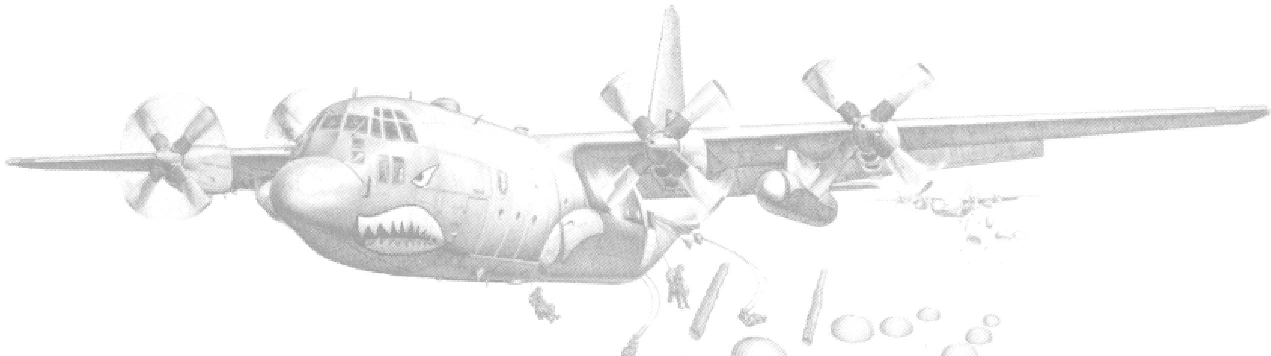
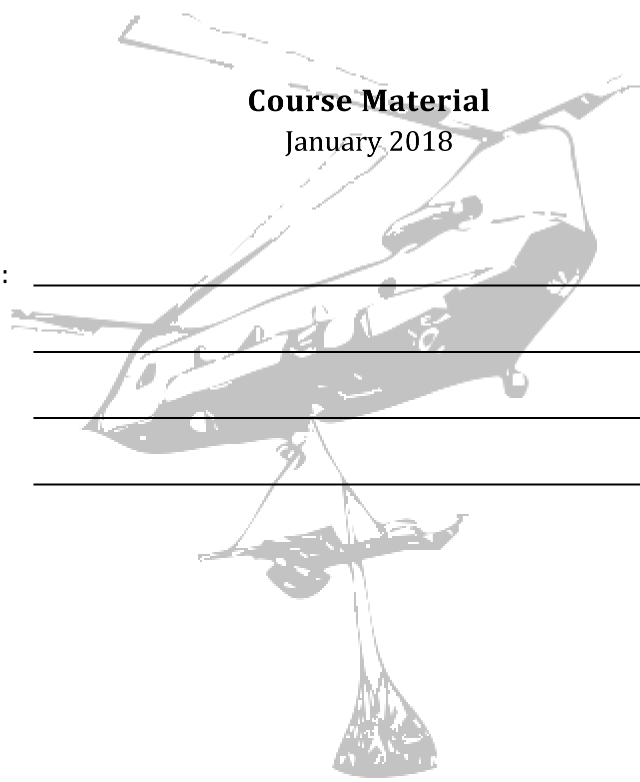


U. S. ARMY PATHFINDER SCHOOL
1/507th Parachute Infantry Regiment
7480 Riordan St, Bldg 2768
Ft Benning, GA 31905

Course Material
January 2018



Student Rank/Name: ______________________________

Section: ______________________________

Class Number: ______________________________

Phone Number: ______________________________

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SSG Walker	Operations
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SFC Jackson	
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TSgt Garrett	Operations

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DO NOT PROCEED UNTIL DIRECTED BY AN INSTRUCTOR

Do not proceed to sections until covered by the formal block of instruction. You may review any previously covered sections throughout this handout for reference.

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SLING LOADS

REFERENCES:

TM 4-48.09
MULTISERVICE HELICOPTER SLING LOADS BASIC OPERATIONS AND EQUIPMENT

TM 4-48.10
MULTISERVICE HELICOPTER SLING LOADS SINGLE POINT RIGGING PROCEDURES

TM 4-48.11
MULTISERVICE HELICOPTER SLING LOADS DUAL POINT RIGGING PROCEDURES

FM 3-21.38
PATHFINDER OPERATIONS

FM 4-20.102
AIRDROP OF SUPPLIES AND EQUIPMENT: RIGGING AIRDROP PLATFORMS

INSTRUCTIONAL INTENT: THE PATHFINDER STUDENT WILL LEARN THE RESPONSIBILITIES OF THE DIFFERENT UNITS AND ELEMENTS INVOLVED IN SLING LOAD OPERATIONS, THE CAPABILITIES AND CHARACTERISTICS OF THE EQUIPMENT USED, THE BASICS OF SLING LOAD THEORY, GROUND CREW SAFETY PROCEDURES AND RESPONSIBILITIES, AND THE HAND AND ARM SIGNALS. THE STUDENT WILL ALSO BE EXPOSED TO THE METHODS OF RIGGING COMMON AND UNIQUE LOADS.

UNIT RESPONSIBILITIES

There are four elements/units involved in sling load operations. The responsibilities of these units and element are outlined below.

Supported Unit: The unit whose equipment will be moved

- Advance coordination with the supporting unit no later than **24 hours** prior to the mission.
- Actual rigging of the loads.
- Furnishing slings, straps, clevises, and any other sling load equipment required for the move.
- Assuring that the loads are properly rigged and do not exceed the Allowable Cargo Load (ACL) of the aircraft.

Supporting Unit: The aviation unit that will fly the load(s)

- Ensure that the loads fall within the transporting aircraft's ACL.
- Provides assistance in the recovery and return of sling-load equipment.
- Advises the supported unit on load limitations.
- Advise the supported and receiving units on the suitability of selected LZ/PZ's.
- Establish coordination with the supported and receiving units.

Receiving Unit: Normally an internal element of the supported unit, but not always

- Selecting, preparing, and controlling the landing site to include communications.
- Receiving and de-rigging the load.
- Ensure proper supervision of the de-rigging.
- Provide the return of lifting equipment and or personal.

Pathfinder Unit: Subject matter experts in all aspects of sling load operations; the Pathfinder Unit can either be its own entity or broken up into the other three units.

- Provide advice and aid to the supported, aviation, and receiving units.
- Provide expertise in the planning and execution of both PZ and HLZ operations.
- Supervise the rigging and inspection of all the loads.
- Provide ground guidance and air traffic control during the sling load.
- Ensure that the loads fall under the transporting aircraft's ACL.

EQUIPMENT CHARACTERISTICS AND CAPABILITIES

Types of Loads: All external loads fall under one of three types: **High Density**, **Low Density**, or **Aerodynamic**. Each load exhibits unique characteristics in flight. Pathfinders determine the type, size, and weight of the load during the planning phase of the operation.

High Density: The high density load offers the best stability.
(Example: HMMWV)

Low Density: The low density load offers the least stability.
(Example: A22 Cargo Bag)

Aerodynamic: The aerodynamic load is unstable until the load is streamlined; then it becomes stable (Example: Downed Aircraft)

Maximum External Load (MEL) capabilities will vary due to the environmental conditions and the helicopter performance. Check with the aviation unit to determine the aircraft maximum load capacity for a particular mission.

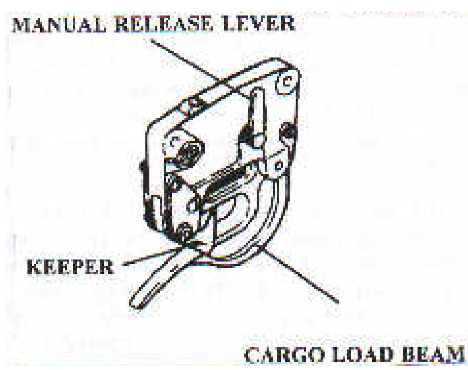
The **Allowable Cargo Load** (**ACL**) is the maximum load capacity for a particular mission and determines what the helicopter can lift. The ACL is based on:

- **T**he type of aircraft
- **A**ge of the airframe
- **P**ilot experience
- **A**ltitude above sea level
- **H**umidity
- **A**viation unit's SOP
- **T**emperature

US MILITARY ROTARY-WING AIRCRAFT

UH-1 IROQUOIS

APEX Requirements: A nylon point of attachment, such as a 3 ft apex ring or a basket hitch must be used to attach the load to the aircraft. In addition the 11k cargo hook reach pendant or a polyester round sling can be used as the point of attachment to the A/C to a UH-1 series Aircraft.

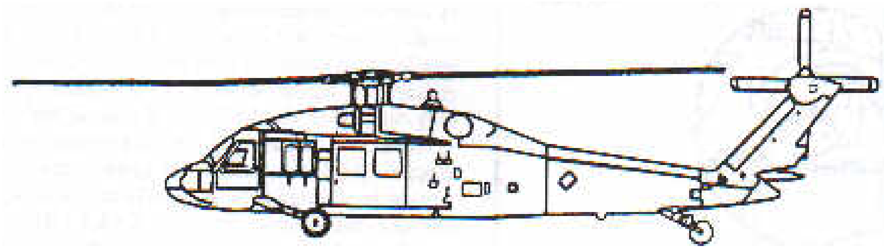


CARGO HOOK TENSILE STRENGTH:

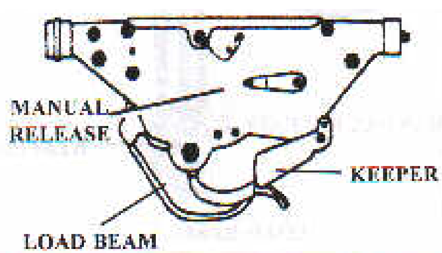
UH-1N - 5,000 LBS

UH-1Y - 5,000 LBS

UH-60 BLACKHAWK



APEX Requirements: When using the 10k apex to secure an external load to the UH-60, the aluminum apex spacer **MUST** be used. This will center the apex on the cargo hook and prevent the apex from lifting the keeper during oscillation of the load, which would result in the load being jettisoned from the cargo hook. If the 25k apex is used, the spacer **MUST BE REMOVED**. If the 25k apex spacer is used, the air crew cannot jettison the load if required and the cargo hook must be manually operated by the crew chief or ground crew on the LZ. **NEVER** use a nylon point of attachment such as a 3 ft. apex ring on a UH-60. The nylon points of attachment will bind on the load beam of the cargo hook and prevent the crew from releasing the load in an emergency situation.



UH-60 CARGO HOOK SYSTEM

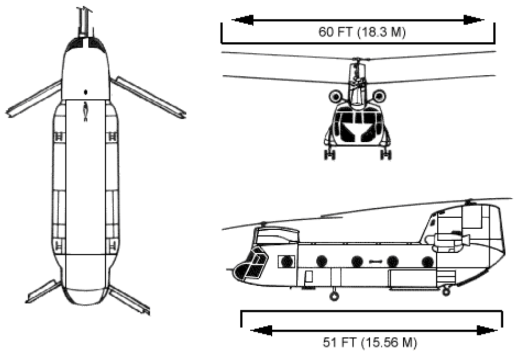
TENSILE STRENGTH:

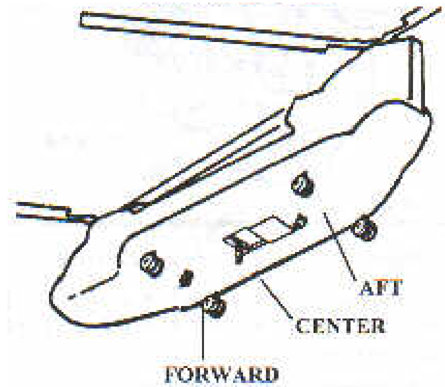
A MODEL - 8,000 LBS

L MODEL - 9,000 LBS

M MODEL-9,000 LBS

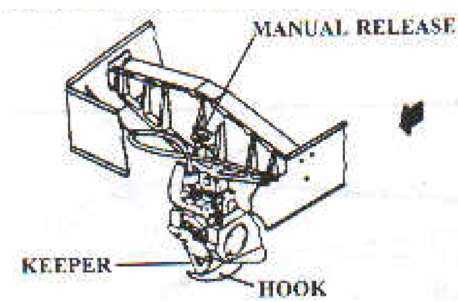
CH-47





******NOTE********

Multiple Single-Point Loads are multiple single point loads connected to two or more A/C cargo hooks; such as cargo nets or A-22 cargo bags attached to cargo hooks on a CH-47 aircraft.



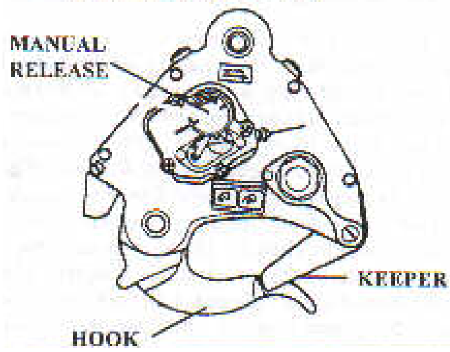
CH-47 MAIN CARGO HOOKS

LOCATION & TENSILE STRENGTH

CH-47 CENTER CARGO HOOK

D MODEL - 26,000 LBS

F MODEL – 26,000 LBS



CH-47D/F FORE AND AFT CARGO HOOKS

EACH - 17,000 LBS

COMBINED - 25,000 LBS

APEX Requirements: The CH-47 requires no special apex preparation and may accept all configurations to include 10k apex (with or without spacer), 25k apex (with or without spacer), any nylon multi-point configuration, and field expedient attachments to include large clevises.

When attaching loads of different weights to multiple cargo hooks on the CH-47, such as attaching three cargo nets, attach them in the following manner:

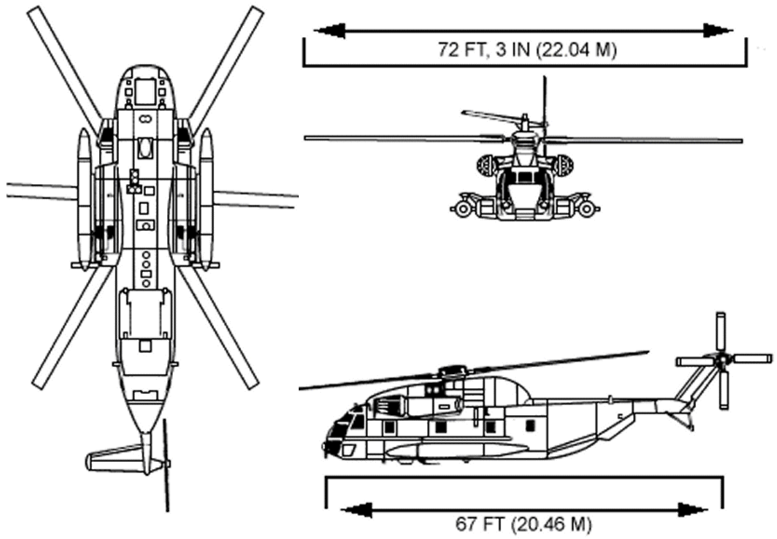
- Heaviest load on the center hook
- Next heaviest (mid-weight) load on the forward cargo hook
- Lightest load on the aft cargo hook

When attaching loads that are being flown to different destinations to multiple cargo hooks on the CH-47, such as attaching three cargo nets with re-supply loads for spread out units, attach them in the following manner:

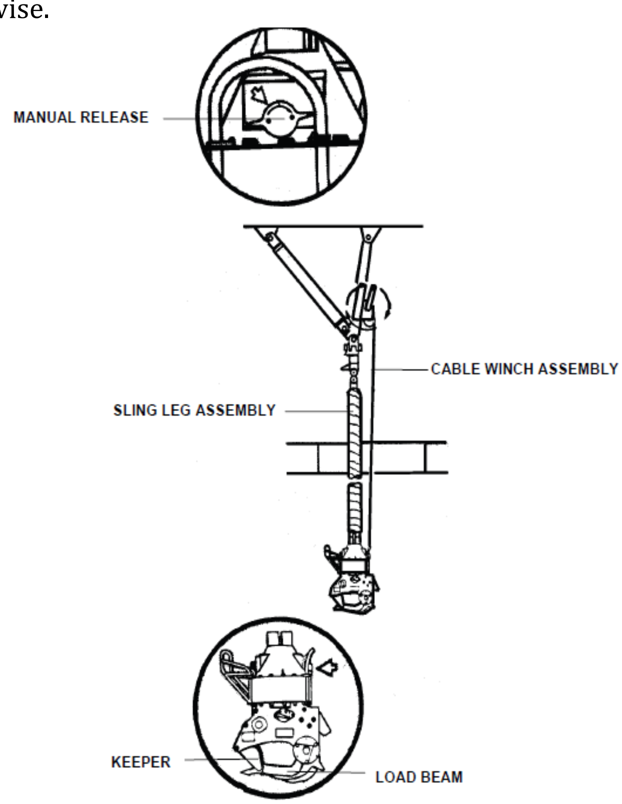
- First to be delivered and lightest load on the forward cargo hook
- Second to be delivered and next heaviest (mid-weight) load on the aft cargo hook
- Last to be delivered and heaviest load on the center hook

***NOTE**: **DO NOT** attach single point loads to the CH-47 D/F if there is a nylon point of attachment to the aircraft.

CH-53E Super Stallion

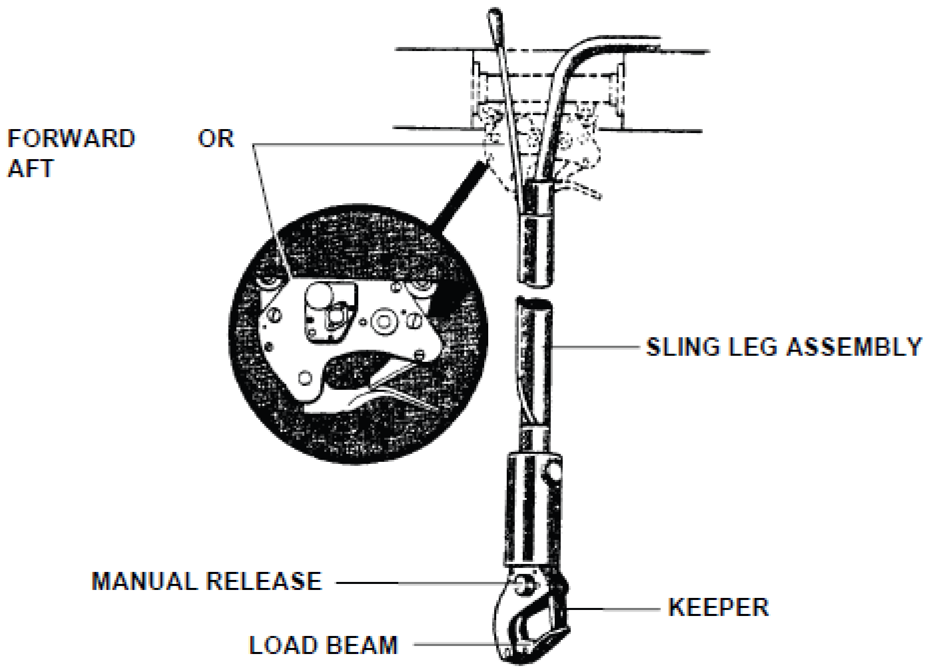


The center cargo hook, suspended on the end of a pendant below the fuselage near the centerline, is used for single-point loads. Even though the hook capacity is greater (36,000 lbs.), the aircraft maximum lift capacity is 32,000 pounds. Loads less than 6,000 lbs. may not jettison when needed. Therefore it is recommended you never carry less than 6,000 lbs. externally on this aircraft. The aircrew can open the cargo hook manually or electrically. A manual release knob is located on a side of the top part of the hook. In an emergency, a ground crewman can open the cargo hook by rotating the knob clockwise.



FORE AND AFT CARGO HOOK FOR CH-53E

RATED CAPACITY COMBINED: 32,000 LBS



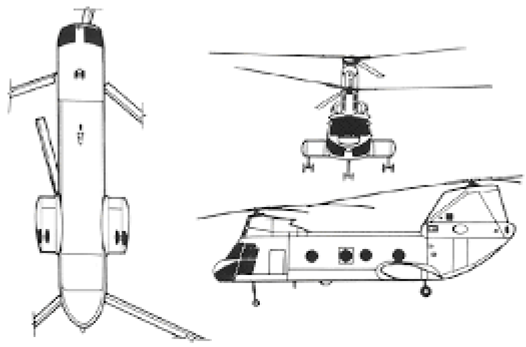
APEX Requirements: A dual-point suspension system, similar to the CH-47D, uses a forward and aft cargo hook. These two cargo hooks, located 10 feet apart, must be used for dual-point loads. The aircraft maximum lift capacity, when carrying a dual-point load, is 32,000 pounds with a maximum of 60 percent of the sling load on either the forward or aft hook. A pendant specifically designed for the CH-53E is used with the dual-point system to provide additional clearance between the helicopter and the hookup team. The aircrew can open the forward or aft cargo hook electrically or manually. A manual release lever is located on the left side of the cargo hook. In an emergency, the ground crew can open the hook by moving the manual release lever up.

