.

Key Words: "NOT SHOULDERED, BENT OR FRAYED, JUMPER BEND"

(54) **Universal Static Line Snap Hook.** After completing your inspection of the reserve, seek out the universal static line snap hook (with your right hand) located on the right side of the container in the stow pocket.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

(55) Grasp the universal static line snap hook with your right hand. Open your right hand and let the universal static line snap hook rest in the palm. Place the left index finger on the girth hitch of the universal static line. Ensure the green ID marking thread is present and the girth hitch has not been reversed. Place the index finger of the left hand in the vicinity of the rivet pin, to ensure it is present and free of rust and corrosion.

(56) Use your right hand, re-grasp the universal static line snap hook and hold it perpendicular to the reserve parachute with the spring opening gate facing toward the jumper. Use your left hand—palm facing the jumper, thumb pointing downward—to grasp the universal static line just above the universal static line snap hook. Rotate the universal static line down and to the jumper's right; push the universal static line toward the universal static line snap hook. Visually inspect inside the girth hitch to ensure it is free of all cuts, frays, and burns. Use your index finger or thumb of your right hand to push the girth hitch back toward the universal static line snap hook and again visually inspect inside the girth hitch for any cuts, frays, or burns. Re-dress the girth hitch down around the narrow portion of the universal static line snap hook and release the universal static line with the left hand.

(57) Raise your right hand up, simultaneously inspecting the universal static line as it passes through the O to ensure it is free of all cuts, frays, or burns. Raise your right hand as high as it can go.

(58) Your right hand should be raised high enough so as to keep the universal static line tight between the hand and the first stow. Place your index finger (or index and middle finger) of the left hand behind the universal static line and below the right hand to make skin-to-skin contact. Trace the universal static line down to ensure it is free of all cuts, frays, and burns and it has not been misrouted to the first stow.

(59) With either hand, form a bite in the universal static line and look at the static line slack retainer loop. Ensure it is present, serviceable, and that a static line slack retainer band is attached.

(60) Place the bite on top of the pack tray and control it with either hand. This hand becomes the control hand. The opposite hand becomes the working hand. Use your index finger and thumb of your working hand to pinch off the first stow and pull it 1 to 2 inches toward the center of the pack tray. Look behind the first stow and ensure the universal static line is free of cuts, frays, or burns and has not been misrouted around the static line stow bar. Release the first stow and let it pop back into place.

(61) Insert the index finger of your working hand from bottom to top behind the first strand of the universal static line as close as possible to the first stow. Trace the first strand of the universal static line ensuring that it is free of all cuts, frays, or burns to the second stow. Use your index finger and thumb of the working hand to pinch it off and pull 1 inch to 2 inches toward the center of the pack tray and conduct the same inspection. Place the index finger or thumb of your working hand from bottom to top behind the second strand of the universal static line and trace it to ensure it is not cut, frayed, or burned.

Note: Use only the index finger when tracing the universal static line toward you.

(62) Continue to inspect the universal static line to the main closing flap in the same manner. Ensure the last strand of the universal static line is routed from the left outer static line stow bar and inspected with the index finger only.

(63) Contain the universal static line snap hook with your left hand and open up the main protector flap with your right hand.

(64) Use your right hand to 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 top side of the container; ensure the top was closed second. Then slide your hand across the left 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 right closing flap and ensure that it was closed fourth.

Key Words: "LEFT, RIGHT"

(65) Inspect the main curved pin attaching loop to ensure that it is properly attached to both the universal static line and the main curved pin. Additionally, inspect to ensure that the main curved pin is on top of the universal static line. Inspect the main curved pin from its point of attachment to ensure it is not bent, cracked, or corroded and is properly routed top to bottom and facing from left to right through the main closing loop. Visually inspect the main closing loop to ensure it is not cut, frayed, or burned more than 50-percent and the main curved pin is not puncturing it in any manner. Conduct a visual inspection of the grommet to ensure it is not bent, cracked, or corroded.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

Key Words: "NOT SHOULDERED OR FRAYED"

(66) Next inspect that the excess universal static line is routed off to the right and is tucked under the right closing flap, ensuring there is no excess sticking out.

(67) At this time gently tap the bottom of the container. This indicates that your inspection is now complete.

Upon completion of the JMPI, start the separate inspection of the HAHO seat.

(1) Locate the left side quick-ejector snap that attaches the seat on the left side of the jumper below the reserve ripcord stow pocket. Press up on the locking gate with your right index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(2) With your right index finger trace the left seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper also ensuring there are no twists.

(3) Visually inspect the seat ensuring it is oriented in the right direction with the hook-pile tape facing up and toward the jumpers legs.

(4) Locate the right side quick-ejector snap that attaches the seat on the right side of the jumper below the main ripcord stow pocket. Press up on the locking gate with your left index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(5) With your left index finger trace the right seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper. Ensure there are no twists.

Note: Ensure the seat is tight enough on the jumper so it will not cause problems on exit.

Figure A-1. Jumpmaster personnel inspection sequence for administrative, nontactical jumps (continued)

JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR COMBAT EQUIPMENT AND WEAPON

A-2. Figure A-2, page A-8 to A-15 describes the JMPI sequence of the RA-1 ARAPS with the Military CYPRES, weapon, and ACH–ARC with Head-Loc retention 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 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.

(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.

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 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) Leaving your left hand in place, use your right hand to grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn, ensuring it rotates freely and is not elongated. Grasp the medium ring and give it a 1⁄4-turn, ensuring 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. Use your left hand to 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. Use your thumbs to 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 DBSL configuration, skip to step 11. There will be no main ripcord handle present.

(9) Use your left hand to trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure the clamp is present. Inspect the cable, ensuring 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. Use your right index finger to inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. Use your right index finger to 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 inboard 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 Words: "WEAPON"

(15) Place your left index and middle fingers on the chest strap. Visually 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.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(16) Keep your left hand in place as your reference hand. Use your right index finger to 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 butt stock 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 butt stock. 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 and that it is not protruding high on the jumper's shoulder or inhibiting the jumper's movement.

(17) Continue to trace the weapon's sling to its attachment point on the butt stock. 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. Inspect 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, use your right hand to find the zipper and ensure it is zipped. Next, use your right thumb and index finger to 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 your hands 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 inspecting the weapon, bring your left index and middle fingers under 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 to ensure that 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. Use the right index finger to ensure that 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) Use your right hand to open 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) Leaving your right hand in place, use your left hand to grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn, ensuring 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).

(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 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 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"

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 the pelican hook is routed through the ring and that 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 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 to expose 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)

(35) Ensure the RIGHT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Words: "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 to expose 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 that colors with respect to the sizing and stitching on the main lift webs match. If they do not, the jumpmaster will ensure they do before continuing the inspection.

Key Words: "I SEE GREEN" (or whatever color is visible)

Note: 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.

Key Word: "WAISTBAND"

Instruct the jumper, "JUMPER, HOLD."

(37) With an overhand motion, palm facing you, use your right hand to seek out the lateral adjustment strap and ensure 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)

(39) Trace the waistband forward with your left hand, inspecting from your left to your right ensuring there are no twists 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 inboard 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 friction adapter with your left or right thumb, inspecting for proper routing. Continue to inspect the waistband until your left hand meets the left main 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. Continue with the right hand on the waistband, ensuring it is routed through the keeper on the accessory pouch and sewn at least 50-percent to the harness-container assembly.

Note: The waistband routing through the M4 carrying handle is optional.

(40) With either an underhand or overhand motion, palm facing you, use your right hand to seek out the lateral adjustment strap and ensure 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."

(41) 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 free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate ensuring it is closed properly.

(42) 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 inboard and stowed properly with a heavyweight retainer band or slack retainer.

(43) 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 there are no twists until you reach the saddle or until your hand stops between the jumper's legs.

(44) 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 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 the same side.

(45) 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 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.

(46) 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 inboard and stowed properly with a heavyweight retainer band or slack retainer.

(47) 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 there are no twists until you reach the saddle, or until your hand stops between the jumper's legs.

Note: For DBSL, ensure that the saddle strap modification is in place.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(48) With 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 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 the same side.

Note: If the jumper wears a CMWH, command the jumper, "JUMPER, RECOVER." Otherwise continue your inspection as follows.

(49) 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 its 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 to ensure the lens is clear and free of damage.

Key Words: "+500, +500 CORRECT", or "-500, +500 INCORRECT"

(50) 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."

(51) **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. Use the working hand to 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, are flush with the outer rim, and the oval pads are covering the bolt ends.

(52) 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 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.

(53) Move your right hand to the CYPRES control unit in its clear window.

(54) Use your right index finger to find and point at the CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current DBSL operation.

Key Words: "1500/35 A, CORRECT" or "2500/29 A, INCORRECT"

(55) Use your right index finger to find and point at the CYPRES control unit's LED indicator light. It should NOT be lit.

Key Words: "NO LED"

(56) 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 setting of the CYPRES.

Key Words: "788","788","CORRECT", or "INCORRECT"

(57) Grasp the reserve flap with both hands and lift up to expose the reserve components.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(58) Use either hand to 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, RSL assist ring, and 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"

(59) 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.

(60) Once you are at the top of the pin, inspect it to make sure it is not shouldered inside the grommet and 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 DBSL configuration do not proceed with anymore inspection points listed under the MFF mode, refer to the DBSL configuration below.

Key Words: "NOT SHOULDERED", "BENT" or "FRAYED", "JUMPER BEND"

(61) **Universal Static Line Snap Hook.** After completing your inspection of the reserve, seek out the universal static line snap hook (with your right hand) located on the right side of the container in the stow pocket.

(62) Grasp the universal static line snap hook with your right hand. Open the right hand and let the universal static line snap hook rest in the palm. Place the index finger of your hand on the girth hitch of the universal static line. Ensure the Green ID marking thread is present and the girth hitch has not been reversed. Place the index finger of the left hand in the vicinity of the rivet pin, to ensure it is present and free of rust and corrosion.

(63) Use your right hand, re-grasp the universal static line snap hook and hold it perpendicular to the reserve parachute with the spring opening gate facing toward the jumper. Use your left hand—palm facing the jumper, thumb pointing downward—to grasp the universal static line just above the universal static line snap hook. Rotate the universal static line down and to the jumper's right and push it toward the universal static line snap hook. Visually inspect inside the girth hitch to ensure it is free of all cuts, frays, and burns. Use your index finger or thumb of your right hand to push the girth hitch back toward the universal static line snap hook and again visually inspect inside the girth hitch for any cuts, frays or burns. Re-dress the girth hitch down around the narrow portion of the universal static line snap hook and release the universal static line with the left hand.

(64) Raise your right hand up, simultaneously inspecting the universal static line as it passes through the O to ensure it is free of all cuts, frays, or burns. Raise your right hand as high as it can go.

(65) Your right hand should be raised high enough so as to keep the universal static line tight between the hand and the first stow. Place your index finger (or index and middle finger) of the left hand behind the universal static line below the right hand to make skin-to-skin contact. Trace the universal static line down to ensure it is free of all cuts, frays, burns and it has not been misrouted to the first stow.

(66) With either hand, form a bite in the universal static line and look at the static line slack retainer loop. Ensure it is present and serviceable and that a static line slack retainer band is attached.

(67) Place the bite on top of the pack tray and control it with either hand. This hand becomes the control hand. The opposite hand becomes the working hand. Use your index finger and thumb of your working hand to pinch off the first stow and pull it 1 to 2 inches toward the center of the pack tray. Look behind the first stow and ensure the universal static line is free of cuts, frays, or burns and has not been misrouted around the static line stow bar. Release the first stow and let it pop back into place.

(68) Insert the index finger of your working hand from bottom to top behind the first strand of the universal static line as close as possible to the first stow. Trace the first strand of the universal static line, ensure that it is free of all cuts, frays, or burns to the second stow. Use your index finger and thumb of the working hand to pinch it off and pull 1 to 2 inches toward the center of the pack tray and conduct the same inspection. Place the index finger or thumb of your working hand from bottom to top behind the second strand of the universal static line and trace it to ensure it is not cut, frayed, or burned.

Note: Use only the index finger when tracing the universal static line toward you.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

(69) Continue to inspect the universal static line to the main closing flap in the same manner. Ensure the last strand of the universal static line is routed from the left outer static line stow bar and inspected with the index finger only.

(70) Contain the universal static line snap hook with your left hand and open up the main protector flap with your right hand.

(71) Use your right hand to 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 top side of the container; ensure the top was closed second. Then, slide your hand across the left 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 right closing flap; ensure that it was closed fourth.

Key Words: "LEFT, RIGHT"

(72) Inspect the main curved pin attaching loop to ensure that it is properly attached to both the universal static line and the main curved pin. Additionally, inspect to ensure that the main curved pin is on top of the universal static line. Inspect the main curved pin from its point of attachment to ensure it is not bent, cracked, or corroded and is properly routed top to bottom and facing from left to right through the main closing loop. Visually inspect the main closing loop to ensure it is not, cut, frayed, or burned more than 50-percent and the main curved pin is not puncturing it in any manner. Conduct a visual inspection of the grommet to ensure it is not bent, cracked, or corroded.

Key Words: "NOT SHOULDERED OR FRAYED"

(73) Next, inspect that the excess universal static line is routed off to the right and is tucked under the right closing flap, ensuring there is no excess sticking out.

(74) At this time, gently tap the bottom of the container. This indicates that your inspection is now complete.

Upon completion of the JMPI, start the separate inspection of the HAHO seat.

(1) Locate the left side quick-ejector snap that attaches the seat on the left side of the jumper below the reserve ripcord stow pocket. Press up on the locking gate with your right index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(2) With your right index finger, trace the left seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper. Ensure there are no twists.

(3) Visually inspect the seat, ensuring it is oriented in the right direction with the hook-pile tape facing up and toward the jumper's legs.

(4) Locate the right side quick-ejector snap that attaches the seat on the right side of the jumper below the main ripcord stow pocket. Press up on the locking gate with your left index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(5) With your left index finger, trace the right seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper. Ensure there are no twists.

Note: Ensure the seat is tight enough on the jumper so it will not cause problems on exit.

Figure A-2. Jumpmaster personnel inspection sequence for combat equipment and weapon (continued)

COMBAT EQUIPMENT AND OXYGEN JUMPMASTER PERSONNEL INSPECTION SEQUENCE FOR DOUBLE-BAG STATIC LINE OPERATIONS

A-3. The following paragraphs and figures detail the JMPI sequences for the combat equipment and oxygen for DBSL jumps.

A-4. Figure A-3, pages A-16 through A-25, describes the inspection sequence for the POM and the Twin-53 oxygen system as worn with the ACH-ARC fitted with oxygen single straps and the RA-1 parachute system.

Note: The Twin-53 is not recommended for HAHO operations with the RA-1 at exit altitudes above 17,500 feet MSL. This is due to the increased probability of parachutists consuming available supplemental oxygen as experienced during live jumps.

Note: The 3,000-psi PHANTOM jump bottle system is compatible with the POM and RA-1 and can be filled with nearly twice the amount of oxygen as the Twin-53.

Note: When wearing the POM and conducting DBSL operations above 17,500 feet MSL, parachutists should use the 3,000-psi PHANTOM jump bottle system or similar high capacity oxygen bottle system in lieu of the Twin-53 bottle system. Reference Chapter 12 for rigging the 3000 psi bottle and pouch to the RA-1 ARAPS.

Inspection sequence of the Twin-53 oxygen system.

(1) Position yourself in front of the jumper and state the presentation of the jumper. Begin by visually checking that the mask is attached to the left side of the jumper's helmet.