The pendant cargo hook is not opened electrically. The aircrew member opens the pendant cargo hook by pulling on the lanyard inside the aircraft. The ground crew can rotate the manual release knob on the side of the cargo hook to open the hook. The ground crew must also re-latch the pendant cargo hook after it is opened each time.

***NOTE**: When attaching dual point loads to the CH-53E/K and **NOT** using Cargo Hook Reach Pendants, **EACH HOOK BEING UTILIZED MUST HAVE ITS OWN STATIC DISCHARGE MAN**.

****NOTE**: **DO NOT** attach single point loads to the CH-53E if there is a nylon point of attachment to the aircraft.

CH-46 A/D/E Sea Knight

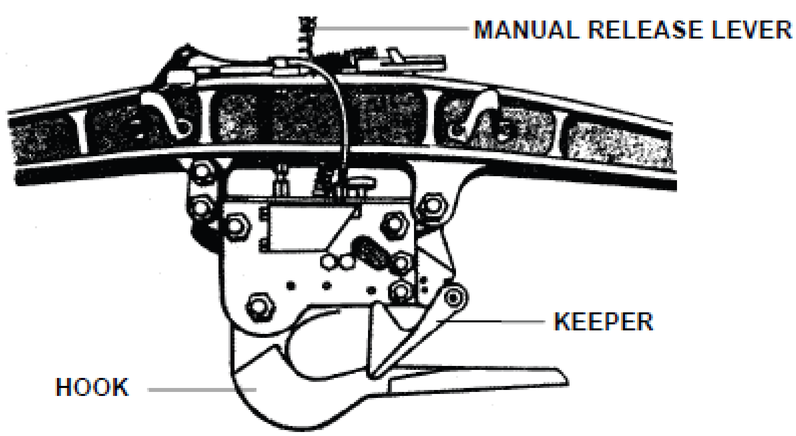


The CH-46A/D/E Sea Knight is a twin engine, tandem rotor helicopter. The cargo hook maximum capacity is 10,000 pounds. The AC6000500 Mod-1 pendant may be used with this helicopter. The cargo hook is normally opened electrically or manually by the aircrew. The manual release cable is mounted on top of the cargo hook and is only accessible to the aircrew.

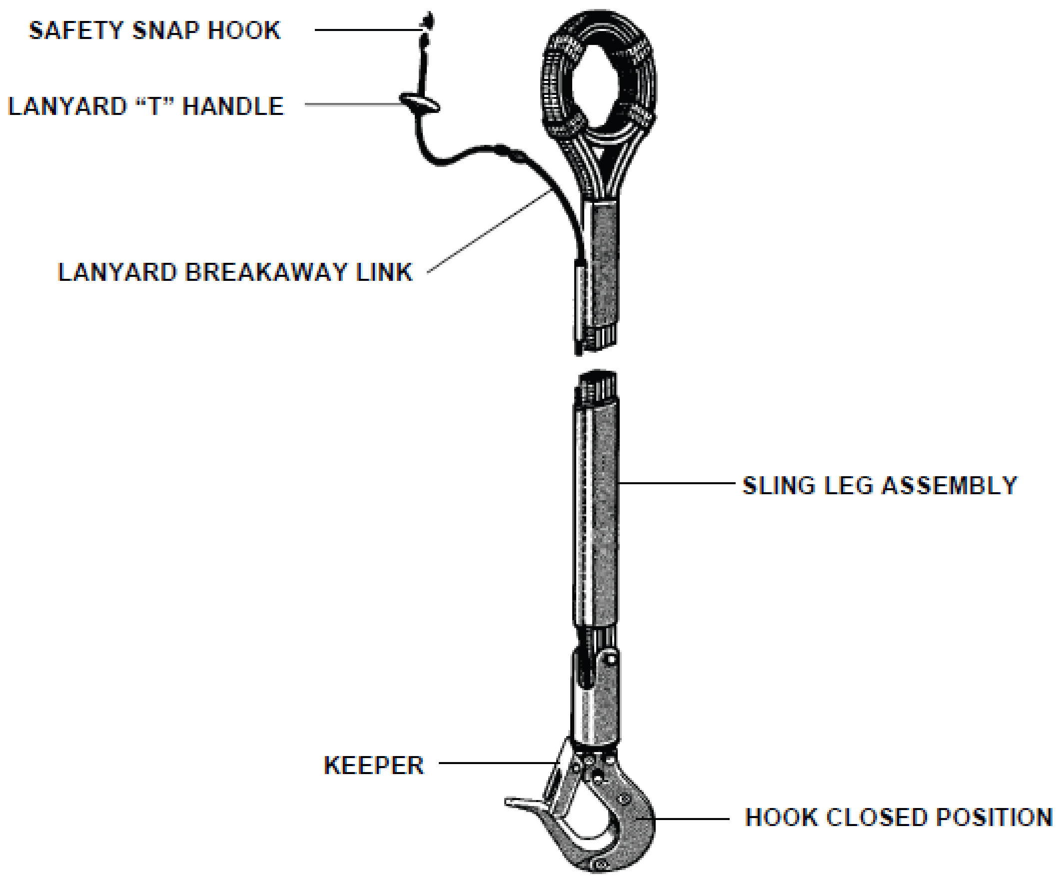
***NOTE**: **DO NOT** attach loads to the CH-46 A/D/E if there is a nylon point of attachment to the aircraft.

CH-46 CARGO HOOK ASSEMBLY

RATED CAPACITY: 10,000 LBS



AC6000500 MOD 1 PENDANT



RATED CAPACITY: 12,000 LBS

LENGTH: 8 FT

WEIGHT: 53 LBS

Equipment: There is currently a variety of equipment in the Army's inventory either adapted or designed for use in sling load operations.

AERIAL DELIVERY SLINGS (ADS):

TYPE XXVI MULTI-LOOP LINE

NUMBER OF LOOPS	PENDANT	MAXIMUM RATED CAPACITY / LIFTINGPROVISION
2	8,900 LB	5,600 LB
3	13,500 LB	8,500 LB
4	17,800 LB	11,200 LB
6	27,000 LB	17,000 LB

NUMBER OF LOOPS	LENGTHS AVAILABLE
2	3’, 9’, 11’, 12’, 16’, 20’, 120’
3	60’, 140’
4	3’, 9’, 11’, 12’, 16’, 20’, 28’
6	60’, 120’

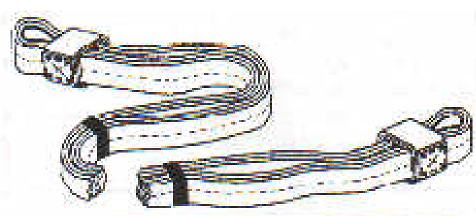
NYLON FLAT-WEB SLINGS

Currently there is only one type of nylon flat-web sling authorized for rigging external loads: the **Type XXVI nylon multiloop line**.

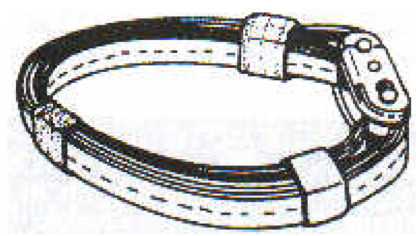
- A yellow thread stitched lengthwise along the middle of the strap identifies the sling as a Type XXVI nylon multiloop line.
- A nylon or cotton buffer must be present on the inside of the nylon web strap to help prevent damage to the sling.
- Multiloop lines that do not have a colored lengthwise stitch are **Type X Nylon Aerial Delivery Slings and are NOT authorized for the rigging of external loads**.

Three Foot Apex Ring (Donut Ring): The Apex Ring (Donut Ring) is primarily used to attach a sling to the helicopter cargo hook. **The Apex Ring is made by joining the two ends of a 2-loop, 3-foot ADS with a Type IV Connector Link**.

- An Apex Ring has a **maximum capacity of 10,000 lbs**.
- When two Apex Rings are used together, the **two Apex Rings have a maximum capacity of 17,500 lbs**.



TYPE XXVI MULTI-LOOP LINE



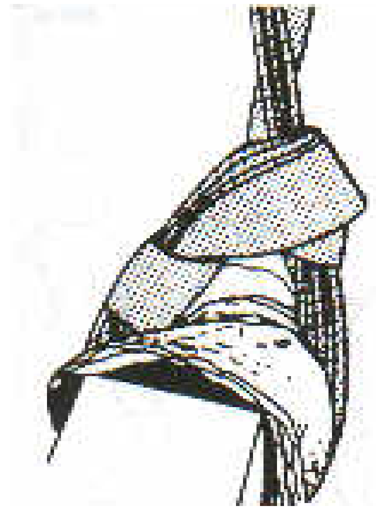
THREE FOOT APEX RING (DONUT RING)

TYPES OF HITCHES: When connecting any ADS to metal air items or directly to the load, one of the following types of hitches will be used:

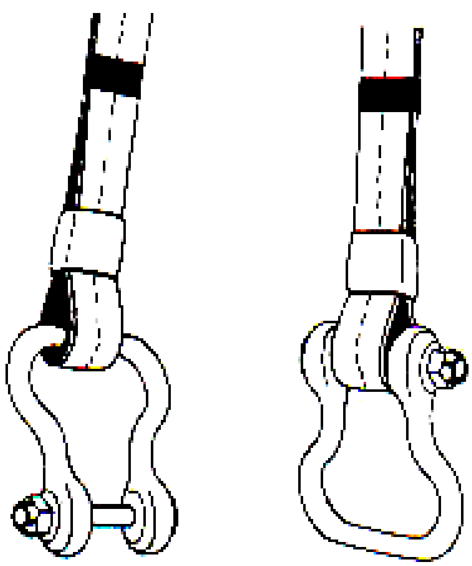
Choker Hitch: Pull the free running end of the sling around the point of attachment and draw it between the loops of the sling's standing end. After ensuring that the cotton buffer is properly in place, milk the keeper of the standing end down to secure the sling. When attaching a choker hitch, the point of attachment must be at least 8 inches in circumference or 2 ½ inches in diameter to prevent the sling leg from failing.

Sling to clevis: Most commonly seen as a vertical pendant.

Basket hitch on an APEX: When using a 10k or 25k apex, the spacer must be removed.

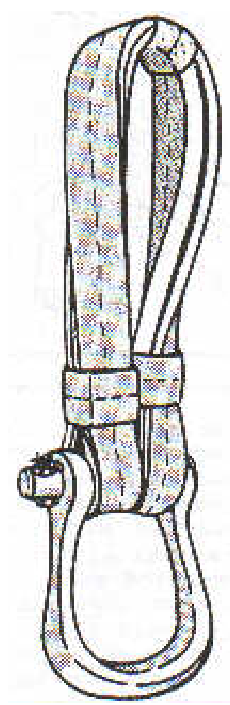


CHOKER HITCH



SLING -TO-CLEVIS

ATTACHMENT



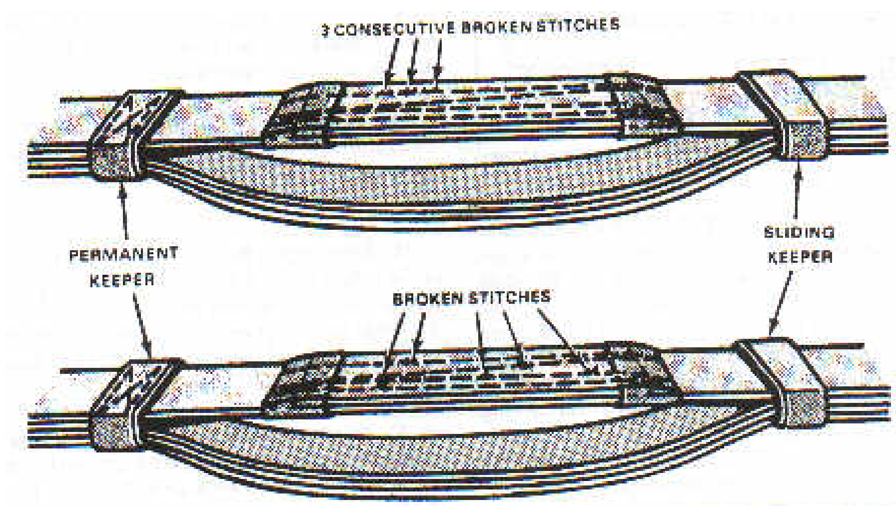
BASKET HITCH ON AN APEX

AUTHORIZED FITTING FOR UH-1

INSPECTION OF FLAT-WEB SLINGS (AERIAL DELIVERY SLINGS): A parachute rigger is no longer required to inspect the flat-web sling (ADS); the unit can conduct its own inspection. Each sling must be marked with 1-inch letters showing the date that the set was first placed in use. This means the first day the set was used, not the day of issue. The marked date is used in determining when the next required inspection is due. Although the slings are routinely inspected before and after each use, they must be thoroughly inspected every 6 months. If the sling is found to be satisfactory for use, the old date is marked over and the new date is applied. The date can be the calendar date or the Julian date. The dates will be applied using orange-yellow parachute marking ink, orange tube type marker, strata blue parachute marking ink, or strata blue tube type marker. If the old date was marked with strata blue, mark over the old date with strata blue and apply the new date using orange-yellow ink. Only one date should appear on the sling. An alternate method for recording the inspection date is to attach a metal tag to the sling set to identify the last inspection date.

SERVICEABILITY OF FLAT-WEB (ADS) SLINGS: If the sling is unserviceable, stencil "UNSERVICEABLE" on it and dispose of it through supply channels. The sling set is unserviceable if one of the following defects is found:

- Three or more consecutive broken and/or loose stitches on the stitch pad.
- Five or more broken and/or loose stitches in a general area on the stitch pad.
- Fraying, including broken webbing strands.
- Excessive wear or fusing indicated by unusual hardening or softening of webbing fibers.
- Cuts or broken strands of the nylon webbing.
- Any heavy oil stains or mildewed areas.
- Any missing parts such as buffers, sliding keepers or permanent keepers.



SLING WITH BROKEN OR LOOSE STITCHES

CLEANING AND STORAGE OF FLAT-WEB SLINGS (ADS): Spot clean the slings by gently brushing or rubbing the soiled area with a soft bristle brush or clean cloth dampened with dry cleaning solvent (tetrachloroethylene). Rinse the soiled area by repeating the procedure with more of the solvent and then allow the sling to air dry. **DO NOT** wring out the rinsed area. If dry cleaning solvent is not readily available, the slings may be spot cleaned with a solution of 1/2 cup of hand washing detergent dissolved in one gallon of warm water. Rinse the area thoroughly by repeating the procedure with fresh, clean water and let it air dry. **DO NOT** wring out the area or try to heat the slings to reduce the drying time as this could damage the sling. Store the sling sets in a dry area, protected from direct sunlight, in a manner to prevent contact with sharp or abrasive objects and the ground.

***NOTE**: Reference for flat web slings (ADS) is TM 4-48.09 & FM 3-21.38

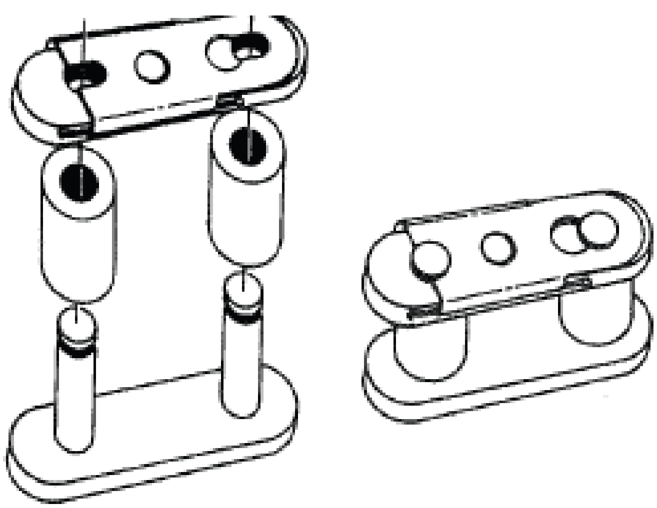
TYPE IV CONNECTOR LINK

Used in the construction of the 2 loop, 3-foot Apex Ring (Donut Ring) or to connect one ADS to another.

Rated capacity of 12,500 lbs.
NSN 1670-00-783-5988.

When inspecting the Type IV link assembly, look for the following deficiencies:

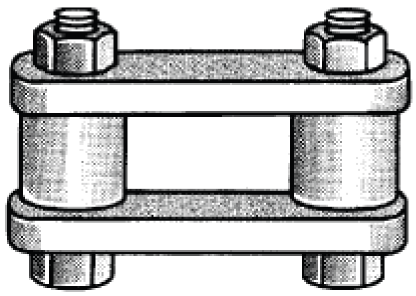
- Aluminum buffers not rotating freely or missing
- Posts that is bent or cracked.
- Bent slide connectors, No metallic "click" when locked.



TWO POINT LINK ASSEMBLIES

Used to join to ends of four- or six-loop multi loop line ADS Slings together.

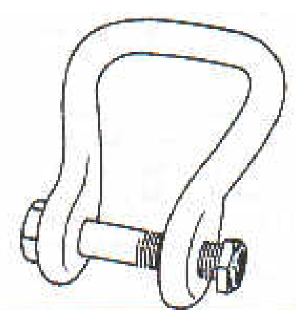
Rated capacity of 25,000 lbs



CLEVIS ASSEMBLIES

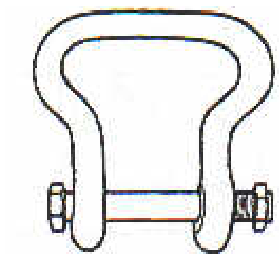
Large Suspension Clevis:

Rated capacity of 12,500-lbs (pendant) 7,875-lbs (lifting provision). (If 2 clevises are used as attachment points -15,750-lbs, for 3 as attachment points - 23,625-lbs, for 4 as attachment points - 31,500-lbs); 7,875-lbs (lifting provision). (NSN 1670-00-090-5354)



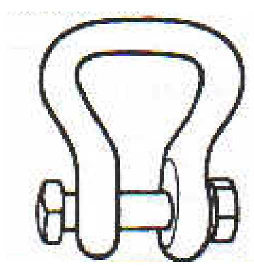
Medium Suspension Clevis:

Rated capacity of 6,250-lbs (pendant) 3,750-lbs (lifting provision). 2 attachment points - 7,500-lbs, for 3 attachment points - 11,250-lbs, for 4 attachment points - 15,000-lbs). (NSN 1670-00-678-8562)



Small Suspension Clevis:

Rated capacity of 6,250 lbs (pendant) 3,750-lbs (lifting provision). 2 attachment points - 7,500-lbs, for 3 attachment points - 11,250-lbs, for 4 attachment points - 15,000-lbs). (NSN 1670-00-360-0304)



*NOTE: When using any clevis assembly, the nut will only be tightened **HAND TIGHT**. Both ends of the nut and bolt will then be taped to prevent slippage during use. Use only case hardened nuts and bolts and **NEVER** mix items. Case hardened marks include (ticks and/or numbers / letters) and will be located on the bolt head.