Key Word: "O2"

(2) Use your right hand to grasp the mask on the outside portion on the hard shell 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. Use your left index finger to point to the exhalation valve. 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 exposing the inside of the mask. Inspect 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. Then, 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.

Key Words: "NO DEBRIS"

(4) Use your right hand to gently pull out and rotate the mask on the jumper's face. Use the left hand to connect the release buckle on the right side of the jumper's helmet to ensure 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) Use the right index finger to trace from the Fastex buckle on the left side of the mask up the left oxygen single strap to the Head-Loc tab to check 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) Use your left index finger to trace from the release buckle on the right side of the mask up the right oxygen single strap to the Head-Loc tab to check 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.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment

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 POM inspection as normal.

(7) Using 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. At this time, grasp the union elbow and medium-pressure delivery hose with your right hand as a reference.

Key Words: "1, 2, 3, 4 SCREWS"

(9) Visually inspect the hard shell for cracks. Use your left hand to 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"

(10) Use your left index finger to point to the intercom block on the top of the mask to ensure 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. Use your left hand to gently shake and attempt to twist the regulator to ensure it is secure.

Key Word: "TIGHT"

(13) Leaving your left hand in place, use your right hand to 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 to ensure 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.

(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.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

Key Words: "THROUGH AND THROUGH"

Move to the right side of the jumper. Instruct the Jumper: "JUMPER, RAISE YOUR ARM."

(17) Use your left hand to 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, ensuring the connection rotates freely.

Key Words: "TIGHT, TURN"

(18) Use your right index finger to 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) Use your left hand to pull up on the oxygen 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.

Key Words: "LOCK ON"

Step in front of your jumper and 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. Use your right hand to 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.

Inspection sequence of the RA-1 parachute system with the Military CYPRES and ACH fitted with ARC Kit and Head-Loc Retention System.

(23) **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, 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.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(27) 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. 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.

(28) Leaving your right hand on the chinstrap as your reference hand, open 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 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.

(29) Leaving your left hand in place, use your right hand to grasp the small ring of the three-ring riser release assembly. Give it a 1⁄4-turn, ensure it rotates freely and is not elongated. Grasp the medium ring, give it a 1⁄4-turn, ensure it rotates freely and is not elongated. Grasp the medium ring, give it a 1⁄4-turn, 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).

(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"

Note: When inspecting the RA-1 in the DBSL configuration, skip to step 11; there will be no main ripcord handle present.

(31) Use your left hand to trace the main ripcord cable-housing forward to where it ends and the cable protrudes; make sure the clamp 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"

(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. Use your right index finger to inspect the main canopy release cables as they protrude from the housing, making sure they are not twisted. Use your right index finger to 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 inboard 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"

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(37) Place your left index and middle fingers on the chest strap. Visually 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.

(38) Keep your left hand in place as your reference hand. Use your right index finger to 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 butt stock 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 butt stock. 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 and that it is not protruding high on the jumper's shoulder or inhibiting the jumper's movement.

(39) Continue to trace the weapon's sling to its attachment point on the butt stock. 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, use your right hand to find the zipper and ensure it is zipped. Next, use your right thumb and index finger to press on the snap fastener and ensure it is snapped at the top of the accessory pouch. Give the accessory bag a tug upward ensuring it is properly attached to the tube fastener.

Key Words: "ZIP, SNAP, TUG"

(42) Drop your hands 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 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.

(44) Continue your inspection as normal starting at the reserve ripcord stow pocket.

(45) After inspecting the weapon (or if no weapon is found), bring your left index and middle fingers under 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 to ensure that the ripcord handle is in the proper pocket.

Key Words: "PROPER POCKET"

(46) Keep the left hand in place and the right hand becomes the working hand. Use your right index finger to 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) Use your right hand to open 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) Leaving your right hand in place, use your left hand to 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).

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(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 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 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) Use your left index finger to 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 that it separates the yellow nylon of the RSL from the shackle.

Key Word: "RING"

(54) Use your left index finger to 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"

(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 to expose 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)

(58) Ensure the RIGHT HAHO seat attachment point is properly stowed and the main lift web is not twisted.

Key Words: "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 to expose 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. Use your left thumb to 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"

Key Words: "CORRECT" or "INCORRECT"

Note: 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.

Key Word: "WAISTBAND"

Instruct the jumper, "JUMPER, HOLD".

(60) Use your left hand to 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 ensure it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(61) Use your left hand to seek out the origin of the waistband. 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 there are no twists. Inspect for proper routing through the oxygen pouch keepers.

Key Words: "THROUGH AND THROUGH"

(63) 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 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 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 for 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 inboard 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 it with your LEFT or RIGHT thumb, inspecting for proper routing. Continue to inspect the waistband until your left hand meets the left main 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. Continue with the right hand on the waistband, ensuring it is routed through the keeper on the accessory pouch and sewn at least 50-percent to the harness-container assembly.

Note: The waistband routing through the M4 carrying handle is optional.

(64) Using either an underhand or overhand motion, palm facing you, the right hand seeks out the lateral adjustment strap. Ensure that it fits snugly against the jumper's body by giving it a tug.

Key Word: "SNUG"

Instruct the jumper, "JUMPER, SQUAT."

(65) 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 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.

(66) 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 for no twists. Inspect excess webbing making sure it is rolled inboard and stowed properly with a heavyweight retainer band or slack retainer.

(67) 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.

(68) 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 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 the same side.

(69) 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 free of all matter. Rotate it so the gate is visible from the side. Visually inspect the gate to ensure it is closed properly.

(70) 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 inboard and stowed properly with a heavyweight retainer band or slack retainer.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(71) With your left hand, hook the leg strap with your thumb or fingers next to your right hand, making skin-to-skin contact with 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.

Note: For DBSL ensure that the saddle strap modification is in place.

(72) 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 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.

(73) 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 its 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 to ensure the lens is clear and free of damage.

Key Words: "+500, +500 CORRECT", or "-500, +500 INCORRECT"

(74) 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".

(75) **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. Use the working hand to 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, are flush with the outer rim, and the oval pads are covering the bolt ends.

(76) 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 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.

(77) Move your right hand to the CYPRES control unit in its clear window.

(78) Use your right index finger to find and point at the Military CYPRES control unit's control button. Ensure it is the proper CYPRES default for your current DBSL operation.

Key Words: "1500/35 A, CORRECT" or "2500/29 A, INCORRECT"

(79) Use your right index finger to find and point at the Military CYPRES control unit's LED indicator light. It should NOT be lit.

Key Words: "NO LED"

(80) Next, move your right index finger over to the Military CYPRES control unit's digital read out screen. Read aloud the predetermined millibar setting on the screen. Read aloud the millibar setting that you have written on your hand. At this point, you are inspecting for the proper setting of the Military CYPRES.

Key Words: "788","788","CORRECT", or "INCORRECT"

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

(81) Grasp the reserve flap with both hands and lift up to expose the reserve components.

(82) Use either hand; find the reserve ripcord cable as it 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, 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"

(83) 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.

(84) 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 it is 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 DBSL configuration, do not proceed with anymore inspection points listed under the MFF mode, refer to the DBSL configuration below.

Key Words: "NOT SHOULDERED", "BENT" or "FRAYED", "JUMPER BEND"

(85) **Universal Static Line Snap Hook.** After completing your inspection of the reserve, seek out the universal static line snap hook (with your right hand) located on the right side of the container in the stow pocket.

(86) Grasp the universal static line snap hook with your right hand. Open the right hand and let the universal static line snap hook rest in the palm. Place the index finger of your hand on the girth hitch of the universal static line. Ensure the Green ID marking thread is present and the girth hitch has not been reversed. Place the index finger of the left hand in the vicinity of the rivet pin to ensure it is present and free of rust and corrosion.

(87) Use your right hand, re-grasp the universal static line snap hook and hold it perpendicular to the reserve parachute with the spring opening gate facing toward the jumper. Use your left hand—palm facing the jumper, thumb pointing downward—to grasp the universal static line just above the universal static line snap hook. Rotate the universal static line down and to the jumper's right and push it toward the universal static line snap hook. Visually inspect inside the girth hitch to ensure it is free of all cuts, frays, and burns. Use your index finger or thumb of your right hand to push the girth hitch back toward the universal static line snap hook and again visually inspect inside the girth hitch for any cuts, frays, or burns. Re-dress the girth hitch down around the narrow portion of the universal static line snap hook and release the universal static line with the left hand.

(88) Raise your right hand up, simultaneously inspecting the universal static line as it passes through the "O" to ensure it is free of all cuts, frays, or burns. Raise your right hand as high as it can go.

(89) Your right hand should be raised high enough so as to keep the universal static line tight between the hand and the first stow. Place your index finger (or index and middle finger) of the left hand behind the universal static line below the right hand to make skin-to-skin contact. Trace the universal static line down to ensure it is free of all cuts, frays, burns and it has not been misrouted to the first stow.

(90) With either hand, form a bite in the universal static line and look at the static line slack retainer loop. Ensure it is present, serviceable, and that a static line slack retainer band is attached.

(91) Place the bite on top of the pack tray and control it with either hand. This hand becomes the control hand. The opposite hand becomes the working hand. Use your index finger and thumb of your working hand to pinch off the first stow and pull it 1 to 2 inches toward the center of the pack tray. Look behind the first stow and ensure the universal static line is free of cuts, frays, or burns and has not been misrouted around the static line stow bar. Release the first stow and let it pop back into place.

(92) Insert the index finger of your working hand from bottom to top behind the first strand of the universal static line as close as possible to the first stow. Trace the first strand of the universal static line; ensure that it is free of all cuts, frays, or burns to the second stow. Use your index finger and thumb of the working hand to pinch it off and pull 1 to 2 inches toward the center of the pack tray and conduct the same inspection. Place the index finger or thumb of your working hand from bottom to top behind the second strand of the universal static line and trace it to ensure it is not cut, frayed, or burned.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

Note: Use only the index finger when tracing the universal static line toward you.

(93) Continue to inspect the universal static line to the main closing flap in the same manner. Ensure the last strand of the universal static line is routed from the left outer static line stow bar and inspect with the index finger only.

(94) Contain the universal static line snap hook with your left hand and open up the main protector flap with your right hand.

(95) Use your right hand to 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 top side of the container; ensure the top was closed second. Then slide your hand across the left 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 right closing flap; ensure that it was closed fourth.

Key Words: "LEFT, RIGHT"

(96) At this time gently tap the bottom of the container. This indicates that your inspection is now complete.

Upon completion of the JMPI, start the separate inspection of the HAHO seat.

(1) Locate the left side quick-ejector snap that attaches the seat on the left side of the jumper below the reserve ripcord stow pocket. Press up on the locking gate with your right index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(2) With your right index finger, trace the left seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper. Ensure there are no twists.

(3) Visually inspect the seat, ensuring it is oriented in the right direction with the hook-pile tape facing up and toward the jumper's legs.

(4) Locate the right side quick-ejector snap that attaches the seat on the right side of the jumper below the main ripcord stow pocket. Press up on the locking gate with your left index finger inspecting for spring tension. Press down with your thumb on the activating lever to ensure that 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.

(5) With your left index finger, trace the right seat attaching strap down to the seat ensuring the strap is on the outside of any other equipment worn on the jumper. Ensure there are no twists.

Note: Ensure the seat is tight enough on the jumper so it will not cause problems on exit.

Figure A-3. Jumpmaster personnel inspection sequence of the Twin-53 oxygen system and combat equipment (continued)

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Appendix B

Double-Bag Static Line Pilot Brief and Inspection Procedures

This appendix provides a sample pilot brief and a sample aircraft checklist. The jumpmaster should share the DD Form 2977 (Deliberate Risk Assessment Worksheet) for the operation with the pilot-in-command or air mission commander (if multi-ship), highlighting the hazards identified as highest risk and possibly involving the aircraft crew. Additional information can be located in ATP 3-18.10 and TC 3-21.220.

Note: Jumpmasters and aircrew should share any information in the notice to airmen that could be a potential hazard along the flight route. 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. Notices to airmen are not required reading for pilots and do not make the operation necessarily safer.

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. Drop Zone Safety Officer.
2. DBSL Concept of Operation:
   a. Unit Designation.
   b. Drop Zone.
   c. Type of Jump.
   d. Engines Run On (ERO)/TOT.
3. Questions to the Aircrew:
   a. Have you conducted this type of drop before?
   b. Have you dropped on this drop zone 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? (Discuss if impacts on mission.)
   f. What is the recalculation of HARP on ascent?
4. Aircrew and Troop Safety Briefing:
   a. Time.
   b. Location.
5. Marshaling Area.

Figure B-1. Sample pilot brief

6. Drop Zone:
   a. Designation.
   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.
   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.

Figure B-1. Sample pilot brief (continued)

16. EAAD:
    a. Type: Military CYPRES 2.
    b. Cabin Pressurization (does not matter).
    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. Anchor Line Cable Location.
    b. Anchor Line Cable Retriever.
    c. Seating Configuration (Floor clear of objects from rear wheel to edge of ramp).
    d. 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. 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. 6 Minutes.
    d. 4 Minutes (Red Light, Open Ramp after jumpers are hooked up and ready to exit the aircraft).
    e. 2 Minutes (Red Light).
    f. 1 Minute (Green Light).

Figure B-1.Sample pilot brief (continued)

25. Jump Caution Lights:
    a. Red (at 4 minutes and after jumpers are away or unsafe conditions exist).
    b. Green (at 1 minute and keep on 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 (we would like to get out, 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 drop zone safety officer.
        (4) Aircraft will fly level and maintain altitude and should remain as close to the DZ as possible. Pilot will conduct flat rudder turns opposite to the direction of the anchor line being used to keep the jumper in the center of the ramp.
        (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, he will cut the hung jumper's equipment free.
        (8) If jumper is conscious, the jumpmaster will request to cut the jumper free.
        (9) Once the jumper is cut free, the jumpmaster 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.
        (4) If jumper is being towed by static line, he will be lowered to the ground by the aircraft.
28. Jumpmaster Communications:
    a. Hand and Arm Signals.
    b. 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.
31. Communications Plan (Turn over to DZSO to brief.):
    a. Call Signs:
        (1) Drop zone.
        (2) Aircraft.
        (3) Range Control.
        (4) Other.

Figure B-1. Sample pilot brief (continued)

b. Radio Frequencies:
   (1) Primary (PRI).
   (2) Alternate (ALT).
   (3) Aircraft Emergency Frequencies (GUARD).
   (4) Search and Rescue (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. Time on Target.
34. Manifests.
35. Questions.

Figure B-1. Sample pilot brief (continued)

AIRCRAFT INSPECTION PROCEDURES

B-2. Figure B-2, pages B-5 and B-6, provides a sample aircraft inspection checklist. Additional information is located in ATP 3-18.10 and TC 3-21.220.

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).

Figure B-2. Sample aircraft checklist

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:

   a. 100-mile per hour tape.
   b. 1/4-inch cotton webbing.
   c. Kit bag.
   d. Ear plugs.
   e. Chemlights.

Figure B-2. Sample aircraft checklist (continued)

Appendix C

Double-Bag Static Line Jumpmaster Responsibilities, Currency Qualifications, and Duties

This appendix establishes the procedures and techniques that jumpmasters use in DBSL operations. It delineates duties and responsibilities, 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 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 TC 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 (as needed).
- Malfunction Officer.

C-2. 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 command authority 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 cannot delegate responsibility. Table C-1, pages C-1 and C-2, lists jumpmaster responsibilities.

Table C-1. Jumpmaster responsibilities

Location	Responsibilities/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.