INSPECTION OF METAL AIR ITEMS: Thoroughly inspect ALL metal air items for the following deficiencies:

- Rust
- Stripped threads on the nut or bolt.
- Burrs
- Cracks
- Bent or twisted metal
- **DO NOT** oil any metal air item

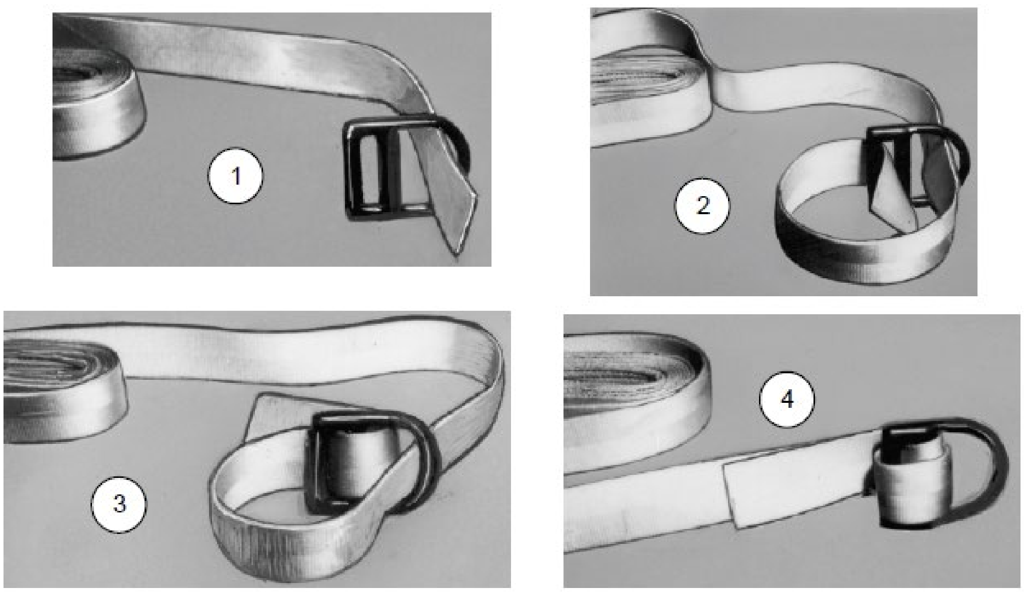
CARGO TIE-DOWN EQUIPMENT

CGU-1/B Cargo Tie-down Device:

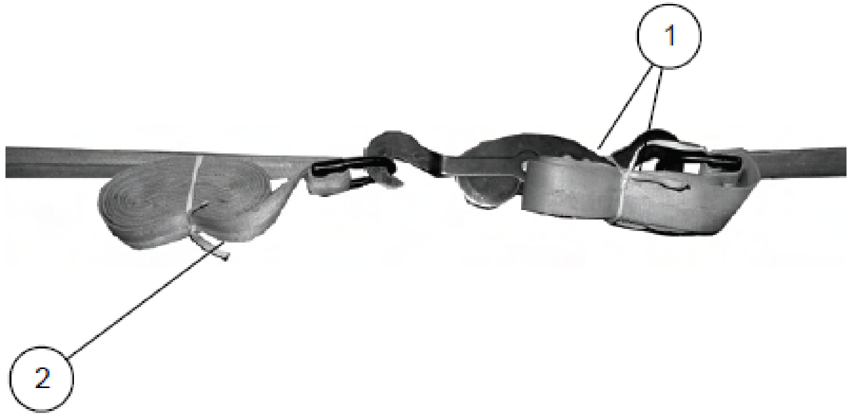
Rated capacity of 5,000 lbs
Length is adjustable

15 Foot Tie-down Strap:

Rated capacity of 10,000 lbs
Length is 15 feet
Proper routing and securing of the 15 Foot Tie Down Strap.
Primary REF. FM 4-20.102 Rigging Airdrop Platforms (Excerpt covered in TM4-48.09).



1. Run the free end of the tiedown strap through the large opening in the D-ring.
2. Run the strap around and through the small opening in the D-ring.
3. Run the strap back through the large opening in the D-ring.
4. Pull the strap taut.



1 After the handle of the load binder has been closed, roll any excess tiedown strap and place the folds alongside the load binder handle. Tie the rolled webbing to the binder and the binder handle closed with a single length of type I, 1/4-inch cotton webbing.

2 Roll any excess from the opposite tiedown strap and place on top of the lashing. Tie the rolled webbing to the lashing with a single length of type I, 1/4-inch cotton webbing.

SAFETY TYING LOAD BINDER HANDLES

Silver or Black Load Binder:

- Silver Max Rated Capacity: 5,000 lbs
- Black Max Rated Capacity: 10,000 lbs

Rated capacity of these items is stamped on the side

A7A/188 inch STRAP:

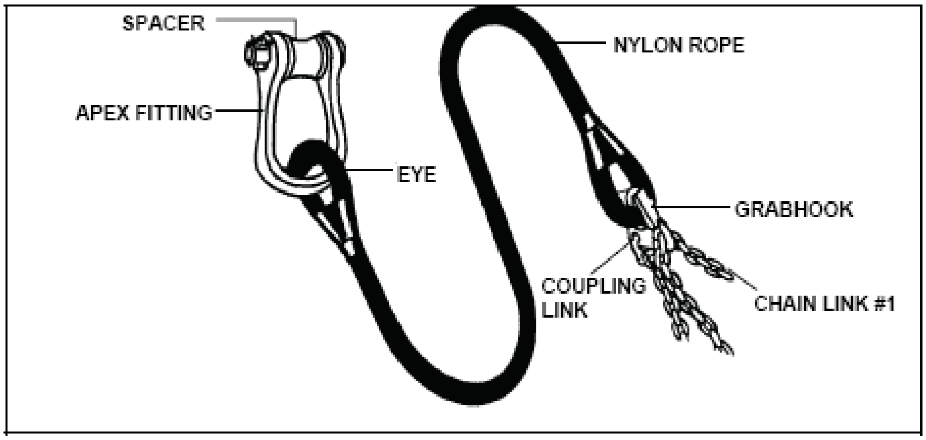
- A cotton or nylon cargo strap with a rated capacity of 500 lbs and 188 inches in length.
- Located on one end of the strap is a friction adapter with a thick lipped floating metal bar.
- The strap is issued with one metal "D" ring. Inspect this piece of equipment for cuts or frays.

***NOTE**: When sewn into the A22 Cargo Bag, it is referred to as a "188 inch strap"

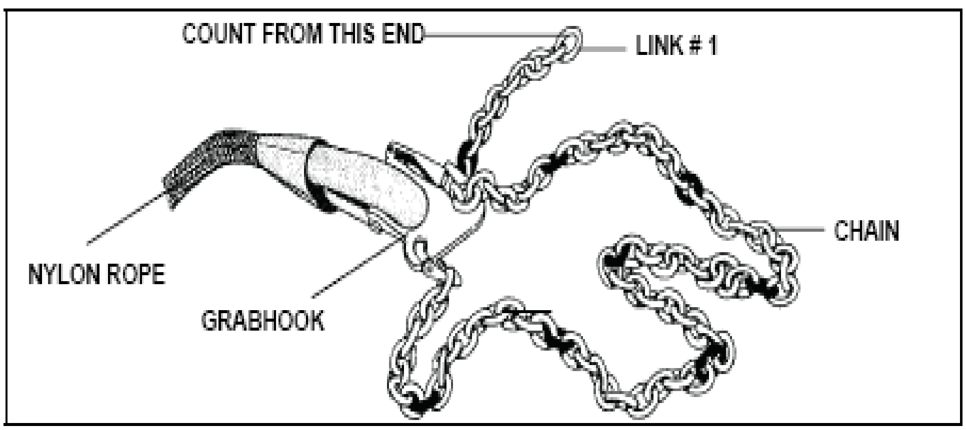
10,000 And 25,000 Pound Capacity Sling Sets

Both Sling Sets are similar with only a few minor differences. Each set consists of four legs. Each of the legs has a rated capacity of 1/4 of the total capacity of the set. It is common to use up to six legs on some loads. The extra legs **DO NOT** increase the rated capacity of the entire set. The nylon rope assembly for each set has an interwoven eye at each end that is covered with polyurethane coating to protect the eye from abrasion. Each rope is of double braided construction and is connected to a grab hook assembly. The grab hooks for the two different sized sling sets look similar but are not interchangeable due to their different ratings.

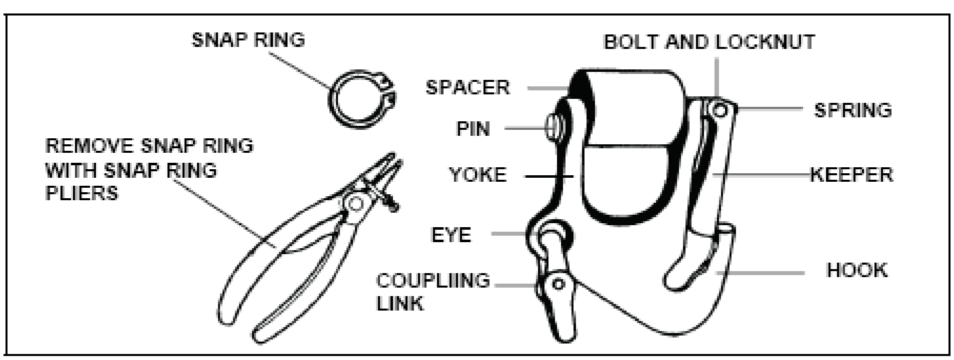
10,000 AND 25,000 POUND CAPACITY SLING SET COMPONENTS



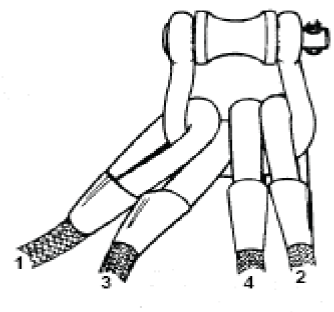
CHAIN ATTACHED TO GRAB HOOK BY COUPLING LINK



GRAB HOOK ASSEMBLY



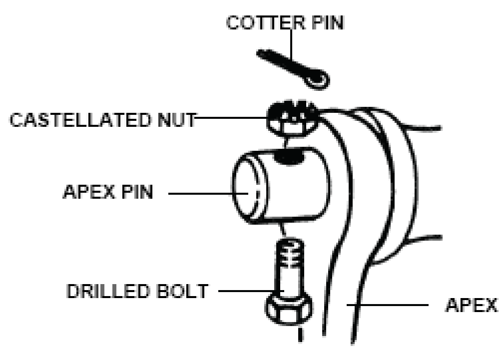
SLING LEG NUMBERING SEQUENCE



6 Component parts of the Apex fitting (10k and 25k):

The pin on both apex fittings is secured with a 3/8 inch drilled bolt, a castellated nut, and cotter pin.

> *__NOTE__: If using the dome shaped nut, ensure that the nut is secured to the apex wrench tight.



- Apex Shackle
- Apex Fitting Pin
- Apex Fitting Spacer
- 3/8 Inch Drilled Bolt
- Castellated Nut
- Cotter Pin

SLING SET CHARACTERISTICS

		10,000 LB	25,000 LB
APEX FITTING			
	Material	aluminum	alloy steel
	Pin size	1 1/8 inch diameter	1 ½ inch diameter
	Weight	4 ½ lbs	10 lbs
NYLON ROPE			
	Rope color	olive drab	black
	Length	12 feet	12 feet
	Rope diameter	7/8 inch	1 ¼ inch
CHAIN			
	Links	110 - 115	84 - 88
	Length	8 feet	8 feet
TOTAL WEIGHT		**52 lbs**	**114 lbs**

*__NOTE__: Reference for these slings is TM 4-48.09 Chapter 6

**__NOTE__: For link count conversion tables, refer to TM 4-48.09 Appendix C

5-5. **SLING LEG LENGTH VARIATION (Figure 5-6).** To ensure proper load distribution, the variation in length of the rope legs used in a sling assembly depends upon the load configuration and should not exceed the guidelines in Table 5-1. Individual sling leg length is measured from the inside of one eye to the inside of the other eye, while being manually pulled taut (Figure 5-6).

Table 5-1. Sling Leg Length Variations

CONFIGURATION	NUMBER OF SLING LEGS	AUTHORIZED LENGTH VARIATION (INCHES)
Single-Point	2	6
Single-Point	3	12
Single-Point	4	12
Single-Point	6	12
Dual-Point	4	12
Tandem	8 (2 Sling Sets)	6
Side-by-Side (Shotgun)	8	12
Cargo Nets/A-22 Cargo Bags	2-4	6

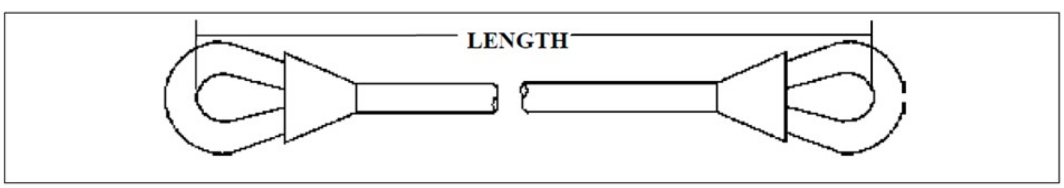


Figure 5-6. Sling Leg Measurement

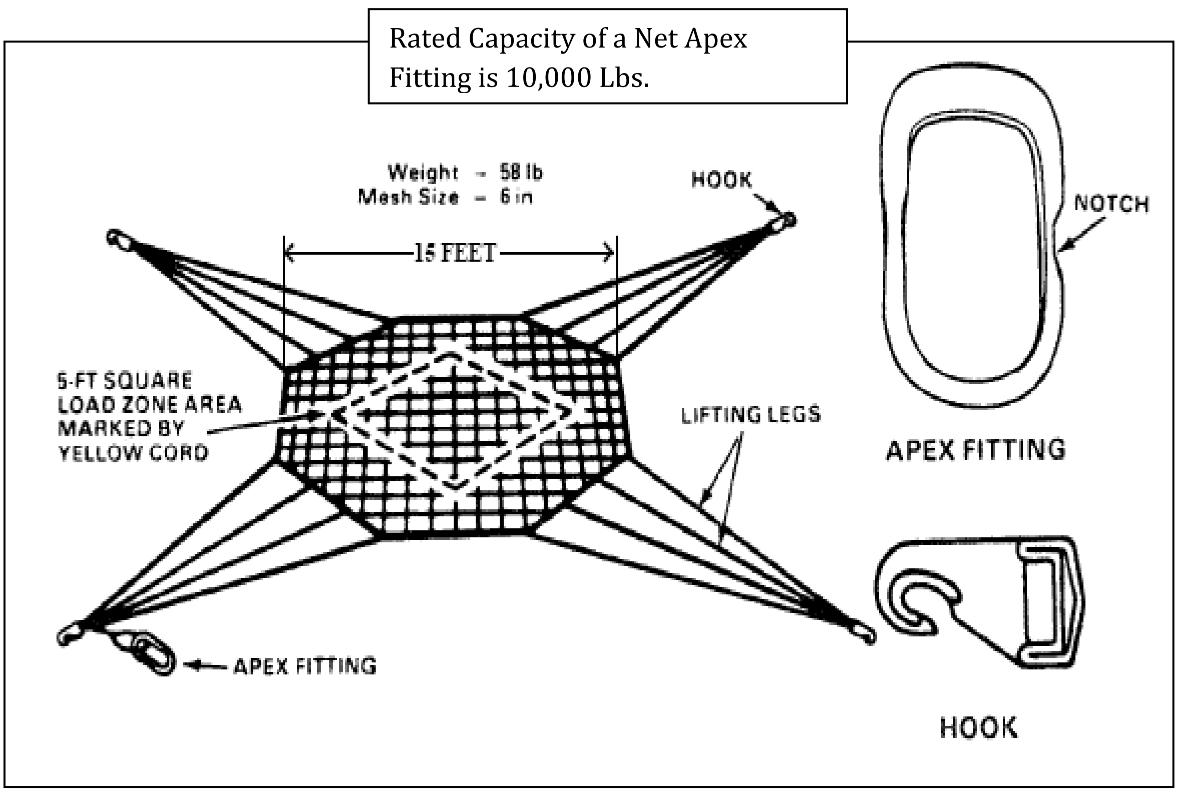
Nets And Containers

5,000 lb and 10,000 lb capacity octagon shaped cargo nets are constructed from interwoven nylon cord. Each set of four lifting legs has a hook that attaches to the apex fitting. The apex fitting can be used directly as a point of attachment to the aircraft cargo hook. The apex fitting is attached by a tether cord to the set of lifting legs with the net identification tag. The other ends of the lifting legs are attached to the net's outer border cord. A square-shaped load zone area is marked by a yellow cord interlaced with the mesh. This zone marks the center of the net and is used as a guide to place the load. When positioning the load, the sides of the load can extend beyond the load zone, but the overhang should be the same on each side.

- The olive drab body of the 5,000 lb capacity cargo net is 15 feet wide.
- The 10,000 lb capacity cargo net is black and the body is 18 feet wide.

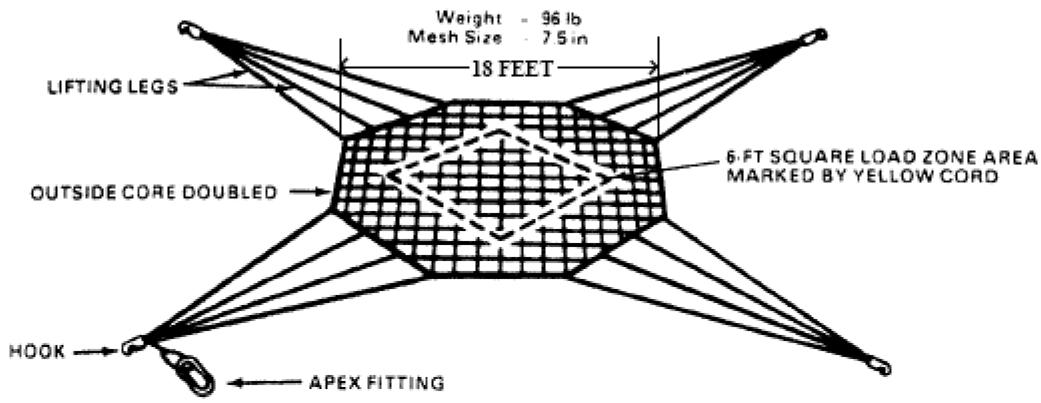
5000 lb Capacity Cargo Net

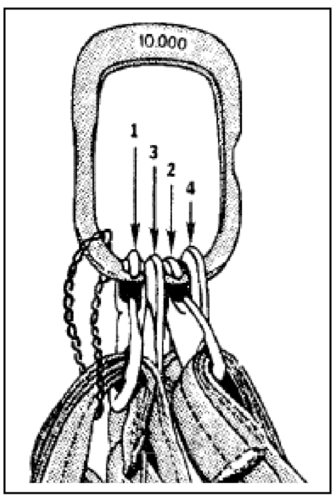
VOLUME = 125 CUBIC FEET



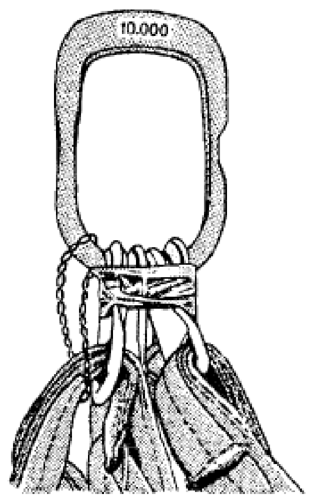
10,000 lb Capacity Cargo Net

VOLUME = 380 CUBIC FEET

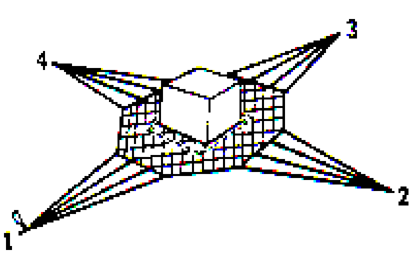




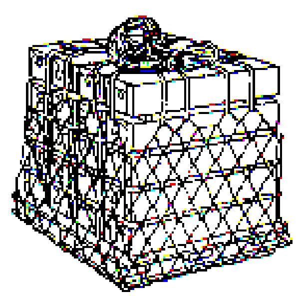
Legs Hooked in Sequence



Taped Hooks



ALIGNED LOAD

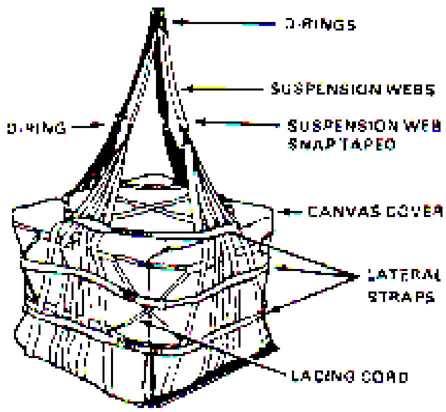


LIFTING LEGS COILED ON TOP OF LOAD

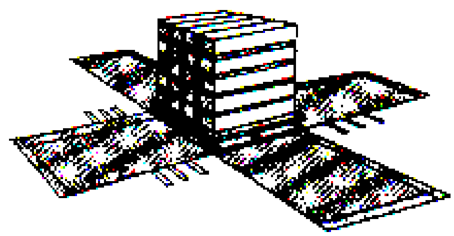
A-22 CARGO BAG

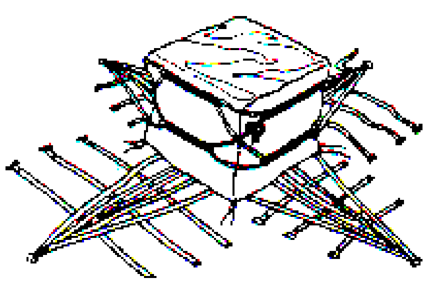
The A-22 Cargo Bag is an adjustable cotton duck cloth/nylon webbing container consisting of a sling assembly, cover and four suspension webs. The bag is used to transport palletized loads, loose cargo, ammunition, drums, and other general cargo. Maximum weight capacity is 2,200 pounds. You may rig the cargo in the bag with or without the cover.

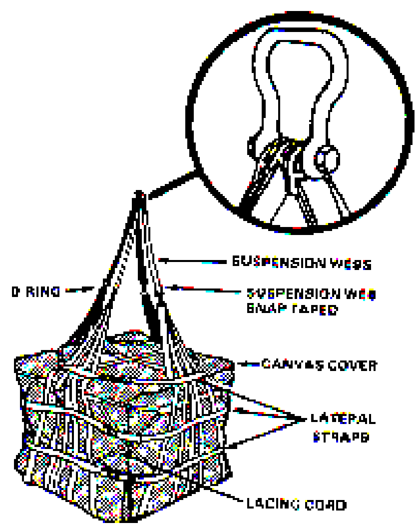
*NOTE: Reference: TM 4-48.09



A-22 CARGO BAG


CENTERED LOAD


SECURING THE COVER WITH LACING CORD



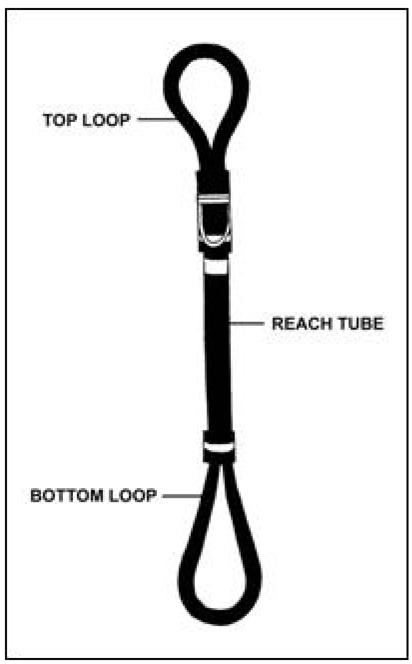
UPPER SLING AND MEDIUM CLEVIS

11,000- AND 25,000-POUND CAPACITY CARGO HOOK REACH PENDANTS

A reach pendant is a synthetic rope assembly within an attached stiffened tube and a loop on each end. The built-in reach tube enables the hookup man to place the pendant's top eye on the helicopter cargo hook while the helicopter hovers at a higher distance over the load.

There are two authorized reach pendants for use on sling loads:

<u>The 11,000-pound capacity Reach Pendant</u>: The 11k cargo hook reach pendant is approximately 5 feet long with an 11,000-pound safe working load capacity. The top eye is black and has a smaller loop, while the bottom eye is green or black with a larger diameter. The safe working capacity is stamped on the reach tube. (NSN 4020-01-365-3115, part no. DSG-5-11K)
<u>The 25,000-pound capacity Reach Pendant</u>: The 25k cargo hook reach pendant is approximately 5 feet long with a 25,000-pound safe working load capacity. The top eye is black with a smaller loop, while the bottom eye is green or black with a larger loop. The safe working load capacity is stamped on the reach tube. (NSN 4020-01-337-3185, part no. BOS-14-K7)



To use the 11k or 25k cargo hook reach pendants with a sling set, remove the sling set apex fitting pin, place the pendant lower eye in the apex fitting, and reinstall the apex fitting pin.

To use with a suspension clevis, remove the case hardened bolt, place the pendant lower eye in the clevis, reinstall the bolt and secure it with the nut, and then tape the ends of the bolt and nut.

Inspection: Inspect the pendants **BEFORE AND AFTER** use. Check for cuts and tears in the nylon-urethane sheath on each loop. If the white strength member (3rd layer) is visible, remove the pendant from service. If, at any time, any cargo hook reach pendant rotates 360 degrees while suspended, the aircraft must be directed to immediately land and cut slingload. At this time, the cargo hook reach pendant must go through a thorough inspection for serviceablity before being placed back into operation.

Cleaning and storage: Clean the reach pendant with a mixture of warm water and mild dish or laundry detergent. Oil and grease may be removed by using varsol or mineral spirits. The top and bottom eyes may be treated with silicone spray. Do not use silicone spray on the reach tube. Store the pendants in a clean, dry area out of direct sunlight.

The advantage of using the cargo hook reach pendant is that it removes the need for a static probe man.

<u>*CAUTION</u>: **DO NOT** use chemical cleaners on cargo hook reach pendants. Chemicals may weaken the strength members of the pendant. If a pendant becomes contaminated with chemicals, remove it from service.

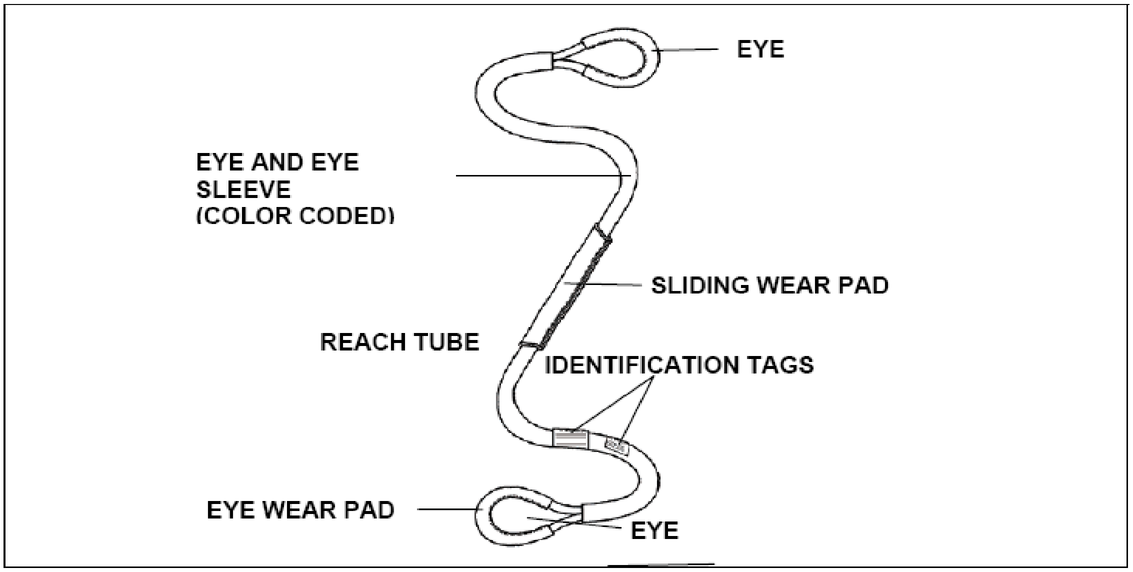
POLYESTER ROUND SLINGS

Polyester round slings are used primarily as a vertical pendant. The lifting capacity of polyester round slings vary with the size of the sling and the type of hitch used to attach the load. Each sling normally comes with two tags permanently sewn to the eye and eye sleeve identifying the size and capacity, as well as other important information necessary for the safe use of round slings. These slings are also color coded to designate the size of the sling.

Inspection: Inspect the round sling before and after each use. Remove the sling from service if any of the following are found:

- Both identification tags are missing.
- At least one identification tag must be legible.
- Acid or alkali burns.
- Melting, charring or weld splatter of any part of the round sling.
- Holes, tears, cuts, snags, embedded particles or abrasive wear that exposes the core fibers.
- Broken or worn stitching in the cover that exposes the core fibers.
- Knots in any part of the round sling.
- Distortion, excessive pitting, corrosion or broken fitting(s).
- Any condition that raises doubt as to the strength of the round sling.

Storage: Store round slings in a clean dry, cool area out of direct sunlight.



POLYESTER ROUNDSLINGS

LENGTH IN FEET	COLOR	LIFT CAPACITY BY HITCH TYPE CHOKED	V ERTICAL	BASKET	WEIGHT
8	GREEN	4,200	5,300	10,600	4
17	GREEN	4,200	5,300	10,600	10
8	YELLOW	6,700	8,400	16,800	5
17	YELLOW	6,700	8,400	16,800	11
30	RED	10,600	13,200	26,400	26
65	BLUE	17,000	21,200	42,400	75
70	BLUE	17,000	21,200	42,400	81

***NOTE**: When attaching to an item by a choker hitch, there is no minimum circumference or diameter needed, unlike the flat web sling (ADS).

SLING LOAD THEORY

The behavior of an external load while in flight can greatly affect the performance of the aircraft carrying it. For this reason it is important to minimize the drag on the aircraft caused by the load. A high drag coefficient will reduce the airspeed of the aircraft, reduce the amount of time that the aircraft will be available to you, and could possibly endanger the aircraft and its crew (a helicopter pilot will not hesitate to "punch a load" if he feels that his aircraft is endangered). In order to minimize drag, it is necessary to stabilize the load.

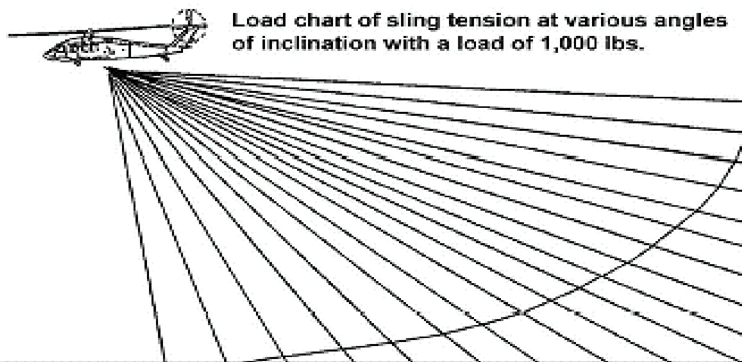
There are **FOUR** methods you can use to accomplish this:

Reduce the airspeed of the aircraft: This is the least desirable method to use. The aircraft will simply fly slowly enough so that the load does not become unstable. This burns fuel and reduces the amount of time the aircraft can fly your loads. Loads should be configured so that they will fly at speeds of 60 knots or greater.

Add weight to the load: Heavier loads are less affected by the air pushing against them while they fly, hence they tend to be more stable. Ensure that you do not add so much weight that you exceed the rated capacity of your equipment or the aircraft.

Streamline the load: Long symmetric loads (two M151 trucks rigged nose to nose) fly crosswise to the direction of flight causing immense drag on the aircraft. Loads tend to stabilize in the center of gravity (CG), located in the first 1/3 of the load. By adjusting the load and, if needed, by adding weight, it is possible to move the center of gravity toward one end or the other. The lighter tail end of the load will act much as the fins on a dart; the heavier end of the load will "seek" the direction of flight and the load will stabilize.

Sling Length: Lengthening the slings that attach the load to the aircraft reduces the load's stability in flight. The shorter, the better, as long as the sling measures at least 6 feet long. The closer the angle of a sling is to horizontal, the greater the stress put on it. For example, a total vertical stress of only 3,000 pounds will put a stress of 4,242 pounds on a sling at an angle of 45 degrees. As an angle decreases to 5 degrees, the stress on the sling reaches 34,419 pounds. Be aware!



TOTAL VERTICAL LOAD (LB)	TOTAL SLING TENSION (LB)	ANGLE DEGREES
		0
1000	11473	5
1000	5759	10
1000	3863	15
1000	2924	20
1000	2366	25
1000	2000	30
1000	1743	35
1000	1555	40
1000	1414	45

TOTAL VERTICAL LOAD (LB)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
TOTAL SLING LOAD (LB)	1000	1003	1015	1035	1064	1103	1154	1220	1305	1414
ANGLE DEGREES	90	85	80	75	70	65	60	55	50	45

To compute the tension in each leg of a sling assembly, divide the total sling tension by the number of sling legs. Divide the load by 1,000 and multiply by the total sling tension found in the table for the corresponding angle.

Load chart of sling tension at various angles of inclination with a load of 1,000 pounds

EXAMPLE:

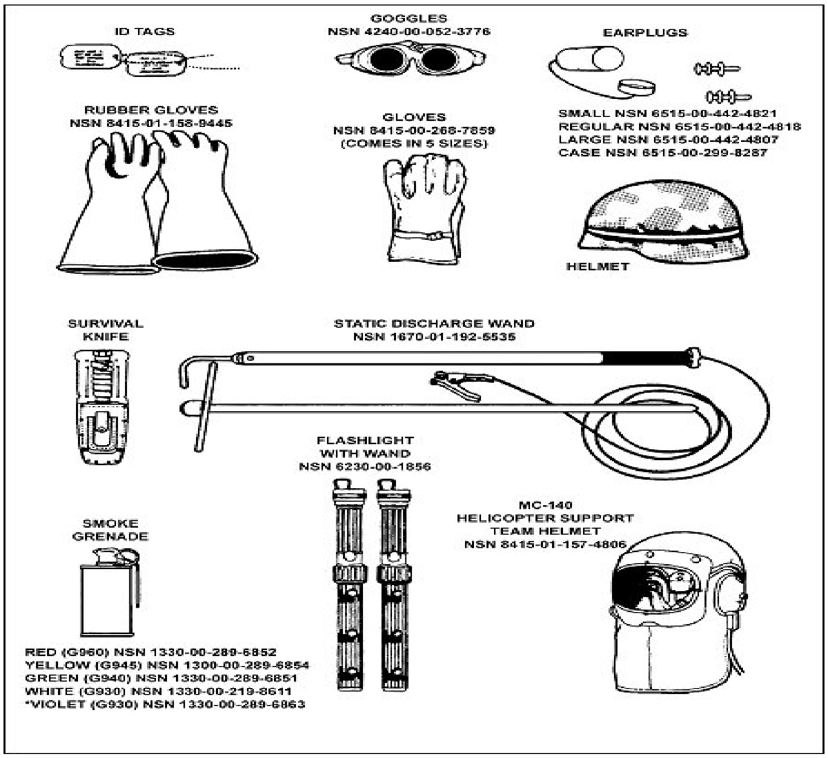
PROBLEM: 100,000 pounds weight is to be lifted by a four leg sling assembly with each leg lifting at an angle of 45 degrees. What will be the tension on one leg?

PROCEDURE: From the chart, the total sling tension on one leg at 45 degrees for 1,000 pounds is 1414 pounds.

Total tension for 100,000 pounds = 141,400 pounds.
Tension on each leg = 141,400/4 = 35,350 pounds.
If all legs lifted vertically, the tension on each leg = 100,000/4 = 25,000 pounds

Safety Measures, Hookup and Release Procedures for Helicopter External Loads

Items illustrated below are some PPE ground crew should have to ensure maximum protection:



Safety Measures: In addition to wearing the proper equipment, the following safety measures will be enforced at the sling load site:

- Wear long sleeved shirts and have the sleeves rolled down and fastened.
- Button the shirt collar.
- Tuck shirttails or jacket bottoms into the trousers.
- Police the operational area thoroughly prior to conducting sling load operations. This can greatly reduce the amount of debris thrown about by the rotor wash.

Ground crews must remain alert during hookup and release operations. Good, sound judgment and common sense are the keys to success. They must be ready, at all times, to get clear of the load. In the past, soldiers have been crushed between the aircraft and loads, have been dragged over them, or have taken an unwanted ride because they inadvertently became entangled with the load. Particular care should be exercised during hookup operations if the crew must mount the load to affect hookup.

Rotor wash is the high velocity air movement under a hovering helicopter. Large helicopters, such as the CH-47 and CH-53, can generate rotor wash in excess of 120 knots. This strong wind may cause ground crew personnel difficulty in walking or standing and its force can move unsecured material. The greatest rotor wash velocity occurs between 20 and 60 feet outside the rotor disc and will diminish once the aircraft is over the ground crew. Before conducting sling load operations, brief the ground/deck crew on the rotor wash potential of the helicopter.

Slings under tension can easily crush an arm or leg against the load. Some of the particular hazards associated with loads are outlined on below.

Cargo extensions and/or projections: Gun tubes, landing gear, missile launchers, bridge planks, etc. can cause interference or injury to the ground crew by striking or tripping them. Crewmen should stand clear of such projections or position themselves so that they can immediately clear the load.

Sharp projections, hooks, and protruding handles or levers: Items such as tarpaulin tie down hooks, door handles, spare tire racks, hooked or jagged edges, and similar projections should be avoided by the ground crew if possible. Serious injury can be caused by the sharp edges and a crewman could easily become hooked to the load should his clothing or part of his equipment become hooked on one of these items. Be aware and be prepared to move immediately to avoid injury.

Top heavy or narrow based loads: Loads that can fall over under the rotor wash should be treated with caution. If possible, position these loads on their sides prior to hookup. If this is not feasible, position the crew on the side or end that is least likely to tip. The crew should be prepared to move immediately.

High loads: Loads can cause serious injuries to crewmen who are required to climb to the top of the load to affect hookup. They may be inadvertently swept off the top of the load by the rotor wash or find it necessary to jump in order to avoid a dangerous situation. (Crewmen on top of a load must pay particular attention to where they stand. If at all possible, do not stand on the top. Stand on a lower projection or step so that should the aircraft make contact with the load, they are not caught in between). The crew should work from a crouched position or from their hands and knees. If possible, have a vehicle backed up to the load that can be used as a working platform. (Move the vehicle prior to lifting the load). The crew should use solid footholds and handholds and be ready to clear the load immediately.

GROUND CREW EMERGENCY CONDUCT

The signalman will be facing the aircraft. He should move to a point where he will be safe.

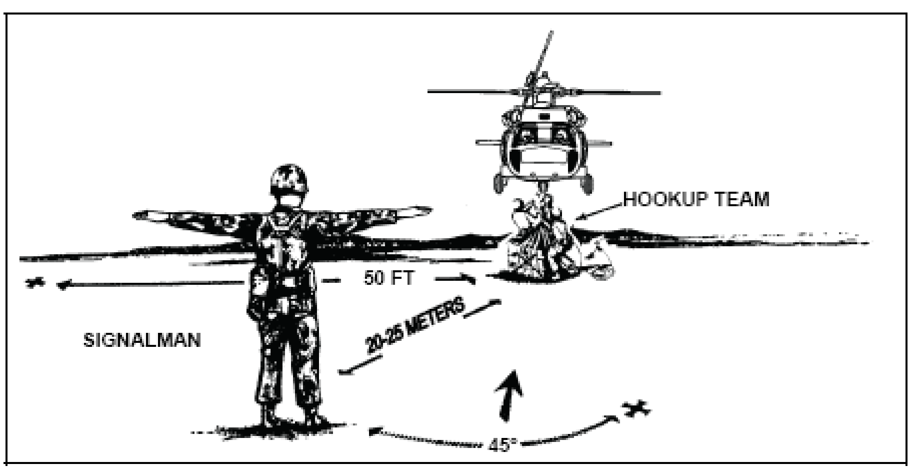
The hookup team may be under the aircraft at the time of the emergency. They should attempt to work along the right side of the load so that they do not have to climb over or go around the load to seek safety. They would then be able to move directly off of and away from the load. If the load is a heavy piece of equipment, they may wish to keep the load between them and the aircraft while they are moving. This will offer some protection should the aircraft crash.

Hookup Procedures Using A Ground Signalman

The ground crew will normally consist of three individuals; the ground crew signalman and two hookup men.

Duties of the signalman:

- Prior to the arrival of the aircraft, the signalman will direct the positioning of the load. He will supervise the rigging of the load for proper routing of the slings and proper preparation.
- He will ensure that the load is ready to fly.
- As the helicopter approaches, he will position himself at least 20-25 meters and within a 45 degree angle from either side (whichever position allows him to be best seen) and in front of the load and give the hand and arm signal of "Assume Guidance."
- As the helicopter reaches the vicinity of the load he will use hand and arm signals to position the cargo hook of the aircraft directly over the load and close enough to the load so that the hookup men will be able to place the apex fitting onto the cargo hook. During this time it is critical that the signalman position himself so that the pilot can easily view his signals. Since the pilot of an Army aircraft is located on the aircraft's right side, the signalman will usually be located slightly to the aircraft's right. If terrain in the area forces him to place himself elsewhere, he must ensure that he is in the pilot's view at all times, regardless of where he is positioned.
- During the hookup process, the signalman must also observe the cargo hook and the apex fitting. Once hookup has been accomplished, he must hold the aircraft at a hover until the hookup men are clear of the load.
- When they are clear, the signalman will signal the aircraft to “Move Upwards” slowly so that the sling legs/lifting legs gradually take up the load. This is done to check that the sling legs/lifting legs are not fouled on the load. If they are fouled, the signalman will motion the pilot downwards, then instruct him to cut away and the procedure will be repeated.