Table C-1. Jumpmaster responsibilities (continued)

Location	Responsibilities/Actions
At the Departure Airfield (continued)	• 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
In Flight	• Remain ground-oriented. • Constantly check personnel. • Enforce flight rules and regulations. • Issue time warnings. • Oversee preparation, placement, and drop of bundles. • Give heading corrections to flight crew (when using jumpmaster release). • Perform outside safety checks of the aircraft and drop zone before personnel jump. • Issue jump commands. • Visually identify the aircraft is in the vicinity of the high-altitude release point, unless conducting an Adverse Weather Aerial Delivery System jump. (The jumpmaster may use navigational aids to assist in identifying the high-altitude release point.)
On the Drop Zone	• Account for personnel and equipment. • Oversee care and evacuation of injured personnel. • Ensure jumpers turn in air items/equipment. • Report to drop zone safety officer (peacetime).

QUALIFICATIONS

C-3. For appointment by the airborne commander as either a jumpmaster or assistant jumpmaster for a DBSL operation, the individual must be a graduate of the MFF Jumpmaster Course for an approved ARAPS. He must have performed DBSL jumpmaster duties within the previous 6 months (180 days) or attended DBSL jumpmaster refresher training. An assistant jumpmaster must have performed assistant jumpmaster duties at least twice before being designated as a DBSL jumpmaster.

Note: The Commandant, 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 a DBSL jumpmaster when utilizing the RA-1 ARAPS in the DBSL configuration. All jumpers must have attended training on the RA-1 ARAPS before conducting any DBSL operations with the RA-1 ARAPS in the DBSL configuration.

Note: All regulations related to jumping DBSL for all USASOC Soldiers are covered in USASOC Regulation 350-2.

CARDINAL RULES FOR THE JUMPMASTER

C-4. 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-5. A DBSL 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 DBSL primary or assistant jumpmaster duties within the last 6 months where parachutists actually exited the aircraft while using a jumpmaster-directed release.

C-6. Previously qualified DBSL jumpmasters who do not meet proficiency and currency requirements will meet the following requalification requirements:

- Undergo DBSL parachutist refresher training and jumpmaster refresher training.
- Receive JMPI training for the primary DBSL parachute system used in his parent unit.
- Receive refresher training in wind drift (HARP) calculation for DBSL mission profiles.
- Receive oxygen equipment refresher training.
- Perform assistant jumpmaster duties for two DBSL jumps.
- Execute under-canopy navigation techniques specific to the navigation aids unique to the parent unit.

Note: A DBSL jumpmaster who meets the currency criteria will conduct the requalification and refresher training for the RA-1 ARAPS.

Note: Being a current MFF jumpmaster does not constitute being a current jumpmaster in DBSL. The jumpmaster must be trained and meet the currency criteria for the configuration being jumped. Example: A jumpmaster that is trained in both MFF and DBSL jumpmaster duties, but has only performed MFF jumpmaster duties in the last 180 days will not meet the proficiency and currency requirements for DBSL jumpmaster duties.

Note: Whenever possible, a jumpmaster-directed release should be used to enhance DBSL jumpmaster skills.

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Appendix D

Double-Bag Static Line Qualification and Refresher Training Requirements

DBSL parachuting skills are highly perishable. In order to maintain the required level of proficiency, DBSL personnel must conduct regularly scheduled training events. Lack of regularity in training will have a negative impact on mission capability and parachutist safety.

MEDICAL AND PHYSIOLOGICAL TRAINING REQUIREMENTS

D-1. Each DBSL parachutist must have met the following medical and physiological requirements to participate in DBSL operations:

- Must have a current HALO physical examination in accordance with Service regulations. Students attending the DBSL 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.

CURRENCY REQUIREMENTS

D-2. Currency does not equate to proficiency. Currency is maintenance of the minimum performance. Proficiency is achieved when the parachutist obtains the knowledge he can on the system being jumped, and applies all skills needed to safely conduct the airborne operation. Parachutists should only consider DBSL jumps with tactical application as proficiency jumps. DBSL currency standards are listed below. DBSL jumpmaster currency standards are outlined in Appendix C.

D-3. To meet the minimum DBSL currency standards, the parachutist must have—

- A current HALO physical (per Service requirements).
- A current USAF physiological training card (Air Force Form 1274 or USASOC Form 4080).
- Conducted a DBSL jump within the last 180 days.

Note: The parachutist must be a graduate of a USSOCOM-recognized DBSL parachutist course for the system being jumped.

DOUBLE-BAG STATIC LINE PARACHUTE REQUALIFICATION REQUIREMENTS

D-4. Previously qualified DBSL parachutists who—after meeting medical and USAF chamber currency requirements—do not meet the currency requirements listed above, will undergo the following training to become requalified:

- Review DBSL hand-and-arm signals, aircraft procedures, and jump commands.
- Review DBSL DZ markings.
- Attend a DBSL packing class.
- Attend Military CYPRES 2 class.
- Attend an oxygen class.

- Review and practice exit procedures for DBSL.
- Attend DBSL emergency procedures class, conduct suspended harness drills, and demonstrate emergency procedures.
- Attend combat equipment rigging (combat pack and weapon) class.
- Attend canopy control and grouping under canopy class.
- Perform one DBSL daylight jump without combat equipment, stressing a stable DBSL exit, proper canopy control, and landing within 50 meters of the group leader
- Perform one DBSL daylight jump with weapon and combat equipment, executing a stable DBSL exit, proper canopy control, and landing within 50 meters of the group leader.
- Perform one DBSL night jump with weapon, combat pack (rucksack), and complete oxygen system, executing a stable DBSL exit, proper canopy control, , 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 the parachutist has not satisfactorily performed the task. The jumpmaster will conduct an after action review with all DBSL refresher jumpers.

DOUBLE-BAG STATIC LINE PARACHUTIST REFRESHER TRAINING

D-5. Previously qualified DBSL parachutists who do not meet proficiency requirements will, after becoming current as a DBSL 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 DBSL parachutist skills, ability, and confidence, culminating in a stand-off night combat equipment oxygen jump. Refresher training recommendations include that the parachutists make—

- One daylight DBSL grouping jump with combat equipment from an altitude not to exceed 13,000 feet AGL. They must land within 100 meters of the group leader.
- One daylight DBSL grouping jump with combat equipment and complete oxygen system at an altitude not to exceed 18,000 feet AGL. They must land within 100 meters of the group leader.
- One daylight DBSL grouping jump with combat equipment at altitudes above 20,000 feet MSL, depending upon the availability of USAF physiological technicians. For familiarization purposes, prebreathing can still take place below 20,000 feet MSL. They must land within 100 meters of the group leader.
- One night DBSL grouping jump from an altitude not to exceed higher than 13,000 feet AGL. They must land within 100 meters of the group leader.
- One night DBSL grouping jump with combat equipment at an altitude not to exceed 18,000 feet AGL. They must land within 100 meters of the group leader.
- One night grouping jump with combat equipment and complete oxygen at altitudes above 20,000 feet MSL, depending upon the availability of USAF physiological technicians. They must land within 100 meters of the group leader.

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 Double-Bag Static Line Operations

This appendix details the recommended training guidance for DBSL operations.

MINIMUM QUARTERLY TRAINING

E-1. Commanders follow a minimum program consisting of six parachute jumps per quarter as detailed in table E-1. Commanders should not conduct more than four proficiency jumps in a 24-hour period.

Table E-1. Minimum quarterly training guide

Jump Number	Jump Type	Definition of Jump Type
1	DBSL/A	DBSL/Administrative-Nontactical
2	DBSL/E	DBSL/Equipment
3	DBSL/E/O	DBSL/Equipment/Oxygen
4	DBSL/N	DBSL/Night
5	DBSL/N/E	DBSL/Night/Equipment
6	DBSL/N/E/O	DBSL/Night/Equipment/Oxygen

Note: Commanders must remember for safety and parachutists' confidence, DBSL parachutists require a jump refresher before executing DBSL night combat equipment jumps after prolonged periods of not jumping. Commanders may not be able to conduct the six jumps depicted in table E-1 in the quarterly training plan; however, commanders should follow the intent of the progression where possible. For example, after a 2-month layoff, an element should make a daylight DBSL combat equipment jump before a night combat equipment jump.

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 USAF 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 any altitude's oxygen use requirements. These training mission profiles might occur in areas where airspace restrictions are in force or when there are not enough aircrew personnel.

RECOMMENDED TACTICAL DOUBLE-BAG STATIC LINE PROFICIENCY TRAINING PROGRAM

E-2. Parachutists should only consider DBSL jumps with tactical application as proficiency jumps. Nontactical jumps are for currency and not necessarily for proficiency. While DBSL jumps give a parachutist the advantage of maneuverability and landing in more confined areas, the 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 DBSL 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 DBSL. The detachments will use available navigational aids and 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 MSL using on-board OXCONs, during hours of darkness, onto an austere and poorly lit landing area while using NVG.

E-4. The DBSL parachutists may fulfill these requirements at lower altitudes, but units will use the mission profile with the on-board consoles to ensure jumpers are maintaining proficiency of the full spectrum of oxygen equipment. Examples of justification to utilize lower altitudes for proficiency jumps include the following:

- Lack of USAF 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 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 on-board consoles and procedures.

E-5. All DBSL detachments will conduct, at a minimum, one SEON per month and one SEO NVG per quarter based on operations tempo. This is done to maintain a combat-ready status (also known as Level I).

E-6. The goal of the first portion of training should give DBSL detachments the opportunity to identify differences in canopy descent rates, 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.

E-7. For example, a current DBSL jumper who has not jumped with a navigational aid will use the daylight training to become familiar with navigational aids. A DBSL jumper who has never used NVG will use the daylight jumps to become familiar with flying the canopy while wearing NVG in daylight hours before attempting to wear them at night.

E-8. Identifying different descent rates between DBSL jumpers will allow the detachment 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-3, provides a template for a 3-day DBSL training plan that focuses on stand-off parachute infiltration.

Note: The suggested 3-day combat-ready training program (table E-2, page E-3) is not meant to be a basic train-up plan done as a requalification event. It is meant as an advanced proficiency train up for fully trained elements. Personnel executing this schedule should already be a current and trained on night and oxygen and NVG operations. Commanders should combine multiple jumps in a 24-hour period to maximize training value. (Example: Jump numbers 1, 2, and 3 could all be jumped on the same day).

Table E-2. Suggested 3-day double-bag static line combat-ready training program

Jump Number	Type Jump	Maximum Recommended Exit Altitude (AGL)	Notes
1	DBSL/S/A	8	Jumpers focus on fundamental canopy control.
2	DBSL/S/E	8	Proper equipment-lowering procedures and new equipment.
3	DBSL/S/E/O/N	8	Proper equipment-lowering procedures and new equipment.
4	DBSL/S/E/O/N	12	Jumpers focus on use of navigation aids and maintaining a tight stack.
5	DBSL/S/E/O NVG	12	Jumpers focus on use of navigation aids, night vision aids, and maintaining a tight stack.
6	DBSL/S/E/O NVG	8	Jumpers focus on fundamental canopy control.
7	DBSL/S/E/O NVG	8	Proper equipment-lowering procedures and new equipment.

Legend:

AGL above ground level
DBSL double-bag static line

Note: The following codes should be used to indicate the type performed. One or more code symbols may be used. (For example, DBSL S/E/O indicates a **D**ouble-**B**ag **S**tatic **L**ine **S**tand-off jump with **E**quipment using **O**xygen.)

A	administrative/nontactical	NVG	night vision goggle
C	combat	O	oxygen
E	combat equipment	S	high-altitude high-opening/ stand-off
T	tactical	J	jumpmaster
N	night		

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Appendix F

High-Altitude Release Point Calculation

When determining the HARP for each DBSL mission, it is necessary to account for the effects of variable wind directions and speed. Accurate wind data is essential to calculating 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 canopy flight and it will affect canopy performance after deployment.

Note: Jumpmasters should use DA Form 7733 (DBSL 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 1000 feet until either the desired pull altitude is reached or greater than 10,000 feet. Beyond this altitude, canopy drift calculations will be measured wherein it will be in increments of 2000 feet.

Note: If the pull altitude is greater than 6,000 feet AGL, the jumpmaster will record the winds for, and calculate for, a HAHO operation.

- **Free-Fall Drift Calculations.** Wind data is recorded in increments of 2000 feet from pull altitude to exit altitude

CALCULATING AND PLOTTING THE HIGH-ALTITUDE RELEASE POINT

F-3. The jumpmaster calculates and plots the HARP location 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 HARP during HAHO operations may or may not require calculation of free-fall drift, depending upon the length of free-fall required. For 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.

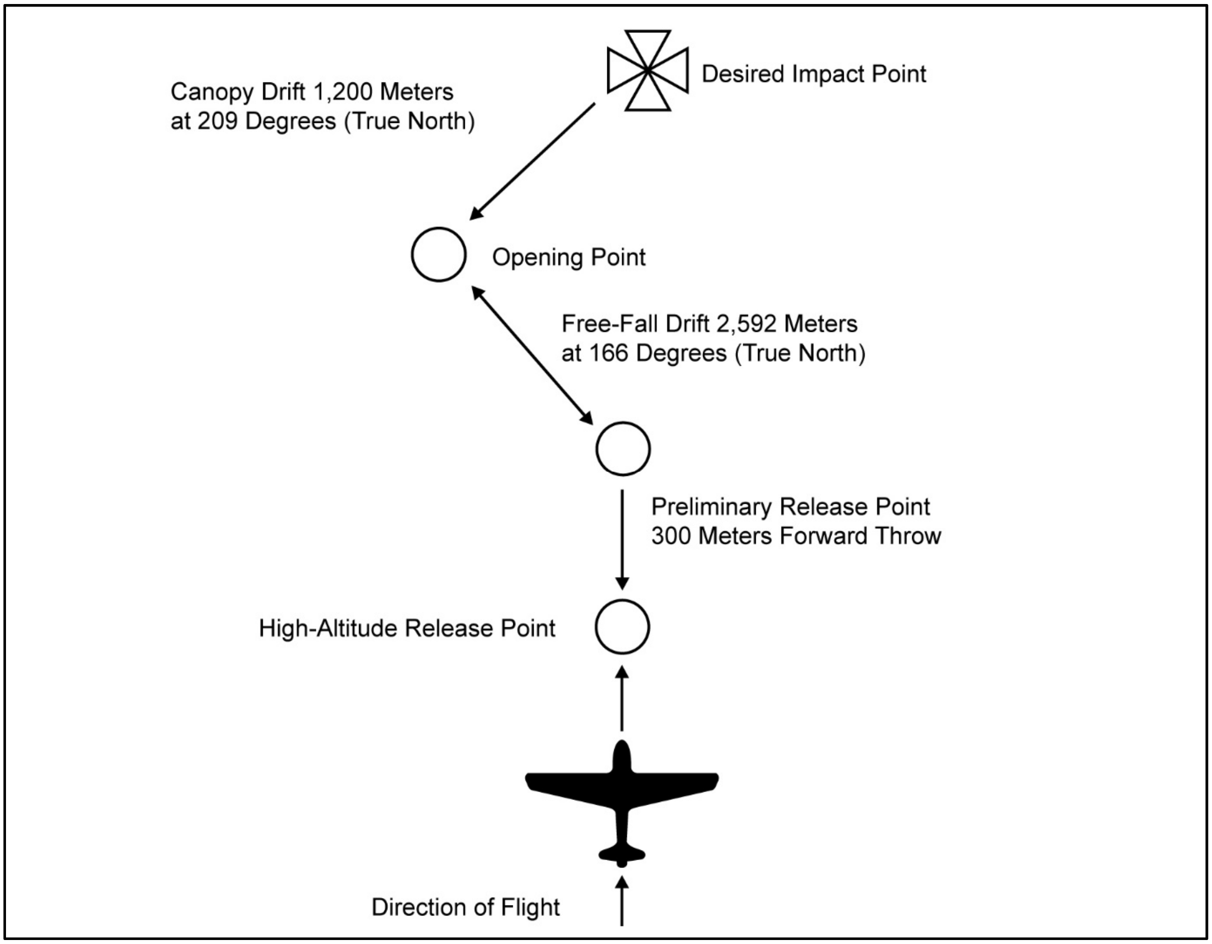


Figure F-1. Plotting the high-altitude release point, free-fall, and canopy drift for a 20,000-foot high-altitude low-opening mission profile

USING THE WIND DRIFT FORMULA AND CONSTANTS

F-6. The jumpmaster uses the wind drift formula D = KAV with the following properties:

- $D = \frac{(A - SF)(V + FS)}{K}$
- D = gliding distance in nautical miles.
- A = altitude in thousands of feet.
- SF = safety factor in thousands of feet (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 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-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 HAHO K factors for the RA-1 ARAPS and MC-4 RAPPS and other parachute systems used within the Department of Defense.

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, TP400	3	20.8	46
HG-380 (HG Mode)	3	20.8	31
HG-380 (Parachute Mode)	3	20.8	39
Notes: 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, MJ and MMPS. When jumping double-bag static line, the high-altitude, high-opening K factor of 36 will be used. The jumpmaster always calculates for the lowest performance parachute (largest K factor) to be used.			

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 and average wind direction from the exit to the opening altitude. Opening altitude (4,000 feet in this example) is not included since it is where the free-fall ends.

Note: The wind data from 4,000 feet to 1,000 feet is calculated using the canopy drift constant.

EXAMPLE:

Altitude (feet)	Velocity (knots)	Direction (degrees)
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**	**1330 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).

  V = 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 where—

- 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 (feet)	Velocity (knots)	Direction (degrees)
4,000	15	190
3,000	15	220
2,000	11	205
1,000	8	220
Total	**49 knots**	**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).

  V = 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).

  D = 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 with the following properties:

- $D = \frac{(A - SF)(V + FS)}{K}$
- 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 HALO and HAHO jump 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 and then multiplying the result by 50 meters. He plots the 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 = 300 meters forward throw, which = 600 meters back in the flight direction

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.

Example 1: Average Less than 360 Degrees		**Example 2: Average Greater than 360 Degrees**	
Incorrect (degrees)	**Correct (degrees)**	**Incorrect (degrees)**	**Correct (degrees)**
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	2135	785	2225

Example 1 Calculation:
Incorrect: Direction = 1415 ÷ 6 = 235.83 degrees or D = 236 degrees
Correct: Direction = 2135 ÷ 6 = 355.83 degrees or D = 356 degrees

Example 2 Calculation:
Incorrect: Direction = 785 ÷ 6 = 131 degrees or D = 131 degrees
Correct: Direction = 2225 ÷ 6 = 370.83 degrees or D = 371 (- 360) = 011 degrees

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 HAHO HARP, the jumpmaster uses the D = KAV formula, as the intention is to maximize the linear distance traveled using the gliding capability of the RAPPS.

Note: For doglegs with less than 6,000 feet of vertical descent, the jumpmaster may use the standard D = KAV formula; however, it will be less accurate.

F-22. The jumpmaster uses the following HAHO gliding distance formula with the following properties:

- $D = \dfrac{(A - SF)\,(V + FS)}{K}$
- 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 being used.
- K = canopy drift constant for parachute being used.

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. The jumpmaster plots back into the aircraft's line of flight to compensate for jumper dispersion and forward throw (300 meters for high-performance aircraft and 150 meters for low-performance aircraft). Examples 1 and 2, pages F-7 and F-8, provide two examples of HAHO HARP calculations.

EXAMPLE 1: 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—

Altitude (feet)	Velocity (knots)	Direction (degrees)
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**	**995 degrees**

F-27. 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 high-altitude release point.
- 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.

EXAMPLE 2: HAHO or 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—

	Altitude (feet)	Velocity (knots)	Direction (degrees)
	14,000	33	210
Above Dogleg	12,000	30	210
	10,000	29	180
		92 knots	**600 degrees**
	9,000	26	075
	8,000	24	080
	7,000	22	085
Below Dogleg	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**	**760 degrees**

JUMPMASTER CALCULATIONS (ABOVE THE DOGLEG FROM 10,000 TO 14,000 FEET)

F-28. The jumpmaster calculates the gliding distance and direction from 10,000 feet to the exit altitude. The jumpmaster—

- Determines 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 the average wind direction from 10,000 feet to 15,000 feet is 200 degrees (True North).
- Determines 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).

F-29. 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.

F-30. 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.

JUMPMASTER CALCULATIONS (BELOW THE DOGLEG FROM 9,000 TO 1,000 FEET)

F-31. The jumpmaster calculates the gliding distance and direction from the desired impact point to the dogleg at 9,000 feet. He—

- Determines 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 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. He 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).

F-32. Jumpmasters should use DA Form 7733 for calculating all data. Figure F-2, page F-10, depicts DA Form 7733 with sample data.

DBSL JUMPMASTER REPORT

For use of this form, see TC 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

GM Angle
M to G = +011
G to M = -011
T to G = -001
G to T = +001

$$D = \frac{(\ 6\text{-}2\ )\ (\ 22.6 +\ 12\ )}{36}$$

__3.8__ NM x 1.85 = __7__ KM @ __331__ degrees (grid)

Jumper Dispersion: ½ number of jumpers (__6__) 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

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. Signature:**	**c. DATE *(YYYYMMDD)*:**
MSG Smith		

DA FORM 7733, APR 2020 APD AEM v1.00ES

Figure F-2. Department of the Army Form 7733 with sample data

Appendix G

Limited Visibility and Night Vision Goggles for Double-Bag Static Line Operations

DBSL 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. (Reference 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 DBSL skills is critical to success.

NIGHT OPERATIONS

G-1. Night DBSL parachuting offers the same advantages as parachuting during adverse weather, especially during the first quarter, new moon, and last quarter moon phases. Night DBSL 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 exit 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 landing is a recommended procedure. The commander may consider using oxygen for all night DBSL 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 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 chemical lights (chemlights) on the parachutist's body, parachute risers, and strobe lights on the back of the helmet.

> ***Note:*** RAPPS, other than the RA-1 ARAPS, may react differently when landing the parachute system during night and limited visibility jump operations. The jumper should land other RAPPS canopies configured for DBSL at half brakes due to the canopy design and flight characteristics.

GENERAL CONSIDERATIONS FOR NIGHT VISION GOGGLES

G-5. DBSL 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 DBSL operations that include the approved types of NVG, authorized mounting brackets, and a review of TB 43-0001-80 for 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 it is difficult for a jumper to turn his head, while under canopy, to see jumpers behind him. Lack of training and rehearsal of this maneuver can increase the potential for canopy collisions. To execute this maneuver without turning his head excessively, the jumper should 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 the jumper's 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 DBSL operations; however, jumpers should always be prepared to land with full brakes and to conduct a parachute landing fall.

DOUBLE-BAG STATIC LINE 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. Changes to helmet-mounted NVG improve the margin of safety for SOF DBSL parachutists performing night DBSL missions by providing visual cues to the DZ terrain features, and the ability to clearly see other jumpers and obstacles while under the canopy. Better vision translates into increased situational awareness during low-illumination deployments. NVG are worn during DBSL operations to reduce the risk of injury and improve the capability of DBSL jumpers 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 DBSL operations; however, if they are not worn in the down-and-locked position during exit, they should be in the up-and-locked position until after postopening procedures.

Note: Airborne commanders or jumpmasters will verify that only jumpers who have completed NVG training participate in NVG-supported DBSL operations. The jumpmaster will ensure that only helmets and NVG listed in TB 43-0001-80 are utilized during all DBSL operations, as well as verify that NVG rigging is done in accordance with the approved training material.

G-7. The following lists the minimum recommended qualifications prior to conducting DBSL operations with NVG:

- An experienced jumpmaster that has performed DBSL jumps with NVG within the past 120 days to train and determine if all jumpers are 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).
- Three day-familiarization jumps with (NVG turned off).
- Two night jumps without equipment, weapon, and oxygen (NVG powered on).

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.

Note: It is recommended that DBSL NVG task-certified personnel perform this task a minimum of once every 120 days for currency.

JUMPMASTER CONSIDERATIONS WITH NIGHT VISION GOGGLES

G-8. JMPIs remain essentially the same for jumping with NVG. 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 that NVG is ON and in proper position on the parachutist (if not, stop the JMPI and correct).
- Turn OFF and raise the 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 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-9. NVG authorized for DBSL NVG operations are listed in TB-43-0001-80.

Note: Rigging procedures for 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 utilized.

MOUNTS

G-10. Mounts should provide a strong attaching point with a low profile from the helmet that is least obtrusive, permanent, snag free, and allows for the best ergonomics and adjustment with all goggles. 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 SOF/conventional parachutist when conducting night DBSL operations.

NIGHT VISION GOGGLES PREPARATION

G-11. 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.
- Close the open end of the bungee cord hook fasteners by using masking tape and 100 mph tape.
- 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 secured closed with tape.

- Inspect and ensure the bungee strap connector is serviceable and attached to the helmet and NVG (figure G-2, page G-5) and the NVG are pulled down and fit securely in place at the jumper's eye or eyes.

Note: The securing lanyard or bungee cord should be short enough so if the NVG become dislodged from the mount, there is minimal slack, thereby reducing the risk of 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 DBSL 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. Do so in a manner that prevents possible snags during parachute opening.

Figure G-1. Securing the night vision goggle mount release lever using a heavyweight retainer band

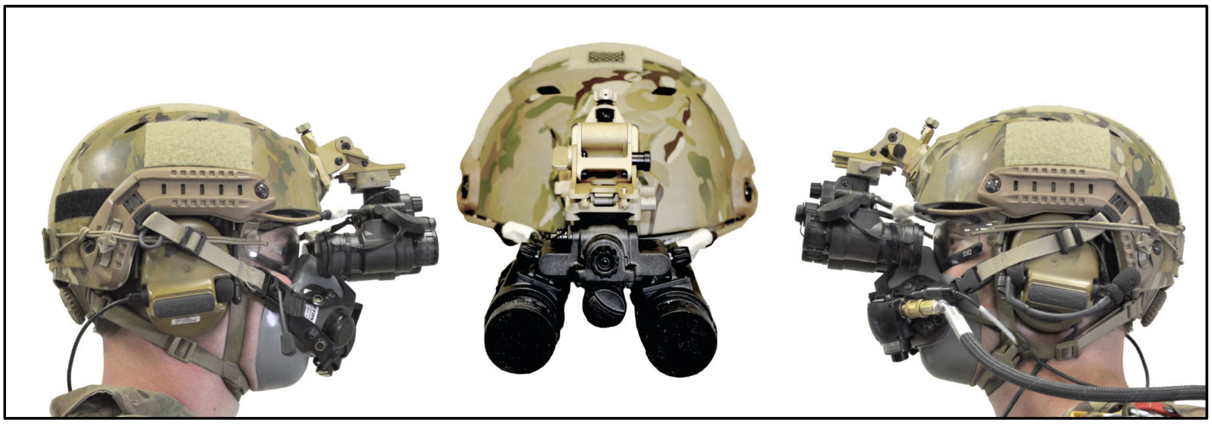


Figure G-2. Bungee position on night vision goggle mount

HELMETS

G-12. Only helmets, mounts and NVG listed in TB 43-0001-80 will be used during DBSL operations. Regardless of which approved helmet is used, it should fit snuggly to help prevent shifting on exit, during canopy deployment, under canopy, or landing. Jumpers should expect the added weight of the NVG to cause shifting and 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 the ACH or modular integrated communication headset helmet insert (padding) at high altitudes expands, freezes, gets hard and causes the helmet to get too tight causing pressure on the parachutist's head. Parachutists should not overtighten the helmet when conducting DBSL high-altitude operations. When wearing the ACH or modular integrated communication headset with or without oxygen, the chinstrap is routed underneath the chin.
>
> ***Note:*** The ACH becomes the modular integrated communication headset when worn with communications equipment.

G-13. For helmet preparation, the parachutist should—

- Check components for serviceability.
- Install 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 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. All horseshoe malfunctions should be treated as such, and jumpers should immediately execute cutaway procedures.

G-14. 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/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. In accordance with AFI 11-410, only oxygen masks certified and approved for use may be used.

RECOMMENDED DOUBLE-BAG STATIC LINE JUMP PROGRESSION FOR NIGHT VISION GOGGLES

G-15. NVG qualified jumpmasters should progress their jumpers through the NVG training in the same manner as for live jumps (dummy parachute with NVG, dummy parachute and equipment with NVG, and emergency procedures with NVG). During all phases of training, jumpers should concentrate on adjusting the NVG, lowering and raising the NVG, locating all switches, and practicing emergency procedures. A hanging harness in a dark and unlit room can be used to conduct simulated training.

Note: Additional information regarding NVG training can be found in Appendix E of this book.

LIVE JUMP NIGHT VISION GOGGLE TRAINING

G-16. Army SOF will conduct the following minimum jump progression to complete the NVG 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated group leader.
- Perform one daylight jump as a member of a group with weapon, combat pack, complete oxygen system, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated 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 and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated group leader.
- Perform one night jump as a member of a group with weapon combat pack, complete oxygen system, and NVG mounted on the jumper's helmet. Jumper will execute a stable exit and maintain heading. Jumper will execute proper canopy control procedures and land within 50 meters of the designated group leader.

NIGHT VISION GOGGLES CURRENCY GUIDELINES

G-17. DBSL-qualified parachutists using NVG during DBSL operations will follow the standard currency guidelines set forth in USASOC Regulation 350-2.

AUTHORIZED TRAINERS

G-18. The initial train-the-trainer qualifications will be done by jumpmasters who have completed the Tactical Infiltration Course at Yuma Proving Ground (completion dates inclusive from January 2010) or through members of the MFF School Tactical Application Detachment. Once initial training throughout the force has commenced, any current DBSL jumpmaster who has completed the approved NVG training support package may administer DBSL/NVG training.

LIGHT SYSTEMS USED DURING DOUBLE-BAG STATIC LINE OPERATIONS

G-19. During DBSL night operations jumpers should use some sort of light system to identify the jumper and his direction of flight under canopy to avoid collision with other jumpers. Red lights are place 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, and flashing light functions, and can be easily switched from one mode to another. The following paragraphs details some of the light systems being utilized for DBSL night operations.

HEL-STAR LIGHT

G-20. HEL-STAR light is a multi-function helmet mounted LED light designed for airborne/DBSL, tactical and other military operations. The light comes in virtually any combination and functions can be selected from virtually any combination of white, green, blue, red, amber and infrared, each in either steady, flashing or identification, friend or foe (IFF) coded operation and is omnidirectional. This type of light was designed with a curved profile (aerodynamic shape) on all sides for mounting on any helmet—thus minimizing a snag hazard specifically for DBSL operations, and ground tactical operations. The HEL-STAR light comes with integrated tie-downs and Velcro for ease of donning. Detente sliding switches are designed for positive operation by a gloved hand and can be controlled with the helmet donned in the dark. This system uses one standard lithium CR123 photo cell battery for long life and extreme temperature operations and can be changed in the field without the use of special tools. The light exceeds the Federal Aviation Administration's 3 statute mile visibility requirement and is shock and vibration resistant, dustproof, and open sea waterproof to 130 feet of sea water.