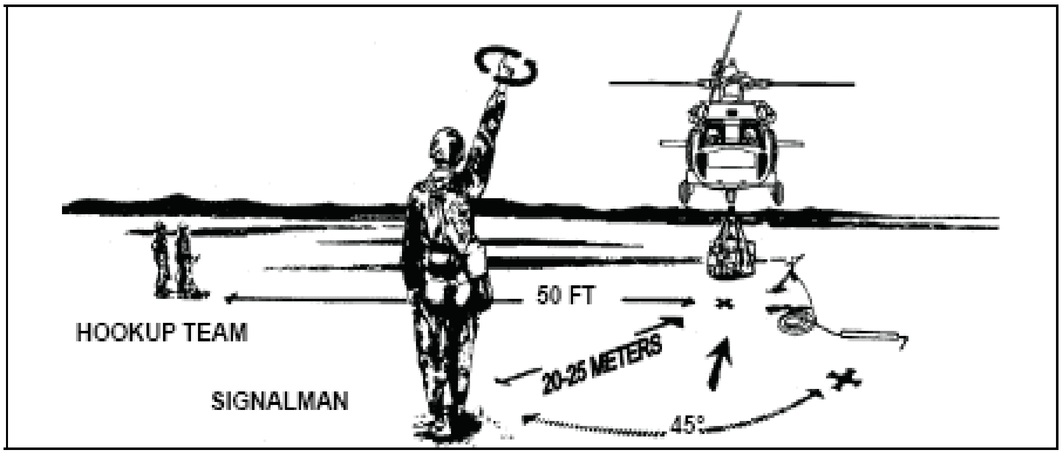


RELATIONSHIP OF AIRCRAFT, SIGNALMAN, AND HOOKUP CREW

If the load has been successfully suspended, the signalman will give the aircraft the signal to depart, and then move quickly aside to clear the helicopter's path.

***NOTE: AT NO TIME WILL THE SIGNALMAN OR ANY OTHER MEMBER OF THE TEAM ALLOW A SUSPENDED LOAD TO PASS OVER HIS HEAD.**

WARNING: Coordinate the evacuation route of the ground crew to a rendezvous point with the liaison officer or helicopter crew before the start of the operation. Proper coordination will prevent any mix up. Helicopter emergency procedures depend on terrain, wind direction, and pilot choice. Good prior coordination will prevent the helicopter and ground crew from moving in the same direction.



GROUND CREW POSITIONS DURING HELICOPTER TAKEOFF

The hookup team consists of two men. One will handle the static discharge probe and the cargo hook; the other will control the apex fitting of the sling load. Hookup must be completed rapidly to reduce helicopter hover time and minimize the exposure time of the hookup men under the helicopter.

Duties of the hookup men:

- The hookup men will be in position at the load when the helicopter arrives.
- As the helicopter hovers over the load, the hookup men position themselves so that the hookup can be accomplished quickly. They will ensure that the signalman can observe the operation at all times.
- When the helicopter is in the correct position for hookup, the static probe man will ground the aircraft by contacting the static probe to the cargo hook. The other hookup man will then place the apex fitting onto the cargo hook and ensure the hook is properly closed (and locked, if required).

***NOTE**: It is futile for the hookup men to grab the cargo hook of the aircraft and attempt to pull the aircraft down to the load. Leave it alone until you are ready to attempt the actual hookup and **STAY ALERT**.

WARNING: Helicopters are susceptible to high levels of stored static electrical energy. Severe electrical shock may result from improper grounding of the cargo hook system.

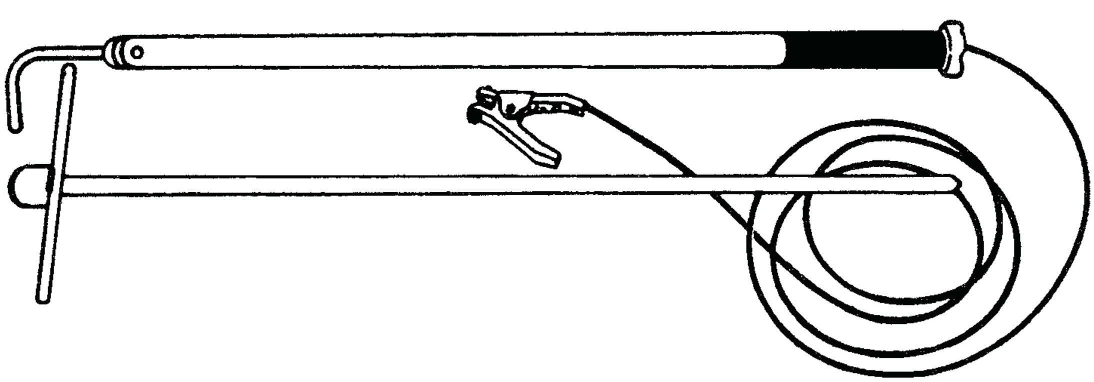
Proper Grounding Technique to Aircraft: Ground the helicopter cargo hook by touching the wand to the cargo hook. Maintain continuous grounding contact.

Wear 5,000-volt shockproof gloves, if available, when using the static discharge wand. However, these gloves are not repairable and will offer no protection from electricity if they have been damaged.

- After the load is properly hooked up to the aircraft, the hookup team will move quickly aside to the designated location coordinated with the aviation unit. If any of the legs become fouled and it is necessary to re-hook the load, the same procedure will be followed.

STATIC DISCHARGE WAND

To avoid the possibility of a static electric shock, ground crewmen use discharge wands (field expedient and manufactured) to ground the cargo hook. Since these wands connect the helicopter to the ground, the static electric charge is dissipated and the hookup man will not receive a shock when he connects the apex fitting to the cargo hook. Figure 3-2 shows a manufactured static discharge wand. This wand may be ordered through supply procedures. TM 4-48.09, Appendix D, page D-1, provides instructions, materials list, and a diagram needed to fabricate a field expedient static discharge wand.

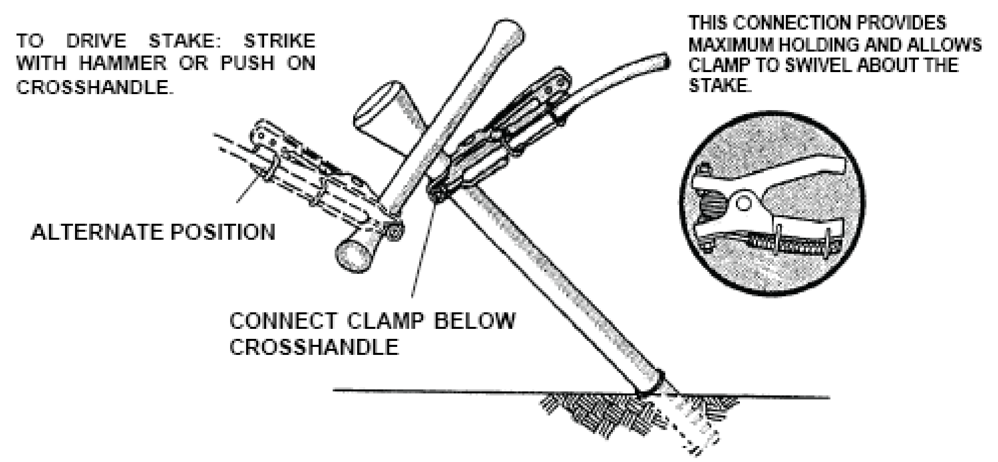


Cleaning and storage of the static discharge wand:

- Remove fuel, grease, or oil from wand. Remove salt water residue or dirt. Wipe dry.
  Contaminants on the wand may be conductive and allow an electrical discharge to travel the outside surface of the wand and reach the operator.
- Store the wand in a dry place out of direct sunlight.
- Turn the wand upside down and coil the cable, lariat-style, into several loops (12-inch diameter).
- With the last remaining loop, interlace the cable around the loops several times and attach the clamp to the end plug.
- Hang the wand upright by the wand hook. Do not attach clamp jaws to the grounding cable because you may puncture the cable insulation.

Operating Instructions for All Static Discharge Wands:

- Inspect static wand to make sure it is in serviceable condition.
- Select the grounding rod location. The recommended location is on the side of the load opposite from rendezvous point or ground crew exit direction so that the hookup team will not trip over the cable as they depart the load.
- Drive the rod into the ground until firmly seated. A minimum of 6 to 8 inches is required in firm ground, 24 inches in sandy or loose soil. Drive the grounding rod in at a 45-degree angle away from the side of the load. This angle will cause the rod to bend, resulting in a less severe injury if someone should fall on it.
- Connect the cable clamp to the vertical shaft of the stake.
  When operating on concrete or asphalt surfaces, position loads as close to the edge of the surface as possible so that the grounding rod can be driven into the ground. For shipboard operations, the cable clamp is attached to a deck pad eye or designated grounding point.
- Do not hold the discharge wand within 16 inches of the metal hook end. A strong static charge can jump up to 12 inches. To be effective, the grounding wand must maintain contact with the cargo hook during the hookup operation (Figure 3-4). If contact is lost, all personnel will pull back from the hook until contact is established between the wand and the aircraft's cargo hook. Static electricity will begin to build up as soon as five seconds after contact has been lost.



GROUNDING ROD CONNECTION

Release procedures using a ground crew signalman

For this mission, the hookup men will now be called the cargo release team.

- As the helicopter approaches the site it will take instructions from the signalman, who will guide the aircraft into position for cargo release.
- The cargo release team will stand by unless they are needed to manually release the load.
- The signalman will direct the aircraft to set the load on the ground and then give the release signal.
- At this time the apex fitting should fall free of the cargo hook. If it does not, the signalman will have the aircraft hover, then direct the cargo release team to move under the helicopter and manually release the load from the cargo hook.
- When the load is free of the cargo hook (and the release men are no, longer under the aircraft) the signalman will direct the aircraft to depart and quickly move out of the aircraft's path.

WARNING: If the cargo hook cannot be opened, either by activating it from within the helicopter or the action of the cargo release men, emergency cargo release procedures must be accomplished. Attempt to disassemble the donut and pass the ADS through the hook. If a clevis or apex fitting is used as the attachment point to the cargo hook, unscrew the nut and remove the pin. In some cases, it may be necessary to quickly de-rig the load so that the aircraft can set down and resolve the problem.

Hookup procedures during periods of white-out or brown-out:

*__NOTE__: Due to the nature of these conditions, a signalman is not required and a hover hookup is not safe.

EXAMPLE OF USING A LONG LINE

1. The load will be rigged with a 20-foot or a 40-foot extension as required using 20-foot, 2 or 4 loop ADS' and the appropriate number of Type IV link assemblies or two point link assemblies.
2. An apex fitting will be placed at the end of the extension.
3. The extension will be laid to the LEFT of the load and the aircraft will approach normally, taxi to the location of the apex fitting and set down.
4. Once the aircraft is on the ground, the hookup men will move to the aircraft and attach the apex fitting to the cargo hook.
5. The aircraft will suspend the load normally and depart as directed by the GTA.

WARNING: When attaching the extension to skid equipped helicopters (i.e. UH-1H); care must be exercised so that the sling does not pass THROUGH the skid. The sling will be routed forward of the skid and then attached to the cargo hook.

CLASSIFICATIONS OF SLING LOADS

CERTIFIED – Items of equipment that have been certified and evaluated and tested by U.S. Army Natick Soldier Center (NSC) for sling load certification.
SUITABLE – Have not been certified but have demonstrated acceptable static lift and flight during flight test. These loads have been flown for years and have been proven to be safe.
UNIQUE – Equipment carried on a one time or low frequency basis. Lack of sling load certification in itself does not preclude a unit commander from carrying a load that is not certified. This will be at the discretion of the unit commander.
PROHIBITED – These loads have been denied sling load certification and are a safety hazard.

*__NOTE__: The US Army Natick Soldier Center has indicated that any **single point sling load** certified under a specific aircraft is also certified for any aircraft with suitable lift capability.

CAUTION

This certification is limited to single-point loads only.

Load Configuration Definitions

All sling loads are configured under one of the following definitions:

Single-Point Loads: Single-point loads are one load rigged and one aircraft cargo hook used during flight.

Dual-Point Loads: Dual-point loads are one load rigged and two aircraft cargo hooks used during flight.

Tandem Loads: Tandem loads are two loads rigged, one in front of the other, and two aircraft cargo hooks used during flight.

Side-by-Side (Shotgun) Loads: Side-by-side (shotgun) loads are two loads rigged, one beside the other, and **ONE or TWO** aircraft cargo hooks used during flight.

Employment Considerations

The sling load method of aerial delivery has some advantages and limitations over other methods.

Advantages:

- The rapid movement of heavy, outsized equipment, or emergency supplies directly to the user.
- The ability to bypass surface obstacles.
- The rapid relocation of supplies and equipment.
- The use of multiple flight routes and landing sites to enhance sustainability and security of ground units.
- The establishment of multiple landing sites to support the maneuvering unit requirements.
- Greater movement flexibility for the ground commander to accomplish the tactical mission.

Disadvantages/Limitations:

- The weight of the load is restricted to the aircraft's operating capability.
- Load instability during flight may restrict aircraft airspeed or maneuvering capabilities.
- Adverse weather and darkness (low visibility) may limit sling load operations.
- Atmospheric conditions (pressure, altitude, temperature, and winds) affect the helicopter's lift capacity.

- A limited number of helicopters are available for sling load missions.
- Landing site surface conditions may restrict helicopter operation. Loose debris, dust, and snow are safety hazards that also limit pilot visibility.
- Landing site size must be increased during the hours of darkness or reduced visibility to allow the pilot more room to maneuver.

RECORD, DA FORM 7382

In order to improve sling load safety, the Department of the Army has implemented inspection procedures for ALL ARMY equipment being moved by sling load. All Army loads require an inspection by a qualified inspector prior to the arrival of the supporting aircraft using the Sling load Inspection Record, DA Form 7382.

Inspectors must meet the following qualifications:

- Be in the grade of E-4 or above **AND**
- Be a graduate of one of the following courses:
  - Pathfinder
  - Air Assault
  - Sling load Inspector Certification

The Sling load Inspection Record requires three copies to be distributed to/placed on each of the following:

- Supporting aviation unit
- Securely taped or tied to the load
- Supported unit

REFERENCE: FM TM 4-48.09, APPENDIX I.

***NOTE**: The Sling load Inspection Record, DA Form 7382 may be reproduced locally pending distribution.

SLING LOAD INSPECTION RECORD

For use of this form, see FM 4-20.197; the proponent agency is TRADOC.

1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.	3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.

INITIAL ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD	LOAD RIGGED BY	LOAD INSPECTED BY
7. VEHICLE OR LOAD		
A. CORRECTLY POSITIONED	PFR	
B. EMERGENCY BRAKE SERVICEABLE AND SET	PFR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK	PFR	
D. PREPARED AND PADDED IAW THE APPROPRIATE FM	PFR	
8. SLING SET		
A. CORRECT NUMBER AND SIZE *(10K or 25K)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS	PFR	
D. CORRECT LINK COUNT FRONT AND REAR F- R-	PFR	
E. CHAIN SECURED IN GRAB LINK	PFR	
F. EXCESS CHAIN TIED OR TAPED *(10 links or more)*	PFR	
G. BREAKAWAY TIES INSTALLED	PFR	
H. APEX ATTACHED	PFR	
I. APEX SPACER INSTALLED	PFR	
J. REACH PENDANT INSTALLED	PFR	
9. A-22 CARGO BAG		
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
B. RIGGED IAW FM 4-20.197	PFR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED	PFR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS *(4 each)*	PFR	
10. CARGO NET		
A. CORRECT SIZE *(5k or 10k)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. LOAD CORRECTLY POSITIONED	PFR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING	PFR	
E. HOOKS TAPED	PFR	
F. LIFTING LEGS TIED *(Breakaway)*	PFR	
G. CORRECT NUMBER AND SIZE SLING LEGS	PFR	
H. RIGGED IAW FM 4-20.197	PFR	

11. REMARKS

12. LOAD RIGGED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
HHC 1/507TH PIR	PATHFINDER	PFR	PFC

e. SIGNATURE Pathfinder f. DATE *(YYYYMMDD)*

13. LOAD INSPECTED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK

e. SIGNATURE f. DATE *(YYYYMMDD)*

DA FORM 7382, JULY 2005 DA FORM 7382-R, MAR 97, MAY BE USED UNTIL EXHAUSTED. APD PE v1.01ES

SLING CONVERSION CHARTS

SLING CONVERSION CHARTS (CONTINUED)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
41	33	25	No further conversion for 15,000-pound multileg sling set
42	34	25	
43	34	26	
44	35	26	
45	36	27	
46	37	28	
47	38	28	
48	39	29	
49	39	29	
50	40	30	
51	41	30	
52	42	31	
53	43	32	
54	44	32	
55	45	33	
56	45	33	
57	46	34	
58	47	34	
59	48	35	
60	49	36	
61	50	36	
62	50	37	
63	51	37	
64	52	38	
65	53	38	
66	54	39	
67	54	40	
68	55	40	
69	56	41	
70	57	41	
71	57	42	
72	58	42	
73	59	43	
74	60	44	
75	61	44	
76	61	45	
77	62	46	
78	63	46	
79	64	47	
80	65	48	

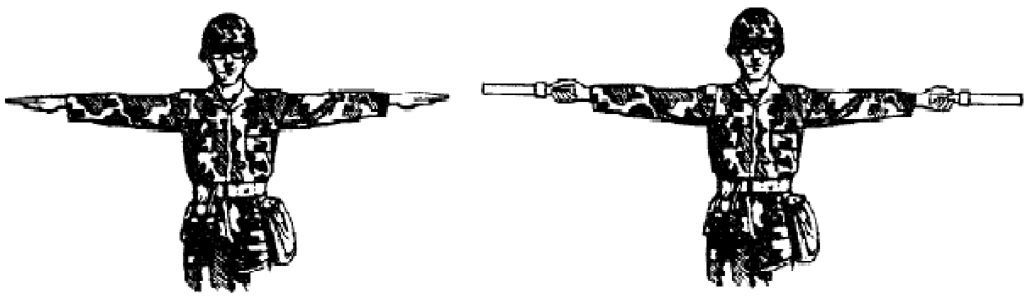
SLING CONVERSION CHARTS (CONTINUED)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
81	65	48	No further conversion for 15,000-pound multileg sling set
82	66	49	
83	67	49	
84	68	50	
85	68	51	
86	69	51	
87	70	52	
88	71	53	
89	72	53	
90	72	54	
91	73	55	
92	74	55	
93	75	56	
94	76	57	
95	76	57	
96	77	58	
97	78	58	
98	79	59	
99	79	60	
100	80	60	
101	81	61	
102	82	62	
103	83	62	
104	83	63	
105	84	64	
106		64	
107		65	

HAND AND ARM SIGNALS

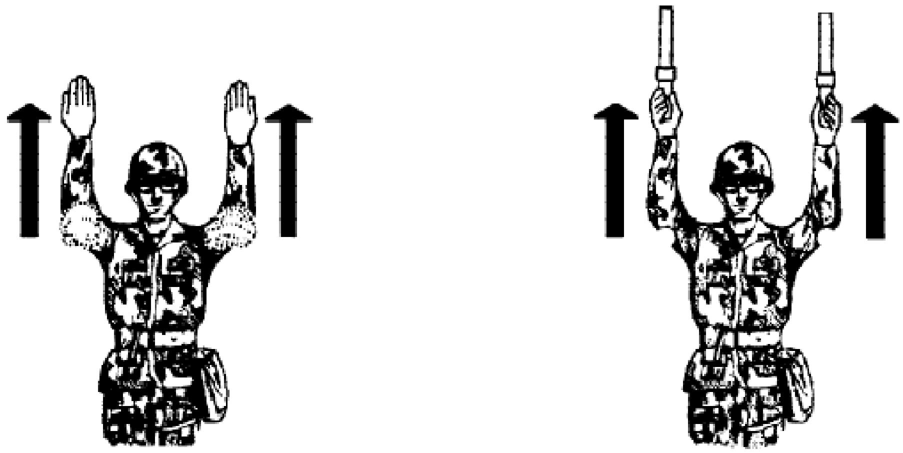
ASSUME GUIDANCE

ARMS EXTENDED VERTICALLY STRAIGHT UP, PALMS FORWARD



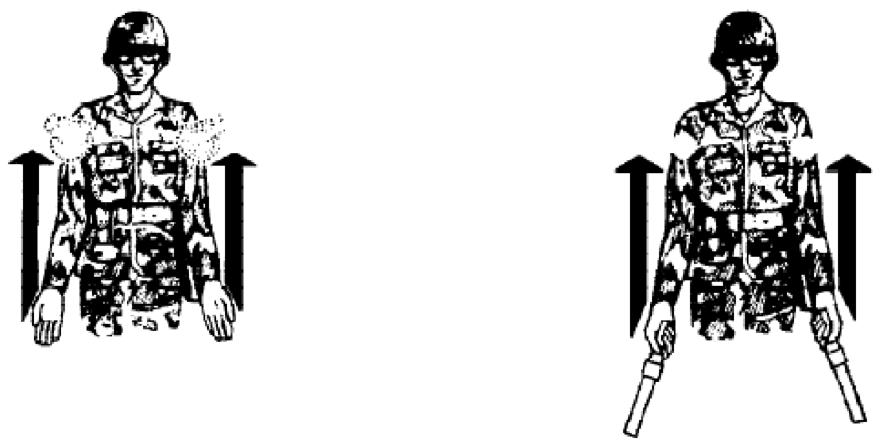
HOVER

ARMS EXTENDED HORIZONTALLY SIDEWAYS, PALMS DOWNWARD



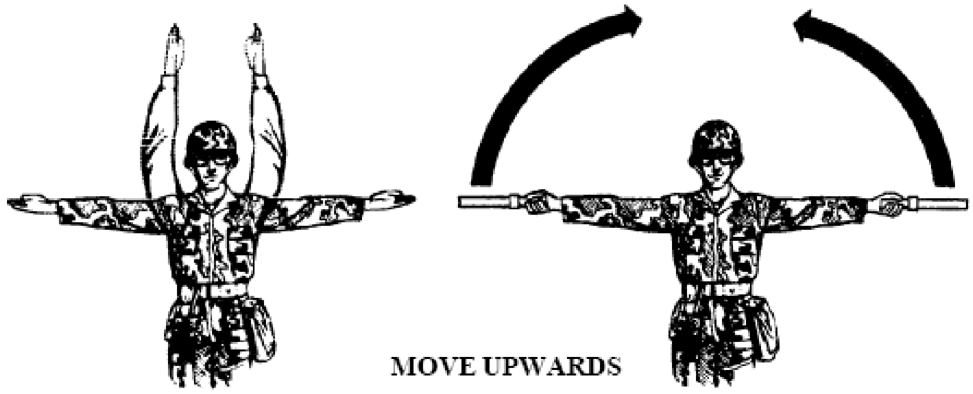
MOVE FORWARD

ARMS A LITTLE ASIDE, PALMS FACING BACKWARDS AND
REPEATEDLY MOVE UPWARD-BACKWARD FROM SHOULDER HEIGHT



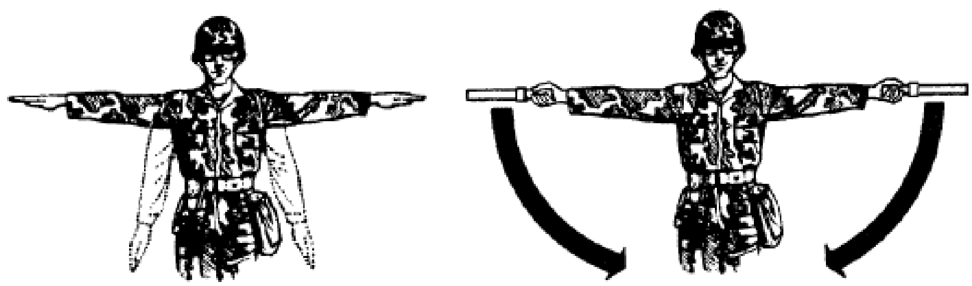
MOVE BACKWARD

ARMS BY SIDE, PALMS FACING FORWARD, ARMS SWEPT
FORWARD AND UPWARD REPEATEDLY TO SHOULDER HEIGHT



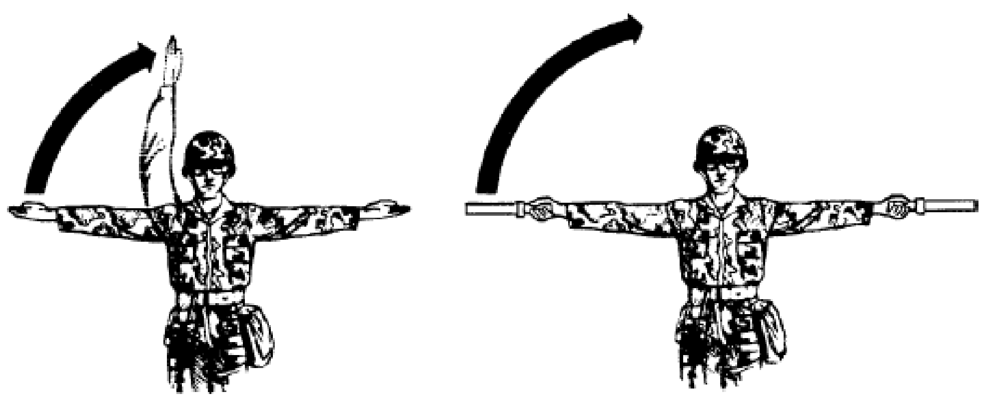
MOVE UPWARDS

ARMS EXTENDED HORIZONTALLY SIDEWAYS, BECKONING UPWARDS, WITH PALMS UP



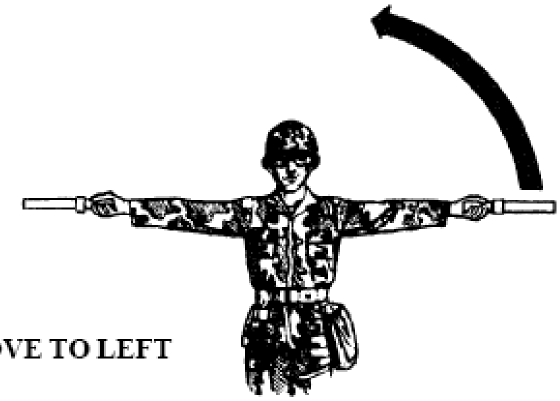
MOVE DOWNWARDS

ARMS EXTENDED HORIZONTALLY SIDEWAYS, BECKONING DOWNWARDS, WITH PALMS TURNED DOWN



MOVE TO RIGHT

LEFT ARM EXTENDED HORIZONTALLY SIDEWAYS IN DIRECTION OF MOVEMENT AND OTHER ARM SWUNG OVERHEAD IN SAME DIRECTION, IN A REPEATING MOVEMENT



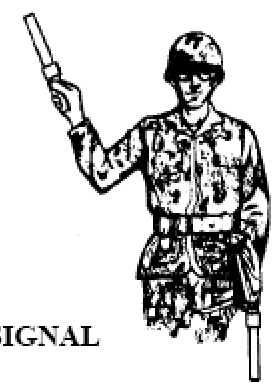
MOVE TO LEFT

RIGHT ARM EXTENDED HORIZONTALLY SIDEWAYS IN DIRECTION OF MOVEMENT AND OTHER ARM SWUNG OVERHEAD IN SAME DIRECTION IN A REPEATING MOVEMENT

HOOKUP

RAISE HANDS ALTERNATELY ABOVE THE HEAD IN A "ROPE CLIMBING " MOTION TO TAKE UP SLACK

> *NOTE: This signal will only be given once the signalman observes the hookup team clear of the load and aircarft

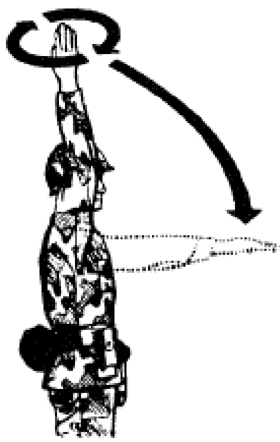
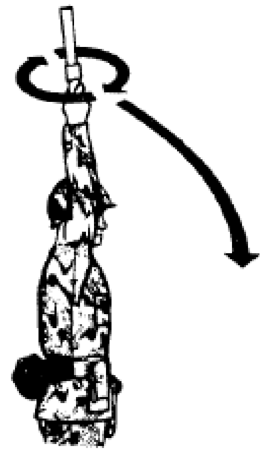


AFFIRMATIVE SIGNAL

HAND RAISED, THUMB UP


NEGATIVE SIGNAL

HAND RAISED, THUMB DOWN

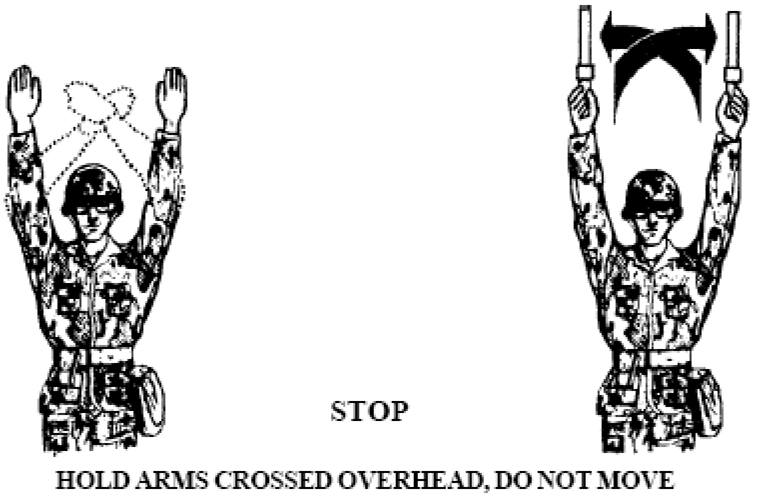



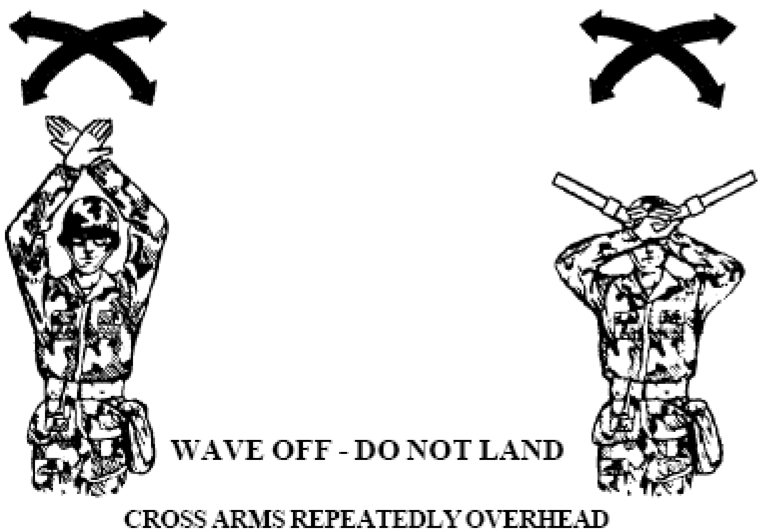
TAKEOFF

MAKE A CIRCULAR MOTION WITH RIGHT HAND OVERHEAD ENDING IN A THROWING MOTION IN THE DIRECTION OF TAKEOFF ALSO MEANS LOAD CLEAR, HOOKUP GOOD


LAND

ARMS CROSSED AND EXTENDED DOWNWARDS IN FRONT OF THE BODY





RELEASE SLING LOAD

LEFT ARM EXTENDED FORWARD HORIZONTALLY, FIST CLENCHED, RIGHT HAND MAKING

HORIZONTAL SLICING MOVEMENT BELOW THE LEFT FIST, PALM DOWNWARD

DA Form 7382 Sling Load Inspection Record Homework

DA Form 7382 Practical Exercises

1. You the Pathfinder are inspecting an M1101 HMT, Bumper #3160T/ Serial #00175, with an estimated weight of 2200 pounds. The load was rigged by PV2 Jimmy Jones reportedly in accordance with the proper FM. Attached to the load is a 10K sling set with proper apex and spacer. The load is being moved by a UH-1N from HMLA-369. It is being moved for your and PV2 Jones' unit, A Co. 2/503rd PIR. During your inspection you found that the right side of the tailgate was held together with one wrap of ¼ inch cotton webbing. The load is secured to the pallet with two A7A straps; one of those A7A straps is going over the CGU-1B that is securing the load to the trailer. You also notice there is no tape on the rear blackout marker light lenses. Your link count was 17 for the front and 5 for the rear. Given this information properly fill out the provided DA Form 7382.

2. You, the Pathfinder, are inspecting a 5K Cargo Net with an estimated 9,556 pounds of cargo within the container. The load was rigged by SPC Jane Doe from C Co., 2/3 AVN BN, 3D ID and is being moved by a CH-47D from D Co., 3/3 AVN BN, 3D ID. Attached to the net apex fitting, with a large clevis, is an 11K Cargo Hook Reach Pendent. During your inspection you found that the smaller loop of the 11K Cargo Hook Reach Pendent was attached to the load, you notice that the opening face of the hooks on the #2 and #3 lifting legs were facing the same way, the #1 lifting leg is routed through the netting mesh and while inspecting the A7A strap, you notice that the excess is over the top of the friction adapter

3. You the Pathfinder are inspecting an A22 Cargo Bag with an estimated weight of 2250 pounds. The load was rigged by SPC Jameson reportedly in accordance with the appropriate FM. The A22 Cargo Bag is being moved by a UH-60A from Raven Co. 2/29 INF and is being moved for SPC Jameson's unit 11th INF DIV HQ. The A22 Cargo Bag has a 25K sling leg with proper apex, missing the spacer, attached to the large clevis for a vertical pendant configuration. During your inspection you found the 24 inch suspension web on the right side was turned more than a ¼ turn. You found that the 188 inch strap was rolled in a way that created a ramp like affect, the butterfly snaps were facing down, and the bolt head on the large clevis wasn't taped. Given this information properly fill out the provided DA Form 7382. Given this information, properly fill out the provided DA Form 7382.

4. You the Pathfinder are inspecting an M1151A2 HMMWV, bumper #3160T/ serial #MD0185A, that weighs an estimated 11,500 pounds. The load was rigged by SGT Richards reportedly in accordance with the proper FM using a 25K sling set prepared for a dual-point hook up. The transporting aircraft is a CH-47F from the 101st Combat Aviation Brigade and is being moved for SGT Richards unit B Troop 2/17th CAV. During your inspection you found the front 25K apex was missing the spacer but the rear 25K apex spacer was present, the front left sling chain was wrapped around the sling point twice and the blast shield for the turret was facing forward. You also found that the right rear tire was flat, the passenger mirror was secured with two breakaway ties, and 550-cord was used to tie the front sling legs to themselves. Given this information properly fill out the provided DA Form 7382.

SLING LOAD INSPECTION RECORD

For use of this form, see FM 4-20.197; the proponent agency is TRADOC.

1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.	3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.

INITIAL ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD	LOAD RIGGED BY	LOAD INSPECTED BY
7. VEHICLE OR LOAD		
A. CORRECTLY POSITIONED	PFR	
B. EMERGENCY BRAKE SERVICEABLE AND SET	PFR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK	PFR	
D. PREPARED AND PADDED IAW THE APPROPRIATE FM	PFR	
8. SLING SET		
A. CORRECT NUMBER AND SIZE *(10K or 25K)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS	PFR	
D. CORRECT LINK COUNT FRONT AND REAR F- R-	PFR	
E. CHAIN SECURED IN GRAB LINK	PFR	
F. EXCESS CHAIN TIED OR TAPED *(10 links or more)*	PFR	
G. BREAKAWAY TIES INSTALLED	PFR	
H. APEX ATTACHED	PFR	
I. APEX SPACER INSTALLED	PFR	
J. REACH PENDANT INSTALLED	PFR	
9. A-22 CARGO BAG		
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
B. RIGGED IAW FM 4-20.197	PFR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED	PFR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS *(4 each)*	PFR	
10. CARGO NET		
A. CORRECT SIZE *(5k or 10k)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. LOAD CORRECTLY POSITIONED	PFR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING	PFR	
E. HOOKS TAPED	PFR	
F. LIFTING LEGS TIED *(Breakaway)*	PFR	
G. CORRECT NUMBER AND SIZE SLING LEGS	PFR	
H. RIGGED IAW FM 4-20.197	PFR	

11. REMARKS

12. LOAD RIGGED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
HHC 1/507TH PIR	PATHFINDER	PFR	PFC
e. SIGNATURE Pathfinder		f. DATE *(YYYYMMDD)*	

13. LOAD INSPECTED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE *(YYYYMMDD)*	

DA FORM 7382, JULY 2005 DA FORM 7382-R, MAR 97, MAY BE USED UNTIL EXHAUSTED. APD PE v1.01ES

SLING LOAD INSPECTION RECORD
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.

1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.	3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.

INITIAL ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD	LOAD RIGGED BY	LOAD INSPECTED BY
7. VEHICLE OR LOAD		
A. CORRECTLY POSITIONED	PFR	
B. EMERGENCY BRAKE SERVICEABLE AND SET	PFR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK	PFR	
D. PREPARED AND PADDED IAW THE APPROPRIATE FM	PFR	
8. SLING SET		
A. CORRECT NUMBER AND SIZE *(10K or 25K)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS	PFR	
D. CORRECT LINK COUNT FRONT AND REAR F- R-	PFR	
E. CHAIN SECURED IN GRAB LINK	PFR	
F. EXCESS CHAIN TIED OR TAPED *(10 links or more)*	PFR	
G. BREAKAWAY TIES INSTALLED	PFR	
H. APEX ATTACHED	PFR	
I. APEX SPACER INSTALLED	PFR	
J. REACH PENDANT INSTALLED	PFR	
9. A-22 CARGO BAG		
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
B. RIGGED IAW FM 4-20.197	PFR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED	PFR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS *(4 each)*	PFR	
10. CARGO NET		
A. CORRECT SIZE *(5k or 10k)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. LOAD CORRECTLY POSITIONED	PFR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING	PFR	
E. HOOKS TAPED	PFR	
F. LIFTING LEGS TIED *(Breakaway)*	PFR	
G. CORRECT NUMBER AND SIZE SLING LEGS	PFR	
H. RIGGED IAW FM 4-20.197	PFR	

11. REMARKS

12. LOAD RIGGED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
HHC 1/507TH PIR	PATHFINDER	PFR	PFC

e. SIGNATURE	f. DATE *(YYYYMMDD)*
Pathfinder	

13. LOAD INSPECTED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK

e. SIGNATURE	f. DATE *(YYYYMMDD)*

DA FORM 7382, JULY 2005 DA FORM 7382-R, MAR 97, MAY BE USED UNTIL EXHAUSTED. APD PE v1.01ES

SLING LOAD INSPECTION RECORD
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.

1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.	3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.

INITIAL ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD	LOAD RIGGED BY	LOAD INSPECTED BY
7. VEHICLE OR LOAD		
A. CORRECTLY POSITIONED	PFR	
B. EMERGENCY BRAKE SERVICEABLE AND SET	PFR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK	PFR	
D. PREPARED AND PADDED IAW THE APPROPRIATE FM	PFR	
8. SLING SET		
A. CORRECT NUMBER AND SIZE *(10K or 25K)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS	PFR	
D. CORRECT LINK COUNT FRONT AND REAR F- R-	PFR	
E. CHAIN SECURED IN GRAB LINK	PFR	
F. EXCESS CHAIN TIED OR TAPED *(10 links or more)*	PFR	
G. BREAKAWAY TIES INSTALLED	PFR	
H. APEX ATTACHED	PFR	
I. APEX SPACER INSTALLED	PFR	
J. REACH PENDANT INSTALLED	PFR	
9. A-22 CARGO BAG		
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
B. RIGGED IAW FM 4-20.197	PFR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED	PFR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS *(4 each)*	PFR	
10. CARGO NET		
A. CORRECT SIZE *(5k or 10k)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. LOAD CORRECTLY POSITIONED	PFR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING	PFR	
E. HOOKS TAPED	PFR	
F. LIFTING LEGS TIED *(Breakaway)*	PFR	
G. CORRECT NUMBER AND SIZE SLING LEGS	PFR	
H. RIGGED IAW FM 4-20.197	PFR	

11. REMARKS

12. LOAD RIGGED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
HHC 1/507TH PIR	PATHFINDER	PFR	PFC

e. SIGNATURE	f. DATE *(YYYYMMDD)*
Pathfinder	

13. LOAD INSPECTED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK

e. SIGNATURE	f. DATE *(YYYYMMDD)*

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SLING LOAD INSPECTION RECORD

For use of this form, see FM 4-20.197; the proponent agency is TRADOC.