ADVENTURE LIGHT

G-21. Adventure light (Mockingbird) is another light system used for DBSL operations. This light is small (1.6 inches wide x 1.2 inches deep 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. The light's body is matte black and is constructed of a high-tech polymer and the lens is constructed of a high impact polycarbonate. Adventure Light lenses come in five different colors or infrared. The light uses a 6V lithium coin cell batter pack or you can use 2 CR2032 3V lithium cell batteries that last 100 hours if left in the steady on position. 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), jumper simply flips the battery over. Adventure Light is water proof to 100 meters. Jumpers use the lights to identify their location and direction of movement to other jumpers under canopy. Jumpers will place a red light on their chest strap, front-mounted PDB, or ruck and a green light on back of the parachute container.

CHEMLIGHTS

G-22. Chemlights have been used for years during night and limited visibility DBSL operations and as a backup light source when reading the altimeter. Chemlights provide instant 360 degree illumination that is easily seen up to a mile away. Chemlights come in different colors and sizes, ranging from extremely small (1 inch) to extremely long (15+ inches) and are durable, water proof 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 the chemlight. During DBSL operations jumpers will usually place a red chemlight on their chest strap, front-mounted PDB, or ruck and a green chemlight on back of the parachute helmet or container to identify their location and direction of movement to other jumpers 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-23. 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 is only visible with night vision equipment.

COMMUNICATIONS

G-24. All DBSL 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. Communication equipment and cables must be attached and configured in a way so there is no interference with canopy opening procedures, cutaway procedures, or performing any emergency procedure. Communication equipment should be attached to the jumper and not to the parachute harness or container to allow the jumper to quickly derig after landing.

Appendix H
Double-Bag Static Line Deliberate Water Operations

This appendix outlines the policies, procedures, and restrictions for conducting deliberate DBSL operations into water DZs. Units will use their applicable supplemental regulations and SOPs when conducting DBSL operations into water DZs. The procedures outlined in this chapter are different from the emergency water-landing procedures discussed in Chapter 9.

Note: When conducting joint deliberate water DBSL operations, each military service branch must determine if there is a waiver requirement for minimum exit altitudes with or without the use of an EAAD for joint operations. For more information, reference USSOCOM 350-3.

SUPPORT REQUIREMENTS

H-1. All basic DBSL parachute support operations outlined in this manual and USASOC Regulation 350-2 must be used when conducting deliberate water parachute operations. Listed below is the support needed for parachute operations using water DZs. Units should refer to supplemental regulations and SOPs 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 the parachutists are not—

- Combat swimmers.
- Combat divers.
- Graduates of a USASOC-approved waterborne infiltration course.
- Scout swimmers.
- Second-class swimmer certified.

H-3. If the parachutists are combat swimmers, combat divers, graduates of a USASOC-approved waterborne infiltration course, scout swimmers, 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 boat 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 will indicate 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-4. 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-5. 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-6. 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-7. Safety swimmers must be qualified swimmers or divers in accordance with TC 21-21, USASOC Regulation 350-2, 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-8. 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-9. Currency requirements for conducting deliberate DBSL water jumps include the following:

- **Training Before Jump.** Commanders must ensure individuals meet the qualifications as specified in USASOC Regulation 350-2, and the unit supplemental publication or special operation procedures.
- **Parachutist Swimmer Qualification.** Parachutists must be qualified swimmers in accordance with USASOC Regulation 350-2, USASOC Regulation 350-20, and 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.
- **Jumper Currency.** Personnel who are not current can use a water jump for refresher provided it is done during the day and without combat equipment.

Note: The final decision for DBSL 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 DBSL 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-10. Equipment requirements for conducting deliberate DBSL 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 devices to enable them and 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 and not interfere with any emergency procedures.

CAUTION

Routing the chest strap over the UDT life preserver will present 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 DBSL parachute operations without an altimeter in accordance with USASOC Regulation 350-2.
- **Electronic Automatic Activation Devices.** The EAAD is required for all DBSL 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. The supporting parachute rigging facility will identify by serial number and track by annotating in shop records the following information: date, DZ, salt or fresh water, and estimated depth and duration of submersion for all Military CYPRES 2s that have been used for water operations. Additionally, they will perform post-water-operation procedures as outlined in the CYPRES user's guide. Commanders will 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.
- **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 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 in the aircraft to exit.
  - Taped vertically to shins with foot through 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 worn either in front on the parachutist's thigh or in the back under the pack tray. Fins must be placed so as not to interfere with parachute deployment or the parachutist's ability to remain stable during free-fall.

H-11. 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 until after entering the water to put them on. 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-12. Parachutist procedures for conducting DBSL water jumps include the following:

- **Water Parachute Jump.** Procedures for a premeditated 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, weapon and continue operation.
- **RSL.** When making a DBSL 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 cut away 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 inflation system.
- **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, 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. Then he should find a seam and follow 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 OR LIFE PRESERVERS

H-13. Parachutists must wear one of the military-approved flotation devices (Tactical Flotation Support System [TFSS]-5326, Life Preserver Unit [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 them 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-14. 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 independent left- and right-hand units (one each), 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-15. 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

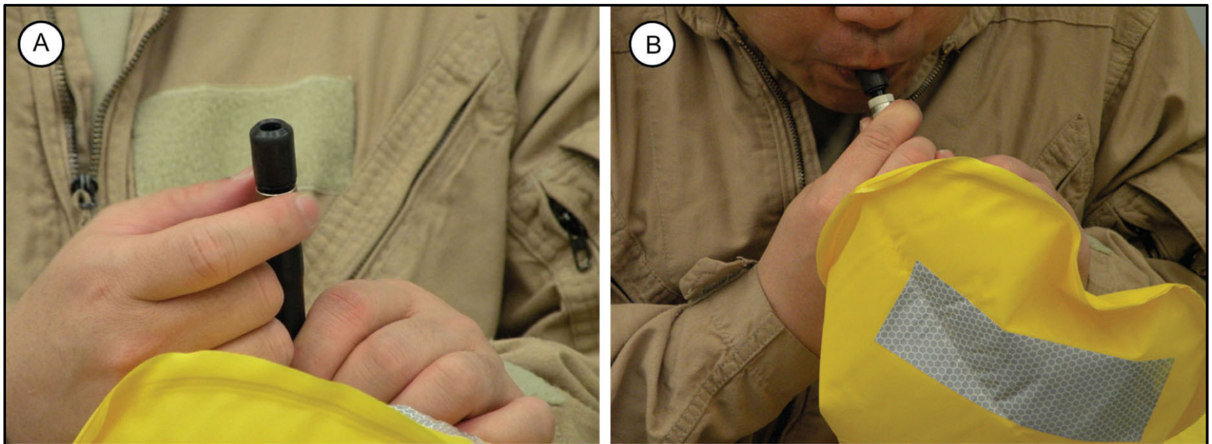
H-16. The TFSS-5326 is a one-size-fits-all system designed to accommodate the personal preference of the user for ease of wearing and comfort. For DBSL operations, the jumper should wear the TFSS-5326 units to the front of his body (figure H-1, page H-5) to avoid interference with the parachute or any 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 DBSL operations, causing injury to the parachutist or damage to 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 when worn incorrectly and inflated. To mitigate this risk, DBSL parachutists should properly mount the TFSS-5326 ensuring the system is not placed under the parachute harness at any location.

H-17. 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, the parachutist must ensure the TFSS-5326 mounting belt is worn tightly around his 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-18. To manually actuate 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 actuated, 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]). 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 DBSL operations (for example, the LPU-10), provided that users adhere to guidance contained in the referenced documentation and the safety releases.

Periodic Maintenance

H-19. 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 each bladder 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 procedures.

Inspections

H-20. 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 each 38-gram carbon dioxide cartridge is 147 grams.

H-21. 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-22. The LPU-10/P is a standard USAF 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. It must be maintained by the unit's parachute rigging facility.

H-23. The LPU-10/P is worn under the parachute harness. The harness is worn so that the inflatable packets are under the parachutist's arms. The manual inflating valves should be completely closed when donning the life preserver. 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 packets 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-24. The parachutist inflates the flotation bladders by pulling two toggle cords (at the bottom of the 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-25. 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 preserver. The parachutist fits the UDT life preserver by performing the following steps:

- Adjust the straps until snug to prevent movement of the UDT life preserver during free-fall and interference with the red cutaway handle or the reserve ripcord handle.
- 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 red cutaway handle and the reserve ripcord pillow (yellow handle).
- 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 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 the UDT life preserver. Accidental inflation by the carbon dioxide cartridges may result in obstruction of the reserve ripcord pillow and cutaway handle.

Figure H-3. Parachutist with underwater demolition team life preserver and RA-1 Advanced Ram-Air Parachute System parachute harness

MARITIME SWIMMER VESTS

H-26. 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-27. 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-28. 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-29. 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-30. 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 exit 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-31. 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-32. 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-33. 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-34. 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-35. DZ requirements and markings for conducting deliberate DBSL water jumps include the following:

- **Establishment of the DZ.** The DZ must be established not less than 60 minutes before TOT to allow time for the DZ safety officer to monitor DZ conditions.
- **Surface Winds.** Surface winds (table H-2, page H-10) shall not exceed 18 knots.
- **Sea State.** Sea state (table H-2, page H-10) shall not exceed limits in accordance with USSOCOM 350-3 and USASOC Regulation 350-2.
- **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. (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 which do not mimic local maritime navigational aids (buoys, channel markers, and so on) should be selected.
- **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-36. 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 so as to minimize confusion during the recovery procedure. These assignments must be briefed by the DZ support team leader or 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 to the boat crewman the center of the trailing edge (tail) and then the harness. 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 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-37. For night water DBSL parachute training, parachutists are required to be equipped with a light visible for 1 mile (such as a chemlight), an emergency light visible for 3 miles (such as a strobe), and a flare for emergencies in the water. During exit 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. For more information on lights used during DBSL operations reference Appendix G of this book.

WATER JUMPS WITH COMBAT EQUIPMENT

H-38. Requirements for water jumps with combat equipment include the following:

- **Combat Equipment Limitations.** Parachutists should minimize the amount of equipment they jump with during a DBSL deliberate water jump for safety reasons. Individual survival gear may be jumped (life preserver, swim fins, knife, approved day and night flare, strobe and chemlights). Weapons will be packed inside a combat pack and secured inside combat rubber raiding craft. USASOC units having a requirement for DBSL deliberate water jump 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 DBSL water jumps. DBSL Parachutists conducting water parachute operations with combat equipment must have 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. Equipment should be dip-tested for buoyancy before the jump.
- **Parachutist Procedures.** When jumping equipment, it is recommended to make the turn on final approach at 500 feet, to allow additional time to unfasten the chest strap and 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.** At no time will any combat equipment or weapon be rigged to the jumper that prevents the life preserver from fully 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 Double-Bag Static Line 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 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 J-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.

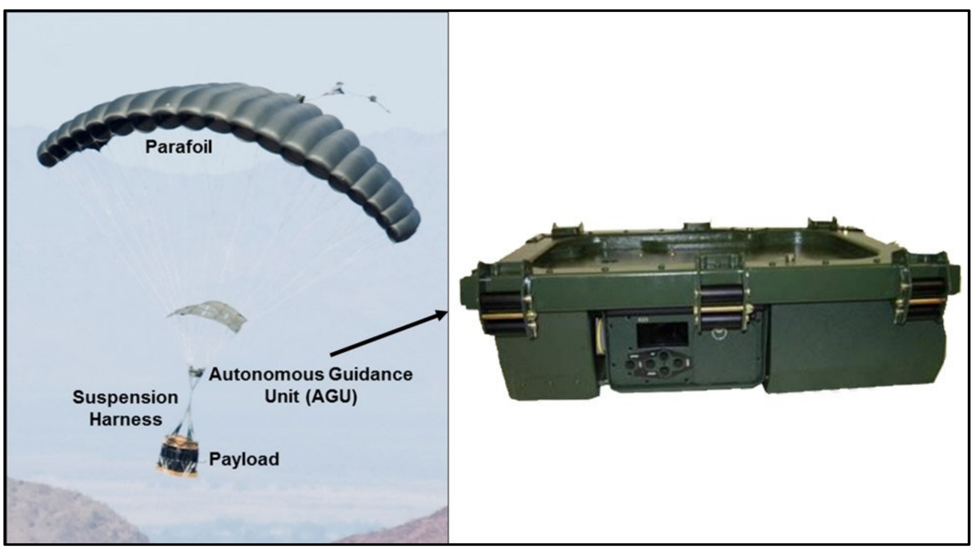


Figure I-1. Joint Precision Airdrop Systems

Operating Envelope

I-4. Table I-1, pages I-2 and I-3, presents 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

WARNING

When conducting combination air drop operations, the RA-1 in the DBSL configuration cannot be jumped from the USAF C-17 doors or ramp. This is due to the jumper's required body position upon exit and the length restriction of the universal static line for DBSL jumps over the aircraft ramp.

THEORY OF OPERATION

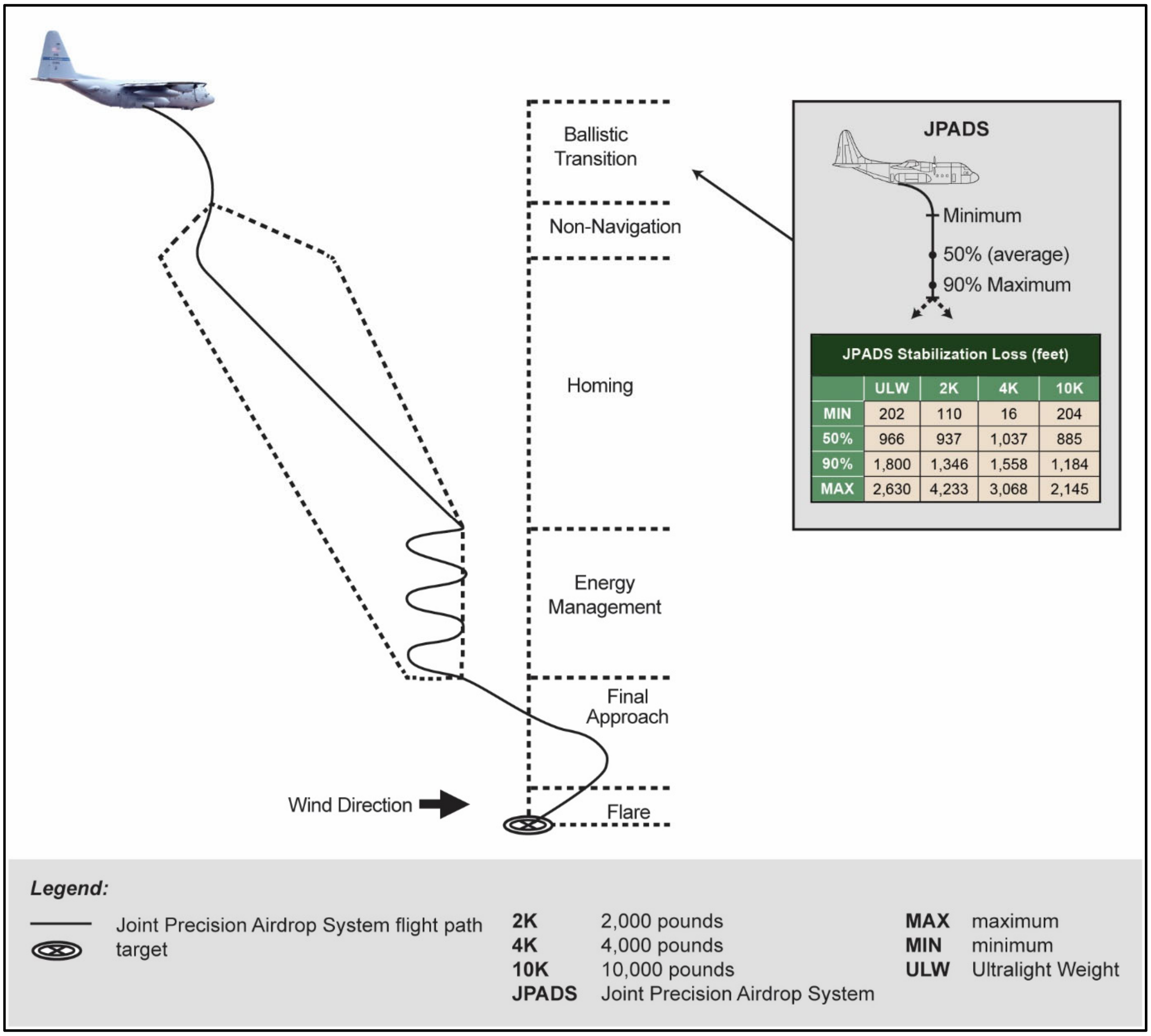
I-5. The JPADS, regardless of weight, adheres to similar flight patterns, which include ballistic transition, non-navigation, homing, energy management, final approach, and flare (figure I-2, page I-4). The system exits the aircraft and goes into ballistic transition during which the parafoil starts 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, in which 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-5, 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-5). The standard landing pattern will try to turn into the surface winds; however, in low or variables 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.