1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.	3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.

INITIAL ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD	LOAD RIGGED BY	LOAD INSPECTED BY
7. VEHICLE OR LOAD		
A. CORRECTLY POSITIONED	PFR	
B. EMERGENCY BRAKE SERVICEABLE AND SET	PFR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK	PFR	
D. PREPARED AND PADDED IAW THE APPROPRIATE FM	PFR	
8. SLING SET		
A. CORRECT NUMBER AND SIZE *(10K or 25K)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS	PFR	
D. CORRECT LINK COUNT FRONT AND REAR F- R-	PFR	
E. CHAIN SECURED IN GRAB LINK	PFR	
F. EXCESS CHAIN TIED OR TAPED *(10 links or more)*	PFR	
G. BREAKAWAY TIES INSTALLED	PFR	
H. APEX ATTACHED	PFR	
I. APEX SPACER INSTALLED	PFR	
J. REACH PENDANT INSTALLED	PFR	
9. A-22 CARGO BAG		
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
B. RIGGED IAW FM 4-20.197	PFR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED	PFR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS *(4 each)*	PFR	
10. CARGO NET		
A. CORRECT SIZE *(5k or 10k)*	PFR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197	PFR	
C. LOAD CORRECTLY POSITIONED	PFR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING	PFR	
E. HOOKS TAPED	PFR	
F. LIFTING LEGS TIED *(Breakaway)*	PFR	
G. CORRECT NUMBER AND SIZE SLING LEGS	PFR	
H. RIGGED IAW FM 4-20.197	PFR	

11. REMARKS

12. LOAD RIGGED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
HHC 1/507TH PIR	PATHFINDER	PFR	PFC
e. SIGNATURE Pathfinder		f. DATE *(YYYYMMDD)*	

13. LOAD INSPECTED BY:

a. UNIT *(Print)*	b. NAME *(Print)*	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE *(YYYYMMDD)*	

DA FORM 7382, JULY 2005 DA FORM 7382-R, MAR 97, MAY BE USED UNTIL EXHAUSTED. APD PE v1.01ES

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Do not proceed to sections until covered by the formal block of instruction. You may review any previously covered sections throughout this handout for reference.

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UNIQUE SLING LOADS

REFERENCES:

TM 4-48.09
MULTISERVICE HELICOPTER SLING LOADS BASIC OPERATIONS AND EQUIPMENT

TM 4-48.10
MULTISERVICE HELICOPTER SLING LOADS SINGLE POINT RIGGING PROCEDURES

TM 4-48.11
MULTISERVICE HELICOPTER SLING LOADS DUAL POINT RIGGING PROCEDURES

FM 3-04.513
AIRCRAFT RECOVERY OPERATIONS

TM 1-1670-260-12&P
OPERATOR'S, AVIATION UNIT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR UNIT MAINTENANCE AERIAL RECOVERY KIT (UMARK)

INSTRUCTIONAL INTENT: THE PATHFINDER STUDENT WILL LEARN THE RESPONSIBILITIES OF THE DIFFERENT UNITS AND ELEMENTS INVOLVED IN SLING LOAD OPERATIONS, THE CAPABILITIES AND CHARACTERISTICS OF THE EQUIPMENT USED, THE BASICS OF SLING LOAD THEORY, GROUND CREW SAFETY PROCEDURES AND RESPONSIBILITIES, AND THE HAND AND ARM SIGNALS. THE STUDENT WILL ALSO BE EXPOSED TO THE METHODS OF RIGGING COMMON LOADS.

TWO TYPES OF RECOVERY

Self Recovery- is defined as actions required for the aircraft or vehicle to move out under its own power to either rejoin the mission or to a maintenance area for additional repairs or inspections. Self-recovery begins at the location where the aircraft or vehicle became inoperable or disabled. It ends with the completion of a standard Battle Damage Assessment and Repair (BDAR) and/or maintenance procedures correcting faults required for the aircraft or vehicle to safely fly or drive to a secure area or rejoin the mission.

Dedicated Recovery- is defined as actions required to extract an aircraft or vehicle by means of an aerial or surface recovery vehicle to a maintenance area for repairs and/or inspections. Dedicated recovery begins with the decision that the aircraft or vehicle will not be able to self-recover. It ends with the movement of the aircraft or vehicle by either aerial or ground vehicle to a maintenance area equipped to conduct required inspections and/or subsequent repairs.

Concept

For this period of instruction we will concern ourselves with dedicated recovery assets. Dedicated recovery assets will be inserted to an area of a downed aircraft or vehicle, to inspect the vehicle for structural strength and the ability to lift the downed vehicle via sling load operations and personnel requirements for a downed vehicle.

DEFINITIONS USED DURING UNIQUE SLING LOADS

Lifting Provision

An integral part of the equipment, commonly called a pad eye, lug, eye, ring, or attachment. A lifting provision provides a means of attaching a sling to the equipment for safe lifting.

Strength

Each lifting provision, including the connecting structure, shall meet the following requirements:

a. A crane lift design limit load of not less than 2.3 times the static load. The static load is determined by static lift test or by mathematical analysis, using the item's GW and the minimum sling length for an equal length single apex sling assembly.

b. If there is sling interference with the equipment, the contact points on the equipment must have sufficient strength to withstand the compressive loads caused by sling contact at the design limit load.

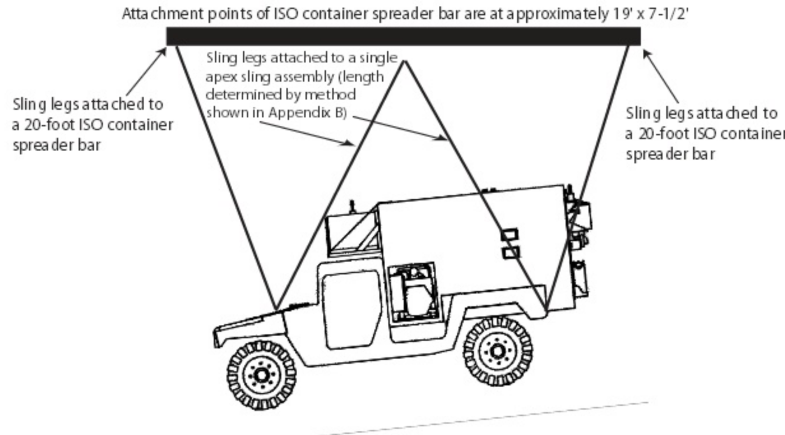
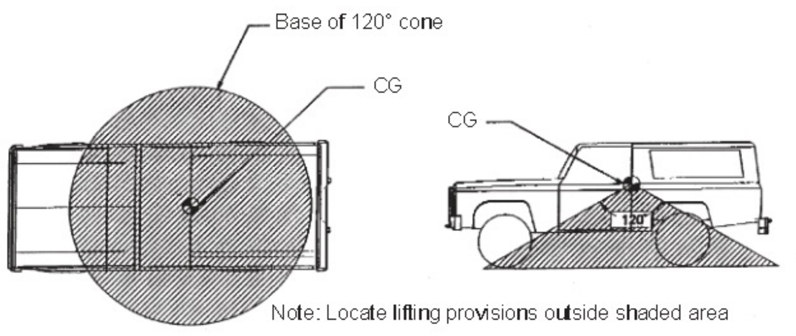
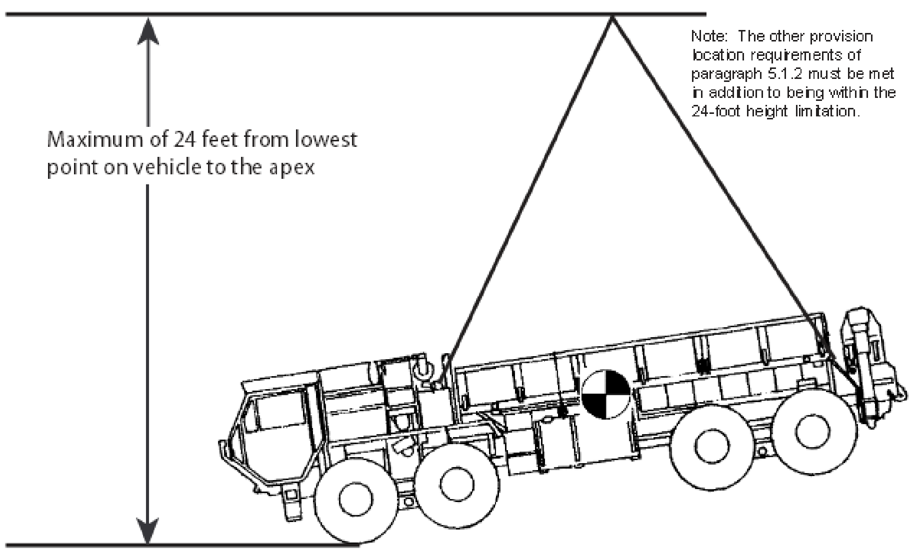


Figure 4. Range of Sling Leg Orientations.





Maximum Projected Frontal Area (MPFA)

For a single point load, the maximum area projected on a vertical plane as the item is rotated about a vertical axis through the aircraft hook; for a dual point load, the maximum projected area on a vertical plane in the direction of flight.

MPFA

Studies were performed in 1972 which identified distinct hook load changes relative to the slung load geometry and weight

Three zones were established:

- HSLWT/MPFA < 45
- HSLWT/MPFA >45 and <60
- HSLWT/MPFA >60

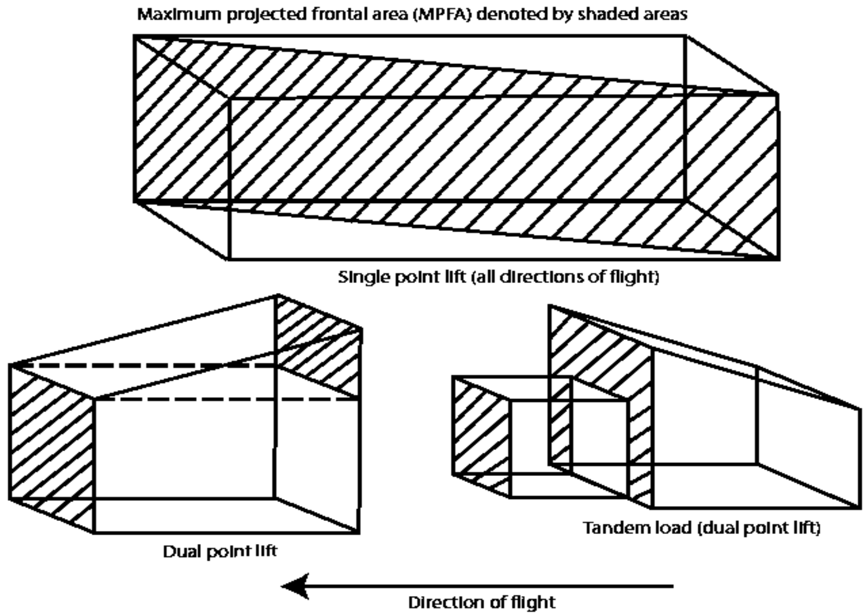
Where:

- HSLWT is the Slung Weight
- MPFA is the Maximum Projected Frontal Area
- HSLWT/MPFA is a ratio of the Weight to Area
- Load Factors are also related to aircraft power

Larger Area Drag

Understand that the larger the object, the more drag it will have and the more air pressure pushing against it that will cause the load to swing further back from the direction of flight. You must take this into account for determining your 3-5 degree attitude.

- Determine Link count to establish a 3-5 degree forward pitch
    - **Single Point**: pitch increased with air pressure from forward flight
    - **Dual Point**: Pitch will increase from aircraft forward pitch
- May increase or decrease based on forward flight air pressure (discussed in Short Loads section below)
- Center of Gravity wants to find a Minimum Energy condition (wants to sit as low as possible)



Design Limit Load

The applied force, or maximum probable force, that a provision (including its connecting structural members) will be subjected to in its most severe transport environment. For lifting, the design limit load is the static load multiplied by the load factor (LF). For equipment tie down, the design limit load is 4.0 multiplied by the gross weight in the longitudinal direction, 2.0 multiplied by the gross weight in the vertical direction, and 1.5 multiplied by the gross weight in the lateral direction.

Permanent Deformation

Any visible permanent change in the original dimensions or shape of the provision or connecting structure resulting from an applied force.

Static Lift Test

A test consisting of rigging and statically lifting the item to verify the rigging configuration and identify clearance problems.

Plane of the Provisions

A geometric plane connecting the centers of all lifting provisions of an item of equipment. The “plane of the provisions” will only be a horizontal plane if the height of the front and rear provisions is the same.

Determine Location of Lifting Provisions

Determining Location of Lifting Provisions

a. The equipment can be lifted using an equal length single apex sling assembly, as defined in this paragraph, without incurring damage to the equipment or the slings. The minimum length of sling leg used for lifting with an equal length single apex sling assembly is determined by setting each sling angle to 45° (referenced from the plane of the provisions). The point in space where the four equal length slings intersect determines the minimum length of the single apex sling assembly. If the length determined by this method is less than 12 feet, the sling length shall be set to 12 feet. This is done because the sling sets typically available for lifting are 12 feet long or longer. The minimum sling length shall be used for testing (see 5.1.5). Appendix B gives an example of how to determine the minimum sling length and the required loads for testing.

b. Not less than 1 inch of clearance should be maintained between the equipment and the sling cables, chains, or the rope portion of helicopter slings. The 1 inch clearance requirement applies when the equipment is lifted with the minimum equal length sling legs (see 5.1.2.a), with sling angles ranging from a 45° single apex sling assembly (this angle will be more than 45° if the spacing of the provisions dictates the use of 12 foot slings (see 5.1.2.a), and if the weight of the equipment is 67,200 pounds or less), to those same sling legs attached to a 20-foot ISO container spreader bar (Figure 4). When a sling leg must contact a part of the equipment, testing or computer-aided engineering structural analysis must demonstrate that the affected part(s) has sufficient strength to withstand the force exerted by the sling leg to prevent permanent deformation of any part of the equipment, and that contact will not adversely affect the material of the sling device.

c. Provisions do not interfere with the functioning of the equipment.

d. Maximum accessibility to the provision is maintained.

e. Orientation of the provision shall be such that an attaching device (hook or shackle), of the proper capacity, does not contact any part of the item being lifted except the provision. This ensures interoperability between the equipment and the transportation systems.

f. Height of provisions shall be between 2 and 6 feet, measured from the ground when the equipment is resting on a level surface, unless an integral means for reaching the provisions is provided.

g. Dynamic stability is required during crane lifting and helicopter sling loading. When possible, lifting provisions should be located above the vertical center of gravity (CG). If this is not possible, lifting provisions shall be located so that a line connecting adjacent lifting provisions is located outside a 120° cone having its apex at the CG and its axis of rotation about the vertical axis (Figure 5).

h. When lifting with equal length slings, it is preferable that the resulting angle of lift be as close to level as possible. In most lifting situations, altering sling length to achieve a level lift is NOT an option, so the equipment shall be capable of being lifted at the resulting angle when using equal length slings.

i. When suspended, the overall height of the equipment and attached minimum length single apex sling assembly shall not exceed a height of 24 feet above the lowest extremity of the equipment.

FUNCTION OF THE DOWNED AIRCRAFT RECOVERY TEAM

Aircraft Recovery

The aircraft recovery mission extracts an aircraft from a downed location to a safe area using recovery kits, a trained recovery team, and recovery aircraft or tactical vehicles. BDAR-trained repair personnel can augment a DART using BDAR procedures to expedite self-recovery and safe return of aircraft and personnel. Furthermore, they prevent enemy retrieval of the aircraft retaining control for future use and eventual reintegration into the battle. DART should recover the airframe if—

- The tactical situation allows for recovery.
- The aircraft is worth recovering.
- The aircraft can be recovered successfully.

Downed Aircraft Recovery Team (DART)

A DART is comprised of select personnel who perform assessment, repairs, and recovery of downed aircraft. This team is equipped, trained, and rehearsed to accomplish aircraft recovery in various environments and conditions.

Downed Aircraft Recovery Team

DARTs perform the following functions:

- Assessing repair requirements.
- Repairing aircraft, or preparing it for a one-time evacuation mission.
- Recommending recovery by aerial or ground means.
- Recommending recovery by aerial or ground means
- Rigging aircraft for recovery
- Serving as ground crew for helicopter lift.
- Serving as crew to secure the load aboard a vehicle.

Assessor

An assessor is a technical expert who can evaluate aircraft battle damage. The assessor's mission is to provide the commander with an initial assessment of the downed aircraft. An assessor can be one, or a combination, of the following:

- Aircrew of the downed aircraft.
- Aircrew of another aircraft.
- Pilot Recovery aircrew.
- DART member.

The ability to determine rapidly that a one-time flight is feasible or a quick-fix repair is possible is important. It may prevent a situation in which the aircraft would otherwise be destroyed (in place) to prevent capture or compromise by the enemy.

Battle Damage Assessment and Repair

BDAR is the use of specialized aircraft damage assessment criteria, repair kits, and trained personnel to modify peacetime aircraft maintenance standards. This concept includes the return of damaged aircraft to a safe location and, eventually, to battle.

Maintenance Evacuation

Maintenance evacuation is the physical act of moving an aircraft from one maintenance location on the battlefield to another. Movement is either by fly-out or aerial/ground transportation. Evacuation is to affect repair, cross-level maintenance workloads, or relieve units of disabled aircraft during tactical moves.

TYPES OF DART OPERATIONS

Deliberate DART:

- Performs standby in a predetermined location until the mission is complete.
- Participates in the air mission brief.
- Assembles all organic and attached personnel at the standby location.
- Preloads all ground recovery assets.
- Prepositions all aerial recovery assets for rapid loading.
- Ensures PCCs/PCIs are complete.
- DART OIC/NCOIC positioned at the controlling CP or appropriate supporting CP.

Hasty DART:

- Continues normal duties until notified of a requirement, and then executes a predetermined recall time line.
- Upon notification, assembles all organic and attached personnel at the standby location.
- Upon notification loads all air or ground recovery assets as required.
- Conducts PCCs/PCIs.
- DART OIC/NCOIC remains in contact per the unit SOP to ensure rapid response.

Aircraft is Unrecoverable

DART will do the following:

- Determines parts, subsystems, or components for cannibalization and removes them.
- Destroys, or takes part in the destruction of, a disabled aircraft to be abandoned.
- Performs salvage recovery to sterilize the area and remove the aircraft in part, or in total, for investigation or disposal.

DEDICATED AERIAL RECOVERY

Dedicated Aerial Recovery

Aerial recovery involves attaching the aircraft to suitable airlift recovery equipment, connecting it to the lifting helicopter, and flying it to the maintenance collection point (MCP) or maintenance facility. All downed aircraft must be rigged according to applicable TMs. Planning for this type of recovery entails thorough analysis of the recovery site and the associated threat due to relatively slow air movement over a battlefield. Medium-lift helicopters will be required for heavier-type aircraft aerial recoveries.

High altitude considerations are a vital part of planning. The power required versus power available is reduced significantly with high altitude operations. Soldier performance is also degraded without acclimation to this environment.

ADVANTAGES OF AERIAL RECOVERY

Aerial recovery reduces the time that recovery assets are engaged and exposed to the battlefield. Route reconnaissance and security escort requirements are considerably less intense than during surface recovery. In addition, the need for aircraft disassembly is greatly reduced. Recovery site accessibility requirements are not as rigid; however, the distance from which recovery assets may be obtained is greater.

DISADVANTAGES OF AERIAL RECOVERY

The possibility exists for complete loss of aircraft through failure of recovery equipment. Although exposure time is less, the distance from which recovery activities are detectable is greater. Loss of recovery assets through enemy action will be more severe, effectively degrading total force fighting capabilities. This is due to the multi-use value and relative low quantity of airlift helicopters, particularly medium-lift helicopters, compared to ground recovery vehicles

UNIT MAINTENANCE AERIAL RECOVERY

The UMARK is a system of slings, tie-downs, stabilizing equipment, and interconnecting hardware that can be assembled in multiple configurations to affect the safe aerial recovery of damaged helicopters. Helicopter damage may include, but is not limited to:

- The destruction of the main rotor head.
- The main rotor shaft or mast bent, broken, or loose in the transmission.
- The main transmission case cracked, broken, loose, or separated from the airframe.
- Damage to the tail boom to such an extent that it is not suitable as a lifting point.
- Bending or buckling of the airframe so as to create aerodynamic instabilities that could result in additional damage during the recovery flight.
- Engine(s) severely damaged or separated from the airframe.