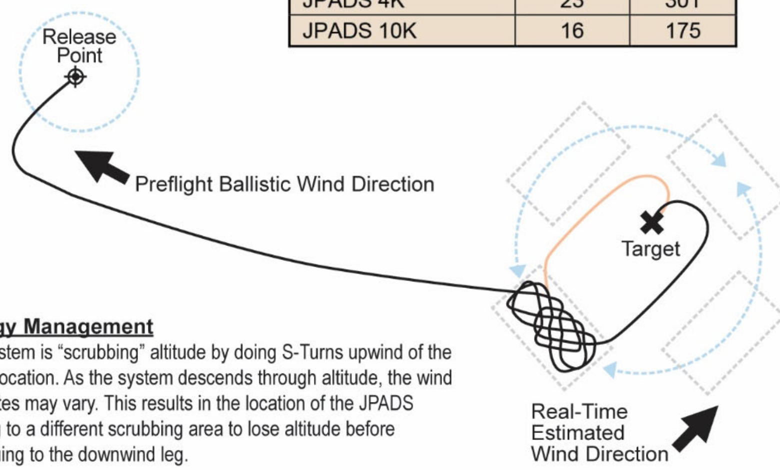


	ULW	2K	4K	10K
MIN	202	110	16	204
50%	966	937	1,037	885
90%	1,800	1,346	1,558	1,184
MAX	2,630	4,233	3,068	2,145

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

Non-Navigation
The system flies in a random direction for a set amount of time.



Final Approach
The system will attack the target while trying to do a downwind leg and turn into the wind. The system may make a right or left turn towards the target, depending on the system's EM exit location and position relative to the target.

Energy Management
The system is "scrubbing" altitude by doing S-Turns upwind of the target location. As the system descends through altitude, the wind estimates may vary. This results in the location of the JPADS moving to a different scrubbing area to lose altitude before continuing to the downwind leg.

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

Legend:

- alternate flight path (wind dependent)
- example flight path
- possible flight path
- alternate energy management area (wind dependent)

2K	2,000 pounds	**JPADS**	Joint Precision Airdrop System
4K	4,000 pounds	**m**	meters
10K	10,000 pounds	**s**	seconds
EM	energy management	**ULW**	Ultralight Weight
ft	feet		

Figure I-3. Joint Precision Airdrop System non-navigation, energy management, and final approach

Global Positioning System Lock Guidance

I-10. The JPADS system 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 is 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 indicators) 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 where the system will land within in 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 RA-1	JPADS ULW MC-4, MC-5	JPADS 2,000 lbs	JPADS 4,000 lbs	JPADS 10,000 lbs
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

Probability	JPADS Footprints Around Target (meters)				
	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 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%.

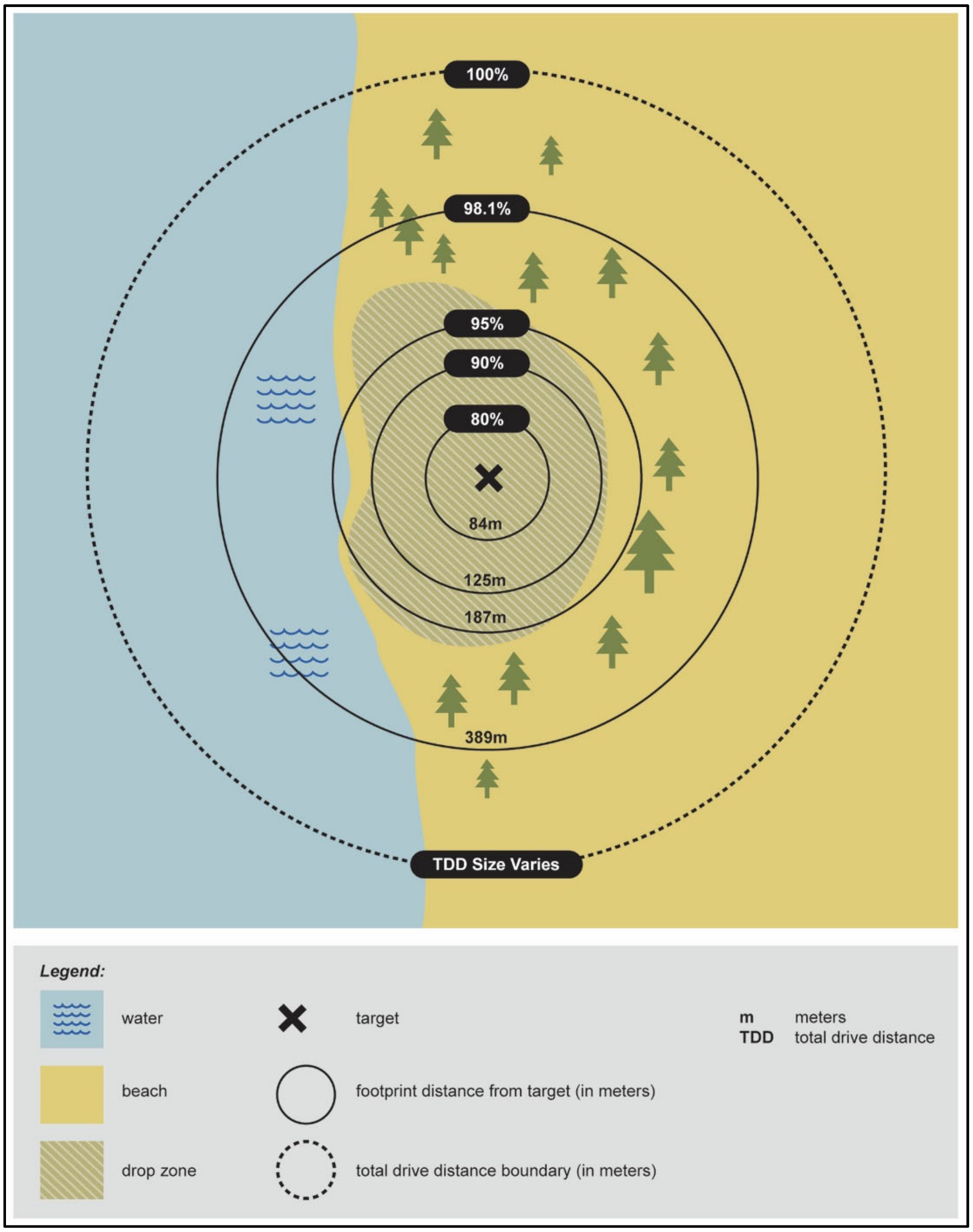


Figure I-4. Drawing footprints on a map

JOINT PRECISION AIRDROP SYSTEM AND PERSONNEL COMBINATION AIRDROP OPERATIONS

I-18. DBSL 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. Since it is common for DBSL personnel to place a sometimes considerable safety factor on release point solution and Jumpers have different flight patterns than JPADS, the perception is that JPADS will outperform the DBSL personnel; however, that is not always the case.

I-20. Jumpers must realize that JPADS are fully autonomous. Jumpers should remain above or higher than the systems at all times. Jumpers must maintain awareness of the JPADS and maintain greater distances than that of other jumpers.

I-21. To ensure they do not fall below the JPADS during descent, the jumpers must properly weigh out the JPADS and/or DBSL 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-22. 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-23. Because of the complexities of JPADS rigging, joint airdrop inspection is required for each JPADS and is only conducted by qualified personnel.

I-24. 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 (which is round), but work well with square loads.

I-25. 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-26. 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 JPADS weight 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 DBSL 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 AGU. Jumpmasters should be present to verify the correct impact point coordinates are programmed. If the JPADS is transitioned to the 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 system 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-27. When comparing a DBSL 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-28. Generally, Jumpers want max 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 DBSL and JPADS, a maximum offset release point has the highest risk of not making the target.

I-29. For combination drops, a release point can be selected between the DBSL 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.

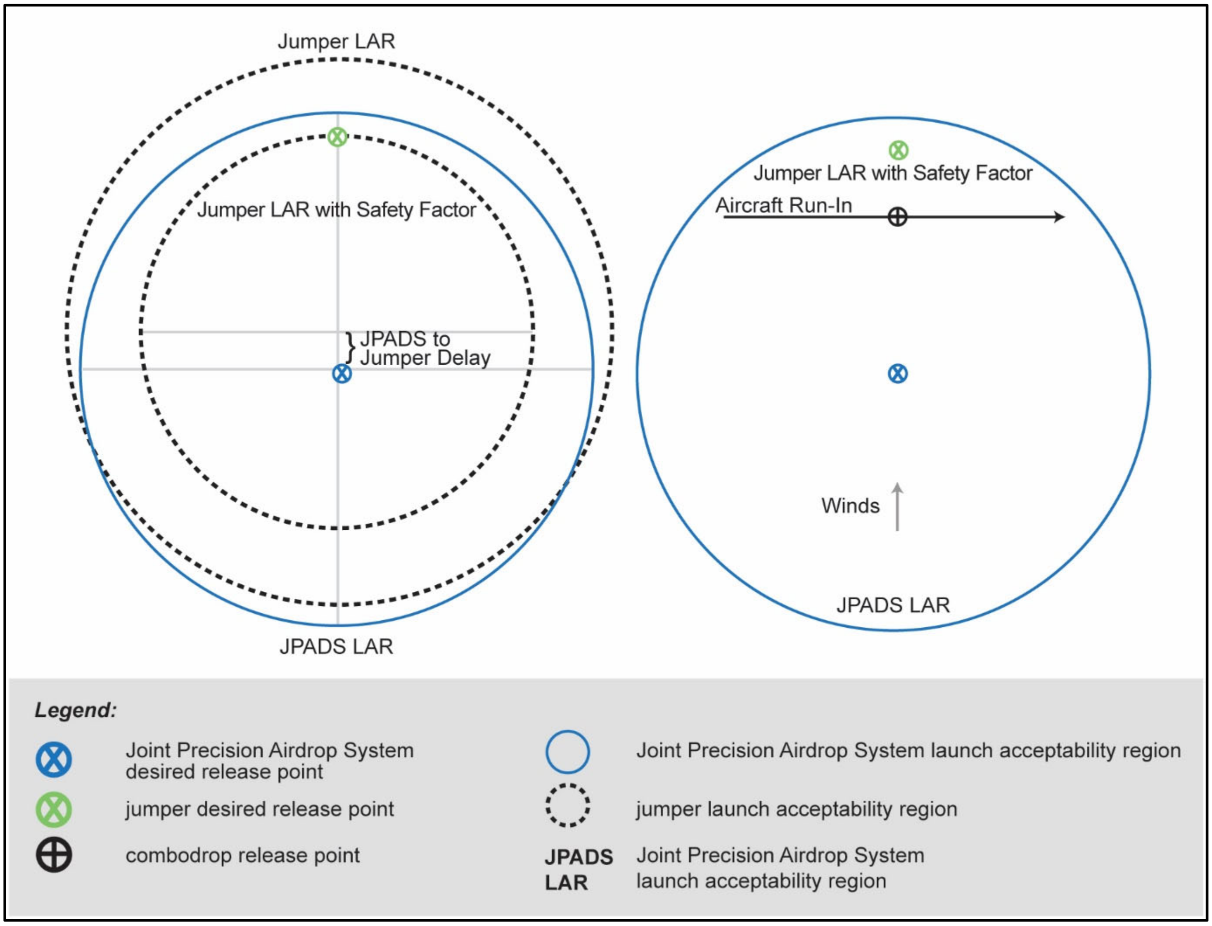


Figure I-6. Jumper and Joint Precision Airdrop System (combination) release point selection

WEIGHT BALLASTING

I-30. 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-31. 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. 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 the jumper landing before the JPADS. This may also increase the risk of injury.

I-32. 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. DBSL RA-1 rate of fall information conservatively assumes full flight and no maneuvering to maintain stack.

I-33. The jumper is required to use this chart unless they 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 tools such as the USAF Consolidated Airdrop Tool and JPADS website mission planner.

Double-Bag Static Line 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	**lbs**	pounds
GRW	gross rigged weight	**ULW**	ultralight weight
JPADS	Joint Precision Airdrop System		

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-34. 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 10.4 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 system 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-35. Figure I-8, page I-17, 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-36. 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 and JPADS should have the same rate.

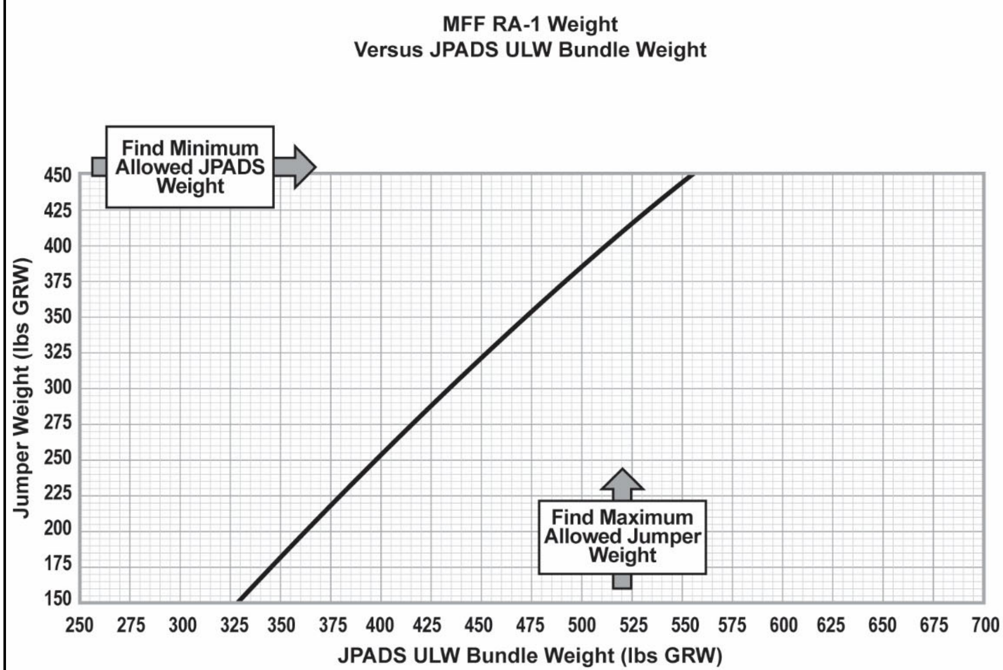
I-37. Using the previous example, if the parachutist's exit weight was increased to 400 lbs while the JPADS still weighs 485lbs gross rigged weight, the jumper's full flight rate of fall would exceed that of the JPADS and the jumper may end up below the bundle if he is not performing braking maneuvers. 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 adjust his canopy flight much more often to stay in the formation.

WARNING

Figure I-8 presents JPADSs ultralight weight RA-1 versus DBSL RA-1 and is not applicable to any other parachute variant. Units using other JPADS and/or DBSL 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 <u>minimum</u> allowed JPADS weight. If the JPADS weight is not adjustable, start with the JPADS weight to find the <u>maximum</u> 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-38. 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.

I-39. During night operations, the bundle will be marked in accordance with a published unit SOP. It is recommended that all DBSL 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-40. 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-41. Jumpers will accomplish standard postopening procedures, build the initial canopy formation behind the bundle, and begin flying the intended flight route.

I-42. 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 DBSL jumper safety factors input in the mission planning phase.

I-43. 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-44. 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 cut away 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 cut away 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 descent.

DUTY POSITIONS

I-45. The bundle safety is responsible for ensuring the bundle is programmed, rigged, loaded, and deployed correctly.

I-46. The bundle pusher and rigger are responsible for verifying the bundle is programmed, rigged, loaded, and deployed correctly. The bundle pusher's primary responsibility is 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-47. The bundle should be placed as close as possible to the ramp hinge, with ratchet portion of 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-48. Time warnings for bundle operations are as follows:

- **10 MINUTES.** All jumpers will put rucksacks on and perform buddy checks of equipment. The safety turns on the GPS repeater, then turns on the JPADS and ensures it is clear of fault codes.
- **6 MINUTES.** Aircraft will be flat and level on heading for jump run.
- **4 MINUTES.** All jumpers stand up and perform pin checks. The safety confirm the JPADS achieved GPS lock at least once during time in aircraft.

- **3 MINUTES.** Lead jumper controls 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 leaders (with the assistance of the safety) will move the bundle halfway to the edge of the ramp.
- **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 t 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 the jumper's rate of descent.

I-49. 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-50. Exit procedures for jumpers are as follows:

- After the lead jumper pushes the bundle, he will delay at least 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 conducting a good DBSL exit.
- After the main canopy deploys, jumpers will orient in the direction of the DZ and check in on the radio in exit number order. Jumpers will follow the canopy deployment procedures for the RA-1 configuration being jumped.

I-51. The responsibility of the low jumper 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-52. 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-53. All jumpers not using a computer navigation aid should use compass boards with a marine compass and a commercial-brand GPS.

I-54. At 2,000 feet AGL, the lead jumper should call by radio the landing pattern to the remainder of the stack.

I-55. If the JPADS is in visible range during JPADS final approach, evaluate the JPADS landing pattern and touchdown to assist in estimating 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 safe distance from JPADS landing patter. 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 cognizant of this and ensure there is vertical separation from them and the JPADS bundle.

I-56. All jumpers will land as normal. Once on the ground, jumpers will turn off strobe lights and assemble on the low man.

Appendix J

RA-1 Double-Bag Static Line Jump Brief and Sustained Airborne Training

All USASOC DBSL jumpers will receive SAT within the 24-hour period immediately prior to Station Time of a DBSL operation. For additional information reference DBSL emergency procedures in Chapter 9. The specific procedures and techniques are outlined below. Except for the jumpmaster's briefing, SAT will be performance oriented.

RA-1 Sustained Airborne Training

Note: *Except for the jumpmaster briefing, SAT will be performance oriented.*

At a minimum, DBSL 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, 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 the SAT will include performance oriented training.

JUMPMASTER BRIEFING

J-1. Jumpmasters will brief the outline (figure J-1, page J-2) to ensure all jumpers understand who the key personnel are, understand the DBSL 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 representative. 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: day/night/water admin/tactical oxygen/rucksack/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.	Inflight 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 J-1. Jumpmaster briefing outline

AIRCRAFT EMERGENCY PROCEDURES

J-2. Jumpmasters will cover all emergency procedures during SAT as detailed in figure J-2, pages J-3 through J-6.

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 good DBSL exit in the opposite direction to 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 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 may issue abbreviated jump commands if time permits. ● If time permits, jumpers will hook-up and exit on the jumpmaster's command. ● If time does not permit, the jumpmaster will place a clenched fist over his reserve ripcord handle and thrust it out to the side, indicating that jumpers will exit on their reserve canopy. ● On the jumpmaster's command, jumpers will execute a good DBSL exit. ● 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.

Figure J-2. Aircraft procedures briefing

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 that jumper must exit immediately.
Nonoxygen Emergency Procedures
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.** The jumpmaster issues this warning. Everyone awake. Keep eyes on the jumpmaster. ● **10-MINUTES.** The jumpmaster issues this warning. Keep eyes on the jumpmaster. Don helmets if removed. ● **WINDS.** Updated winds from the DZ, expressed in knots. ● **CYPRES and PIN CHECK.** Jumpers conduct a CYPRES and pin check. ● **STAND UP.** Given 6 minutes from TOT. Pass the signal back, stand up, face rear of the aircraft, check CYPRES and pins on jumper to your front and pass the static line snap-hook of the jumper to your front to the appropriate side. ● **HOOK UP.** One the jumpmaster's command, each jumper passes the signal back, hooks up to the anchor-line cable with the gate facing the outboard side (skin) of the aircraft and acquires a high reverse bight. ***Note:*** When using a rotary-wing deck-mounted anchor line cable, refer to Chapter 13. ● **CHECK STATIC LINES.** Pass the signal back. Starting with your own snap-hook, trace the static line down to the reverse bight and through your hand with a thumbless grip. Trace the static line of the jumper to your front from the shoulder to the first locking stow. Ensure that there are no interferences such as a weapon, or radio antenna. Last two jumpers face the skin of the aircraft and check each other's static lines. ● **CHECK EQUIPMENT.** Pass the signal back, check all points of attachment (chinstrap, chest strap, quick-ejector snap on lowering line, quick-ejector snap on leg straps, equipment attaching straps). Check location and seating of the release and reserve handles and ensure that goggles are down. ● **SOUND OFF FOR EQUIPMENT CHECK.** Pass the signal back. Beginning with the last jumper in the pass, return the thumbs-up signal over the inboard shoulder of the jumper to the front until the jumpmaster receives this signal from the first jumper. ● **MOVE TO THE REAR.** Given approximately 1 minute from TOT. Pass signal back, then first jumper moves to hinge of ramp. ● **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 J-2. Aircraft procedures briefing (continued)

Oxygen – Aircraft Procedures/Jump Commands

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.** The jumpmaster issues this warning. Everyone awake. Keep eyes on the jumpmaster.
- **10-MINUTES.** The jumpmaster issues this warning. Keep eyes on the jumpmaster. Don helmets if removed.
- **WINDS.** Updated winds from the DZ, expressed in knots.
- **CYPRES and PIN CHECK.** Jumpers conduct a CYPRES and pin check.
- **MASK.** On the command MASK:
  - Connect right side oxygen fitting. (Prebreathing requirements may require you to mask earlier.)
  - 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.

Note: You must go through a JMPI again if you remove your helmet.

- **STAND UP.** Given 6 minutes from TOT. 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 with any deficiencies that are identified.) Pass the static line snap-hook of the jumper to your front to the appropriate side.
- **HOOK UP.** Pass the signal back. Hook up the anchor-line cable with the gate facing the skin of the aircraft and acquire a high reverse bight.
- **CHECK STATIC LINES.** Pass the signal back. Starting with your own snap-hook, trace the static line down to the reverse bight and through your hand with a thumbless grip. Trace the static line of the jumper to your front from the shoulder to the first locking stow. Ensure that there are no interferences such as a weapon, or radio antenna. Last two jumpers face the skin of the aircraft and check each other's static lines.
- **CHECK EQUIPMENT.** Pass the signal back, check all points of attachment (chinstrap, chest strap, quick-ejector snap on lowering line, quick-ejector snap on leg straps, equipment attaching straps). Check location and seating of the release and reserve handles and ensure that goggles are down.
- **SOUND OFF FOR EQUIPMENT CHECK.** Pass the signal back. Beginning with the last jumper in the pass, return the thumbs-up signal over the inboard shoulder of the jumper to the front until the jumpmaster receives this signal from the first jumper.
- **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 hinge of ramp.
- **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.
- **After Exiting:**
  - Leave the mask connected until landing.
  - After landing, turn off the bottle and disconnect the mask. Place mask in container and replace red caps on all fittings.

Figure J-2. Aircraft procedures briefing (continued)

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 J-2. Aircraft procedures briefing (continued)

EXIT PROCEDURES

J-3. Figure J-3 describes the methods that should be utilized to execute a DBSL exit.

Ramp—Overhead Anchor Line Cable
To execute a DBSL exit from a ramp with overhead anchor line cable, the jumper will— ● Move to the edge of the ramp and assume a DBSL exit body position. ● Bend forward 90-degrees at the waist; keep head up and eyes on the horizon. ● Extend arms straight out at shoulder height, body bent slightly at the waist and with palms facing the rear. ● With knees slightly bent, place feet shoulder width apart or wider. ● Gently hop off the ramp with bottom of the container and buttocks exposed to the relative wind. ● Maintain this body position throughout canopy deployment and keep arms out to the sides while counting to 6 until the canopy deploys.
Ramp—Deck-Mounted Anchor Line Cable
To execute a DBSL exit from a ramp with deck-mounted anchor line cable, the jumper will— ● Walk off the ramp bending forward at the waist and bring feet and knees together. ● Place hands on the knees with eyes on the horizon (pike exit). ● Hold this position for 2 seconds then transition to the DBSL exit body position. ● Maintain the DBSL exit body position throughout canopy deployment, keeping arms out to sides while counting to 6 until the canopy deploys.
Side Door Rotary-Wing
To execute a DBSL exit from a side door rotary-wing, the jumper will— ● Vigorously push off the deck with both hands and rotate the bottom of the container toward the relative wind and follow through with the pike exit body position. ● Straighten his legs and bring them together. Bend forward at the waist and grasp his pant legs around his knees. ● Keep head up and maintain eyes on the horizon throughout canopy deployment while counting to 6 until the canopy deploys. ***Note:*** Combat equipment is not authorized for side door rotary-wing operations.

Figure J-3. Double-bag static line exit procedures

EMERGENCY PROCEDURES DURING EXIT

J-4. Figure J-4 describes the emergency procedures that should be employed for specified occurrences during exit.

Towed Jumper

Procedures for a towed jumper during exit are as follows:

- Towed jumper assumes a tight body position with his chin on his chest.
- Any remaining jumpers in the pass will be stopped.
- Jumpmaster notifies the pilot and instructs him to circle the aircraft over the DZ.
- Jumpmaster identifies how the towed jumper is being towed.
- If the towed jumper is being towed by his static line, the jumpmaster makes an attempt to retrieve him into the aircraft
- If this attempt is unsuccessful the towed jumper is cut free as the aircraft passes over the DZ.
- Once the towed jumper begins to feel himself falling free of the aircraft, he goes into a DBSL exit position and begins a six second count.
- If the main parachute fails to deploy after the six-second count, he executes cutaway procedures.
- If the main parachute deploys, he conducts post-opening procedures.
- If the towed jumper is being towed by his equipment the jumpmaster makes an attempt to free the hung equipment.
- If this attempt is unsuccessful, the hung equipment is cut free (as the aircraft passes over the DZ.)
- If the towed jumper is unconscious the jumpmaster attempts to retrieve the jumper into the aircraft.

Note: The preceding statements applying to jumping from a rotary-wing aircraft. If a towed jumper is being towed by anything other than his static line, it will be cut as the aircraft makes a pass over the DZ. If the towed jumper is being towed by his static line, the aircraft will slowly descend to a suitable area and land with the towed jumper.

Canopy Control Procedures

Upon canopy deployment, these procedures will be followed:

- Post-Opening: 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 he wants 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.

Figure J-4. Emergency procedures during exit

POSTEXIT EMERGENCY PROCEDURES

J-5. Figure J-5, pages J-8 and J-10, details the postexit emergency procedures for specified emergency occurrences.

Postexit Malfunction Types

Postexit malfunction types are as follows:

- **High-Speed Malfunction.** 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.
- **Low-Speed Malfunction.** 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 malfunction, 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.

Note: The cutaway decision altitude for high-speed and low-speed malfunctions is 2,500 feet AGL.

Cutaway Procedures for DBSL

WARNING

The jumper must cut away the main parachute before pulling the yellow reserve ripcord pillow.

Cutaway procedures for DBSL are as follows:

- **Arch.** Arch after assuming a hard-arch body position.
- **Counter.** Counter with the left hand.
- **Look.** Look to identify the red cutaway pillow on the right main lift web which should be chest high on the inboard side.
- **Grab.** Grab the red cut-away pillow with right hand.
- **Pull.** Pull the red cut-away pillow to a full-arm extension.
- **Throw Away.** Throw away the red cut-away pillow.
- **Counter.** Counter with right hand.
- **Look.** Look to identify the yellow reserve ripcord pillow on the left main lift web which should be chest high on the inboard side.
- **Grab.** Grab the yellow reserve ripcord pillow with the left hand.
- **Pull.** Pull the yellow reserve ripcord pillow to full-arm extension.
- **Throw Away.** Throw away the yellow reserve ripcord pillow.
- **Check.** Check over right shoulder to ensure the reserve pilot chute deploys.

High-Speed Malfunctions

High-speed malfunctions occur when the following happen:

- Jumper fails to hook up static line.
- Static line breaks.
- Anchor cable breaks.
- Horseshoe malfunction occurs when one or more of the following are caught on the jumper or his equipment:
  - Pilot chute.
  - Parachute.
  - Suspension lines.

Figure J-5. Postexit Emergencies and procedures

High-Speed Malfunctions (continued)
• Bag locks occur when 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 when the main parachute is spinning and less than 50-percent inflated, the jumper initiates cutaway procedures immediately.
Low-Speed Malfunctions
Low-speed malfunctions occur when the following happen: • **Line Over.** 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 Twist.** When the parachute deploys, if the risers and suspension lines are twisted, the jumper— ▪ Reaches up with both hands (thumbs pointed downwards) 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.** 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 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 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. • **Closed End Cells.** 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.** 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.** 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.** 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.

Figure J-5. Postexit emergencies and procedures (continued)

Low-Speed Malfunctions (continued)
● **Broken Suspension Lines.** 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.** 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.** 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.

Figure J-5. Postexit emergencies and procedures (continued)

POSTOPENING EMERGENCY PROCEDURES

J-6. Figure J-6, pages J-10 through J-13, detail the postopening emergency procedures for DBSL operations.

Canopy Controllability Check
With all malfunctions, the jumper performs a canopy controllability check if the canopy controllability is in question. To perform a canopy controllability check— ● Grasp both toggles and pull down to release the brakes and attempt to fly the canopy straight at full flight. ● Pull the brakes down to the full-brake position and determine the canopy's flare points. ● Return to the full flight. ● Look right and turn 90 degrees to the right. ● Look left and turn 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. Initiate cutaway procedures. ***Note:*** Make only two attempts to clear a malfunction. Cutaway procedures must be initiated by 2,500 feet AGL.
Entering a Cloud Under Canopy
When entering a cloud under canopy, the jumper— ● 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, down plane, or partially deployed.

Figure J-6. Postopening emergency procedures

Dual Canopy Deployments (continued)

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.

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 parachutist landing fall.

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 if below 1000 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 execute a parachute landing fall.

Partially Deployed Configuration

- 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 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 execute a parachute landing fall.

Figure J-6. Postopening emergency procedures (continued)

Canopy Entanglements
Canopy entanglements may occur with another jumper and at any altitude. Follow these procedures to resolve canopy entanglements.
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 pillows with your left arm and attempt to bounce off. • If line entanglement occurs, stay calm and do not grab 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.”
Entanglements Above 2,000 Feet
• If the higher jumper has a good canopy, he 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 initiating 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 pillows protected. • If the canopy cannot be cleared safely, he should fly slowly with brakes to diminish the other canopy’s drag and potential for interference in flight and control.
Entanglements Between 2,000 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 parachutist landing fall.
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 parachutist landing fall.

Figure J-6. Postopening emergency procedures (continued)

Canopy Entanglements (continued)

Neither Jumper Has a Good Canopy

- Jumpers should attempt to establish communication system to convey 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; additionally this may alternate repeatedly.

- If a jumper is entangled in lines, he should attempt to free himself and cutaway first.
- The lower jumper should cutaway after the higher jumper.
- The higher jumper could become 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 configuration.

Figure J-6. Postopening emergency procedures (continued)

TRAFFIC, LANDING, AND EMERGENCY LANDING PROCEDURES

J-7. Figure J-7, pages J-13 to J-15, details the best practices for maintaining optimal traffic patterns, the components of the landing pattern and emergency landing procedures.

Traffic Pattern

To maintain optimal traffic patterns—

- Stay alert and keep your air space clear.
- Maintain 25 meters of clearance horizontally and vertically.
- Respect that the lower jumper 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 lower jumper or lead the group if you are the lower jumper.
- 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

The following are the components of the landing pattern:

- **Downwind Leg.** Enter the landing pattern at 900 feet AGL. Offset from where you want to land at a 60-degree angle (dependent upon winds). Check the lowering line. Fly the landing pattern at quarter to half brakes and make 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 the 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 approach, clear the airspace below and lower combat equipment at 200-100 feet AGL. Be prepared to counter the weight shift.

Note: If your combat equipment has not been lowered by 100 feet AGL, you will land with it attached.

Figure J-7. Traffic, landing and emergency landing procedures

Landing
Follow these procedures for landing: ● At 200 feet AGL, go to full flight to fully inflate the canopy and generate enough speed for landing. ● Initiate the flare between 10-15 feet AGL, depending on the wind speed. For higher winds (11-18 knots) flare lower. For lower winds (0-10 knots) flare higher. If the jumper flares too high, he should hold the toggles in the full brakes position and be prepared to do a parachute landing fall. Do not use combat equipment as a flare indicator. ● Continue to give toggle and harness input as needed to counter gusts and keep the canopy over the head. ● After landing, push the risers to one side or pull one toggle to collapse the canopy. Follow SOP for assembly procedures. ● For night landings, go to full brakes position at approximately 100 feet AGL, look to the horizon, keep the feet and the knees together, and execute a parachute landing fall.
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 keep on oxygen mask if one was 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 tree or catch your canopy on thickest branches. ● Protect your face with your forearms. ● Keep your feet and knees together and be prepared to execute a parachute landing fall. ● If 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 parachutist landing fall in case the water is shallow. ● Upon entering 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 parachutist landing fall 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.

Figure J-7. Traffic, landing and emergency landing procedures (continued)

Emergency Landing Procedures (continued)
High Wind Landings: (11–18 knots)
• Disconnect your RSL at 1500 feet AGL. • Release one toggle and pull the other toggle hand over hand until the canopy collapses, as soon as your feet touches the ground. • 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 injury or another issue prevents you from getting to your feet or collapsing your canopy, disconnect the RSL (if not already disconnected), and pull the red cutaway pillow.
Dust Devils
• If you fly through a dust devil, go to full flight in an attempt to build speed. Be prepared to parachutist landing fall 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 parachutist landing fall.

Figure J-7. Traffic, landing and emergency landing procedures (continued)

ADDITIONAL PROCEDURES

J-8. The jumpmaster will explain the additional procedures identified in figure J-8. These procedures include the assembly procedures, DBSL HAHO procedures, and bundle procedures.

Assembly Procedures
Assembly procedures for the following jumps will be explained to all jumpers. • Administrative. • Tactical.
HAHO Procedures
HAHO procedures will be explained to all jumpers, including— • 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
Bundle procedures will be explained to all jumpers, including— • 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 J-8. Assembly, high-altitude high-opening, and bundle procedures

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Glossary

ACH	advanced combat helmet
ACH-ARC	advanced combat helmet accessory rail connector
AFI	Air Force instruction
AGU	autonomous guidance unit
ALICE	all-purpose lightweight individual carrying equipment
AGL	above ground level
AR	Army regulation
ARC	accessory rail connector
ARAPS	Advanced Ram-Air Parachute System
ATP	Army techniques publication
CMWH	center-mounted weapon harness
CYPRES	Cybernetic Parachute Release System
DA	Department of the Army
DBSL	double-bag static line
DOD	Department of Defense
DODD	Department of Defense directive
EAAD	electronic automatic activation device
DZ	drop zone
FM	field manual
GPS	Global Positioning System
HAHO	high-altitude high-opening
HALO	high-altitude low-opening
HARP	high-altitude release point
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
MSL	mean sea level
MSV	maritime swimmer vest
NVG	night vision goggle(s)
OXCON	oxygen console

PDB	parachutist drop bag
PHANTOM	Parachutist High Altitude Next Generation Technology Oxygen Mask
POM	parachutist oxygen mask
PRICE	pressure, regulator, indicator, connections, emergency equipment
psi	pounds per square inch
RSL	reserve static line
SAT	sustained airborne training
SOF	special operations forces
SOP	standard operating procedure
TC	training circular
TFSS	tactical flotation support system
TM	technical manual
TOT	time on target
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

References

All URLs accessed on 24 April 2020.

REQUIRED PUBLICATIONS

These documents must be available to intended users of this publication.

DOD Dictionary of Military and Associated Terms, as of January 2020.

FM 1-02.1, *Operational Terms,* 21 November 2019.

RELATED PUBLICATIONS

These documents contain relevant supplemental information.

DEPARTMENT OF THE ARMY PUBLICATIONS

Most Army doctrinal publications are available online: https://armypubs.army.mil.

AR 95-1, *Flight Regulations,* 22 March 2018.

AR 115-10, *Weather Support and Services for the U.S. Army,* 17 December 2018.

AR 750-32, *Airdrop, Parachute Recovery, and Aircraft Personnel Escape Systems,* 18 June 2008.

ATP 3-18.10, *Special Forces Air Operations,* 24 February 2016.

FM 3-21.38, *Pathfinder Operations,* 25 April 2006.

FM 6-27, *The Commander's Handbook on the Law of Land Warfare,* 7 August 2019.

TB 43-0001-80, *Technical Bulletin Army Equipment Data Sheets Personnel Parachute Authorized for Use List,* 1 July 2011.

TC 3-21.220, *Static Line Parachuting Techniques and Training,* 24 October 2018.

TC 21-21, *Water Survival Training,* 25 June 1991.

TM 1-1680-377-13&P-5, *Technical Manual, Operator's, Unit, and Direct Support Maintenance Manual Including Repair Parts And Special Tools List for Helicopter Oxygen Systems (UH-60) Part No. 1660-EG-207 (NSN 1660-01-224-6947) (EIC: NA);Helicopter Oxygen Systems (CH47-FWD) Part No. 1660-EG-208 NSN 1660-01-224-6943 (EIC: NA); Helicopter Oxygen Systems (CH47-AFT) Part No. 1660-EG-209 (NSN 1660-01-224-6944) (EIC: NA); Helicopter Oxygen Systems (UH-1) Part No. 1660-EG-211 (NSN 1660-01-224-6945) (EIC: NA); Pressure-Demand Oxygen Mask MBU-12/P Part No. 834-75-01 (NSN 1660-01-081-9157) (EIC: NA); Part No. 834-75-02 NSN 1660-01-073-7595 (EIC: NA); Part No. 834-75-03 (NSN 1660-01-073-7596) (EIC: NA); Part No. 834-75-04 (NSN 1660-01-081-2368) (EIC: NA),* 23 March 2012.

TM 10-1670-262-12&P, *Technical Manual Operator and Unit Maintenance Manual Including Repair Parts and Special Tools List, Personnel Insertion/Extraction Systems for STABO (NSN 1670-00-168-5952) (1670-00-168-6064) (1670-00-168-6063) Fast Rope Insertion/Extraction System (4020-01-338-3307) (4020-01-338-3308) (4020-01-338-3309) and Anchoring Device (1670-00-999-3544),* 25 September 1992.

TM 10-1670-298-23&P, *Field Maintenance Manual Including Repair Parts and Special Tools List for Container, A-7A Aerial Delivery Cargo Sling (NSN 1670-00-251-1153), A-21 Aerial Delivery Cargo Bag (NSN 1670-00-242-9173), A-22 Aerial Delivery Cargo Bag (NSN 1670-00-587-3421), A-24 Aerial Delivery Cargo Bag (NSN 1670-01-650-5347), Webbing Strap (60-inch) (NSN5340-00-738-5878), Webbing Strap (120-inch) (NSN 5340-00-738-5879)* 15 January 2015.

TM 10-1670-300-20&P, *Unit Maintenance Manual Including Repair Parts and Special Tools List (RPSTL) for Ancillary Equipment for: Military Free-Fall System, Helmet, Free-Fall, Parachutists, Type I (NSN 8415-01-018-4911, 8415-01-018-4912) Helmet, Free-Fall,* *Parachutists, Type II (NSNs 8415-01-018-4913, 8415-01-018-4914, 8415-01-018-4915) Goggles (NSN 8465-01-328-8268) Altimeter, Parachutists (NSN 6660-01-213-9035) Sling Assembly, Equipment Attaching (NSN 1670-01-008-7755) Line, Equipment Lowering (P/N 11-1-2530-2) Release Assembly, Ripcord, Automatic, Type FF2 (NSN 1670-01-213-8145) Release, Automatic Ripcord, AR2, Model 451 (NSN 1670-01-369-7914), Drop Bag Parachute w/7-Foot Lowering Line (1670-01-508-9051), Drop Bag, Parachute w/15-Foot Lowering Line (1670-01-508-9053) Harness, Single Point Release Assembly (NSN 1670-01-227-7992)*, 31 July 2004.

TM 10-1670-329-13&P, *Technical Manual Operator and Field Maintenance Manual Including Repair Parts and Special Tools List (RPSTL) for Parachutist Oxygen Mask (POM) (NSN 1670-01-572-2151) (NSN 1670-01-572-2152) (NSN 1670-01-572-2153) (NSN 1670-01-572-2154),* 21 December 2009.

TM 10-1670-335-23&P, *Technical Manual, Field Maintenance Manual Including Repair Parts and Special Tools List for RA-1 Advanced Ram Air Parachute System (ARAPS) P/N 11-1-9100 (NSN 1670-01-606-1897),* 10 December 2014.

TM 10-8470-204-10, *Technical Manual, Operator Manual For Advanced Combat Helmet (ACH) NSN: 8470-01-529-6302 Small, NSN: 8470-01-529-6329 Medium, NSN: 8470-01-529-6344 Large, NSN: 8470-01-529-6365, X-Large; Reduced Weight Advanced Combat Helmet (ACH Type II) NSN:08470-01-600-8105 Small, NSN: 8470-01-600-8107 Medium, NSN: 8470-01-600-8108 Large, NSN: 8470-01-600-8109 X-Large; NSN: 8470-01-600-8099 XX-Large; Advanced Combat Helmet Generation II (ACH GEN II) NSN: 8470-01-662-5030 Small, NSN: 8470-01-662-5038 Medium, NSN: 8470-01-662-5026 Large, NSN: 8470-01-662-5035 X-Large*, 1 August 2015.

Department of Defense Publications

Most DOD issuances are available online: https://www.esd.whs.mil/DD/

DODD 5100.01, *Functions of the Department of Defense and its Major Components,* 21 December 2010.

Air Force Publications

Most Air Force publications are available on the Air Force e-Publishing website: https://www.e-publishing.af.mil/Product-Index/

AFI 11-403, *Aerospace Physiological Training Program,* 30 November 2012.

AFI 11-409, *High Altitude Airdrop Mission Support Program,* 9 September 2015.

AFI 11-410, *Personnel Parachute Operations,* 4 August 2008.

AFI 13-217, *Drop Zone and Landing Zone Operations,* 10 May 2007.

AFI 15-157, *Weather Support and Services for the U.S. Army,* 17 December 2018.

Other Publications

SS521-AG-PRO-010, *U.S. Navy Diving Manual,* 1 December 2016.

https://www.navsea.navy.mil/Home/SUPSALV/

SSK Military Industries website: http://ssk.us/

Standardization Agreement 7056, Edition 1, *Functional Requirements for Physiological Protection During High Altitude Parachuting Operations,* 20 October 1997.

https://nso.nato.int/nso/nsdd/listpromulg.html

Title 10, United States Code, *Armed Forces.* https://uscode.house.gov/

USASOC Regulation 350-2, *Training: Airborne Operations,* 13 December 2019.

USASOC Regulation 350-20, *USASOC Dive Program,* 1 January 2010

USASOC Regulation 385-1, *Safety: USASOC Safety Program (Army Special Operations Forces),* 3 October 2017.

USSOCOM Directive 10-1, *Terms of Reference – Roles, Missions, and Functions of Component Commands,* 9 May 2018.

USSOCOM Manual 350-3*, (O) Special Operations Forces Baseline Interoperable Airborne Operations (Parachuting) Training Standards (U)*, 19 October 2018.

(***Note:*** Most USASOC and USSOCOM publications are available on the USASOC website: https://usasoc.sof.socom.mil/sites/usasoc-hq/FormsPubs/default.aspx
For organizations outside of USASOC or USSOCOM that require these publications, please send a request to Commander, U.S. Army Special Operations Center of Excellence, USAJFKSWCS, Special Forces Directorate, ATTN: AOJK-SFD, 3004 Ardennes Street, Stop A, Fort Bragg, NC 28310-9610.)

PRESCRIBED FORMS

Unless otherwise indicated, DA forms are available on the Army Publishing Directorate website:

https://armypubs.army.mil

DA Form 7733, *DBSL Jumpmaster Report*

REFERENCED FORMS

DEPARTMENT OF THE ARMY FORMS

Unless otherwise indicated, DA forms are available on the Army Publishing Directorate website:

https://armypubs.army.mil

DA Form 1306, *Statement of Jump and Loading Manifest.*

DA Form 2028, *Recommended Changes to Publications and Blank Forms.*

DEPARTMENT OF DEFENSE FORMS

Unless otherwise indicated, DD forms are available on the Office of the Secretary of Defense website: https://www.esd.whs.mil/DD/

DD Form 2977, *Deliberate Risk Assessment Worksheet*.

UNITED STATES AIR FORCE FORMS

Most Air Force Forms are available on the Air Force e-Publishing website: https://www.e-publishing.af.mil/Product-Index/

Air Force Form 1274, *Physiological Training.*

Air Force Form 3823, *Drop Zone Survey.*

UNITED STATES ARMY SPECIAL OPERATIONS COMMAND FORMS

Most USASOC Forms are available on the USASOC website: https://usasoc.sof.socom.mil/sites/usasoc-hq/FormsPubs/default.aspx

USASOC Form 4080, *Reduced Oxygen Breathing Device Physiological Training.*

(***Note:*** For organizations outside of USASOC that require this form, please send a request to Commander, U.S. Army Special Operations Center of Excellence, USAJFKSWCS, SF Directorate, ATTN: AOJK-SFD, 3004 Ardennes Street, Stop A, Fort Bragg, NC 28310-9610.

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28 April 2020

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