UMARK is designed to allow three ground personnel to rig a disabled helicopter for aerial recovery in minimal time depending on team proficiency and the condition of the disabled aircraft. An exception to this timeframe would be the aerial recovery of a CH-47 helicopter, which requires the installation of components from two UMARK kits. Disabled or damaged helicopters may not require stripping of components, defueling, disarming, or need additional maintenance actions performed prior to aerial recovery.

UMARK Content List

Figure 1 Sheet/ View	Part Number	Descriptio n	Qty
8/X	AL 4021-0804-ELEC07	Shipping Containers	3
8/Y	1670EG029B3	Drogue Chute	1
2/J	94C522-1	Fixed Length Tie down (with snaps)	4
2/K	94C522-2	Fixed Length Tie down (without snaps)	1
5/Q	94C524-1	Box Link Assembly	3
6/V	94C533-1	Cargo Hook Thimble	1
6/T	94D509-1	Lifting Clevis Assembly	1
6/U	94D514-1	Shackle Assembly	1
1/A	94D519-1	Green/White Light Weight Sling 12.5 FT. (150 IN.)	4
1/B	94D519-2	Yellow/White Light Weight Sling 12.75 FT. (153 IN.)	4
1/C	94D519-3	Red/White Light Weight Sling 17.33 FT. (208 IN.)	2
1/D	94D519-4	Blue/ White Light Weight Sling 30 FT. (360 IN.)	2
1/E	94D519-5	Black/White Light Weight Sling 10 FT. (120 IN.)	1
4/P	94D527-1	OH-58D Sight Wedge	1
4/N	94D528-1	UH-1 Square Wedge	1
4/O	94D529-1	AH-1 MAST Wedge	1
4/O	94D530-1	OH-58 A/C MAST Wedge	1
7/W	94H501-1	Crossbar Assembly	1

MAXIMUM ALLOWABLE RECOVERY WEIGHTS

Disabled Helicopter	Maximum Recovered		CH-47D Fwd & Aft Two-Hook 25,000 lb. Max Lift	CH-47D Center One-Hook 26,000 lb. Max Lift	CH-47D Fwd or Aft One-Hook 17,000 lb. Max Lift	UH-60A 8,000 lb. Max Lift	UH-60L 9,000 lb. Max Lift	UH-60M 10,000 lb. Max Lift
	Pounds	Kilograms						
AH-1*	8,000	3,636		X	X			
AH-64A	20,000	9,090		X				
AH-64D	20,000	9,090		X				
OH-58A/C	3,000	1,364		X	X	X	X	X
OH-58D	5,500	2,500		X	X	X	X	X
UH-1*	6,000	2,727		X	X	X	X	X
UH-60	14,000	6,364		X	X			
* All Army Models								

FLIGHT PARAMETERS FOR AIRCRAFT

Recovery of AH-64

Flight parameters for the CH-47 as the recovering aircraft.

Maximum Airspeed:	40 Knots Indicated Air Speed (KIAS)
Maximum Bank Angle:	20 Degrees
Maximum Rate-of-Climb	1000 Feet Per Minute (FPM)
Maximum Rate-of-Descent	1000 Feet Per Minute (FPM)
Drogue Chute	No
Maximum Sink Rate	5.6 Feet Per Second (See Note Below)
Terrain Lifting Limits – Fore/Aft Slope	±12 Degrees
Terrain Lifting Limits – Lateral Slope	±12 Degrees
Note: If maximum sink rate cannot be determined then perform a hard landing inspection in accordance with the applicable technical manual.	

UMARK for AH-64

Item Description	Qty	Item Description	Qty
Black/White 30 Ft Heavy Weight Sling	1	Shackle Assembly	1
Black/White 30 Ft Heavy Weight Sling with Bridle	1	Adjustable Length Tie-Down	2
Green/White 150 Inches (12.5 Ft) Light Weight Sling	4	Fixed Length Tie-Down (With Snap)	4
Yellow/White 153 Inches (12.75 Ft) Light Weight Sling	1	Fixed Length Tie-Down (Without Snap)	1
Red/White 208 Inches (17.33 Ft) Light Weight Sling	1	Blade Sleeve Assemblies	4
Blue/White 360 Inches (30.0 Ft) Light Weight Sling	1	Blade Pole Assembly	1
Black/White 120 Inches (10 Ft) Light Weight Sling	1	Cargo Hook Thimble	1
Sling Link Assembly	2	Drogue Chute	1
Box Link Assembly	3		

Components of UMARK utilized during the one-hook, short-line recovery are listed in Table 2. Common equipment used by the ground rigging crew, such as shockproof gloves, goggles, radios, etc., are not included in UMARK. No additional tools are required for UMARK assembly or rigging of the helicopters.

Recovery of UH-1

Parameter	CH-47 Recovery Helicopter	UH-60 Recovery Helicopter
Maximum Airspeed:	60 Knots Indicated Air Speed (KIAS)	60 KIAS
Maximum Bank Angle:	25 Degrees	20 Degrees
Maximum Rate-of-Climb	1750 Feet Per Minute (FPM)	1000 FPM
Maximum Rate-of-Descent	2000 Feet Per Minute (FPM)	3000 FPM
Drogue Chute	Optional	Optional

UMARK for UH-1

Item Description	Qty	Item Description	Qty
Black/White 30 Ft Heavy Weight Sling	1	UH-1 Square Wedge Assembly	1
Black/White 30 Ft Heavy Weight Sling with Bridle	1	Adjustable Length Tie-Down	1
Yellow/White 153 Inches (12.75 Ft) Light Weight Sling	2	Fixed Length Tie-Down (With Snap)	2
Red/White 208 Inches (17.33 Ft) Light Weight Sling	2	Fixed Length Tie-Down (Without Snap)	1
Blue/White 360 Inches (30.0 Ft) Light Weight Sling	2	Blade Sleeve Assemblies	2
Lifting Clevis Assembly	1	Blade Pole Assembly	1
Sling Link Assembly	2	Cargo Hook Thimble	1
Box Link Assembly	2	Drogue Chute	1
Shackle Assembly	1		

Components of UMARK utilized during the one-hook, short-line recovery are listed in Table 2. Common equipment used by the ground rigging crew, such as shockproof gloves, goggles, radios, etc., are not included in UMARK. No additional tools are required for UMARK assembly or rigging of the helicopters.

Recovery of UH-60

Flight parameters for the CH-47 as the recovering aircraft.

Maximum Airspeed:	40 Knots Indicated Air Speed (KIAS)
Maximum Bank Angle:	20 Degrees
Maximum Rate-of-Climb	500 Feet Per Minute (FPM)
Maximum Rate-of-Descent	1000 Feet Per Minute (FPM)
Drogue Chute	No

UMARK for UH-60

Item	Qty	Item Description	Qty
Black/White 30 Ft Heavy Weight Sling	1	Shackle Assembly	1
Black/White 30 Ft Heavy Weight Sling with Bridle	1	Adjustable Length Tie-Down	2
Green/White 150 Inches (12.5 Ft) Light Weight	4	Fixed Length Tie-Down (With Snap)	4
Yellow/White 153 Inches (12.75 Ft) Light Weight	1	Fixed Length Tie-Down (Without Snap)	1
Red/White 208 Inches (17.33 Ft) Light Weight	1	Blade Sleeve Assemblies	4
Blue/White 360 Inches (30.0 Ft) Light Weight Sling	1	Blade Pole Assembly	1
Black/White 120 Inches (10 Ft) Light Weight Sling	1	Cargo Hook Thimble	1
Sling Link Assembly	2	Drogue Chute	1
Box Link Assembly	3	Drogue Chute	1
		Sling Retention Assembly (SRA)	4

Components of UMARK utilized during the two-hook short-line recovery are listed in Table 2. Common equipment used by the ground rigging crew such as, tape/cotton webbing, 8 foot anti-chafe sleeve (2-1/2” fire hose or equivalent), shockproof gloves, goggles, radios, etc., are not included in UMARK. No additional tools are required for UMARK assembly or rigging of the helicopters.

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AIR TRAFFIC CONTROL

REFERENCES:

FM 3-21.38 PATHFINDER OPERATIONS

FM 3-04.120 ARMY AIR TRAFFIC CONTROL

FAA ORDER 7110.65 (CURRENT VERSION AND SUBSEQUENT LETTERED VERSIONS IE. 7110.65A, B, C, ETC. PUBLISHED ACCORDING TO SCHEDULE APPROXIMATELY EVERY 6 MONTHS)

INSTRUCTIONAL INTENT: TO ENABLE THE PATHFINDER STUDENT TO ORGANIZE, PREPARE AND ISSUE LANDING, TAKEOFF AND EN-ROUTE AIR TRAFFIC INFORMATION TO AIRCRAFT OPERATING AT OR NEAR A LANDING SITE OR DROP ZONE.

Definition Of Pathfinder Air Traffic Procedures

Procedures used by a pathfinder element to promote the safe and expeditious flow of air traffic in and around a Tactical Operation Site.

The Four Purposes Of Pathfinder Air Traffic Control Procedures

- Prevent Collisions
- Expedite Traffic
- Provide Flight Information
- Aid in Search and Rescue

Internal Net Recorder

DA Form 7461-R

The Three Qualities Of A Pathfinder Air Traffic Controller

- Accuracy
- Speed
- Knowledge

Six Communication Techniques

- Avoid a monotonous pitch
- Avoid a too slow or too fast rate of speech
- Avoid any display of emotion, nervousness, indecision or excitement
- Speak directly into the microphone
- Speak in a normal conversational tone
- Speak with confidence

FLIGHT INFORMATION

PERTINENT INFORMATION: Information pertaining directly to your landing site.

- Signal on call
- Description of the landing site
- Wind speed and direction
- Field Elevation of the Landing Site (Night operations only)

ADVISORY INFORMATION: Advisory information is information that the pilot must know in order to avoid a potentially hazardous situation.

- Turbulence at or near the site
- Obstacles/Hazards
- Artillery/Mortar fire (weapon system range, maximum ordinate, weapon location, weapons direction)
- Enemy Situation
- Weather
- Other A/C at or near the site

CARDINAL RULES

THREE CARDINAL RULES for arriving and departing aircraft:

1. Arriving aircraft will not be given clearance to land at a landing point until all preceding aircraft have taxied from or flown forward of the designated landing point.

2. Departing aircraft will not be cleared for departure until all preceding aircraft have flown clear of the forward landing point. This is to prevent one aircraft from over-flying another.

3. Never allow a sling load aircraft to fly over personnel, equipment or another aircraft at any time.

TRAFFIC PATTERNS

Primarily, the traffic pattern is used to control aircraft around a landing sites, drop zones, and pick-up zones in order to ensure aircraft separation. Aircraft may enter from any point or direction as long as it is consistent with safety requirements. The altitude is determined by height of the obstacles or the aircraft requirements and may be adjusted as the situation dictates.

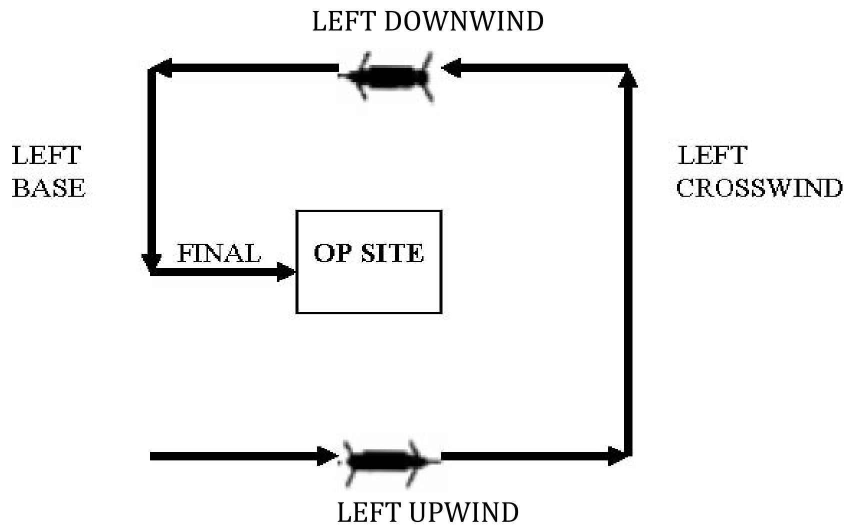
<u>Traffic Pattern</u>: The standard traffic pattern extends in all directions for a distance of one statute mile from the center line of the landing site for forward areas primarily using rotary wing and small fixed wing aircraft. The normal altitude that a pilot will fly will be METT-TC dependant and should be planned and brief prior to the mission.

The standard traffic pattern consists of five legs:

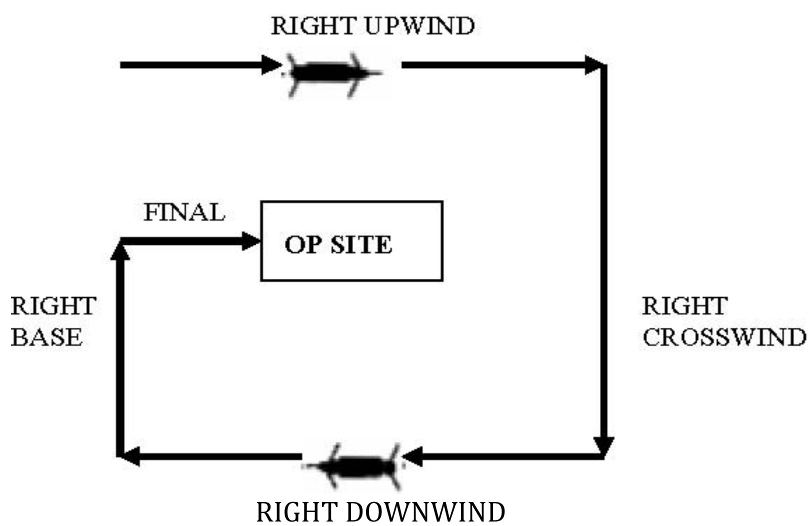
- The **Upwind** leg
- The **Crosswind** leg
- The **Downwind** leg
- The **Base** leg
- The **Final Approach** leg

STANDARD TRAFFIC PATTERNS

LEFT TRAFFIC



RIGHT TRAFFIC



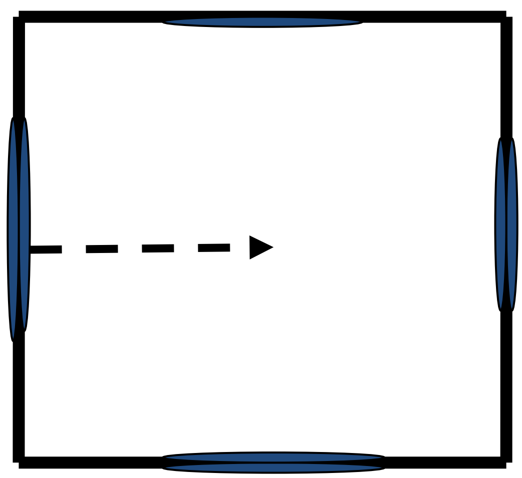
- The minimum pattern that can be flown is the Final Approach Leg. Regardless of what type of approach is made, the Final Approach Leg must always be flown.
- Left traffic is when the aircraft makes all left turns. Right traffic is when the aircraft makes all right turns. Normally, right traffic is best suited for rotary wing aircraft because the pilot sits in the right seat of rotary wing aircraft; however, the most expeditious pattern should be used.

Entering a traffic pattern

- Rotary wing aircraft can enter anywhere in the traffic pattern as long as it is consistent with safety requirements.
- Fixed wing aircraft may enter the traffic pattern during the first one third portion of any leg, at an angle of 45 degrees .
- When an aircraft is within 30 degrees of the final approach leg, the aircraft can be cleared for a straight in approach. A straight in approach may be expeditious to a pilot as long as it is within safety requirements.

CLOSED TRAFFIC PATTERNS

LEFT/RIGHT TRAFFIC



The closed traffic pattern: The aircraft in a closed traffic pattern will continue to orbit the site at the specified altitude. There are two closed traffic patterns: Right and Left closed traffic. Closed traffic is required when the aircraft does not land on the first approach or during drop zone operations when an aircraft is required to make more than one pass over a drop zone.

Modified Traffic Patterns

A modified traffic pattern is any traffic pattern consisting of either two or three legs.

A situation may arise where additional airspace between aircraft in the traffic pattern is needed.

There are two primary methods:

Extending one or more legs of the traffic pattern: will provide the desired spacing and is also used to prevent collisions.
The normal length of the extension is one statute mile.
The base and final approach legs cannot be extended.
The 360-degree turnout: When this command is given to the slower aircraft, it will immediately bank away from the site and execute a standard two-minute turnout, thus preventing collision. An aircraft cannot execute the 360-degree turnout while on the final approach leg.
NOTE: If an aircraft has already been given clearance for landing and a situation arises where it is unsafe to land, the pilot must be instructed to "GO AROUND."

*__NOTE__: The type of approach most commonly encountered by the Pathfinder will be the circling approach. A circular approach can be conducted when a pilot is unfamiliar with the site. He may enter the final leg as long as it will not conflict with the normal flow of traffic.

Aircraft Landing Priority

There are six priorities for landing aircraft at your site. These are the priorities in order of importance:

- AIRCRAFT WITH AN IN-FLIGHT EMERGENCY
- MEDEVAC AIRCRAFT WITH GROUND MEDEVAC
- CODED AIRCRAFT (1 -8)
- FLIGHT OF TWO OR MORE AIRCRAFT
- AIRCRAFT WITH AN EXTERNAL LOAD
- SINGLE AIRCRAFT

ELECTRONIC WARFARE ENVIRONMENT

The Pathfinder should anticipate an active electronic warfare environment for all operations and ensure that he is familiar with the proper countermeasure to be used; e.g. pro-words that indicate the switch to an alternate frequency; transmission authentication procedures; brevity codes and required reports to be initiated when enemy interference is suspected. Proper radio telephone (RTO) procedures and communications electronic operating instructions (CEOI) will be utilized during all operations.

During actual tactical air assault operations, prior planning must be conducted in order to reduce the electronic communications between the Pathfinder/DZSTL and air elements. It is essential to minimize or eliminate electronic signatures during tactical operations, e.g. counter-measures, pro-words and authentication procedures. Pre-mission coordination with aviation and ground assets will enable you to eliminate or reduce transmission time to a minimum for success.

GTA MAP MARKINGS

- CCP and RP to OP site **6 to 8** kilometers
- CCP and RP to Control Zone **3 to 5** kilometers
- Fixed wing control zone **18** kilometers diameter
- Rotary wing control zone **6** kilometers diameter

GTA Block

HEADING_______________ DISTANCE____________

DROP/LAND HEADING__________________

DROP SPEED_____________ DROP ALT.___________

PERT. INFO. _______________________________________

____

______________JUMPERS

> PER PASS

______________BUNDLES

FIELD ELEVATION__________

ADVISORIES____

____

____

____

GTA / INR MAP MARKINGS

I. PURPOSE: For use as a quick reference by the Ground-to-Air (GTA) and Internal Net Recorder (INR) to expedite the flow of aircraft in a control zone.

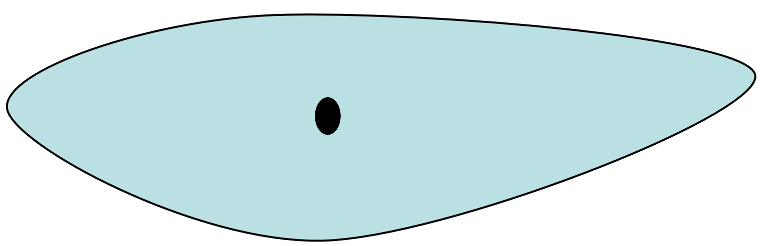
ACRONYMS/TERMS:

- OP SITE – Operations site
- CC – Control Center
- GTA - Ground to Air
- CCP - Communications Checkpoint
- GUC - Ground Unit Commander
- AVN CDR - Aviation Commander
- RP(S) - Reference Point(s)
- ACP(S) - Aerial Control Point(S)
- ATC - Air Traffic Control
- HLS(Z)(P) - Helicopter Landing Site(zone)(point)
- DZ OPS - Drop Zone Operations
- INR - Internal Net Recorder

II. LOCATE OP SITE:

- Grid location is provided
- Mark Op Site with grid dot
- Trace out complete site

Ex:

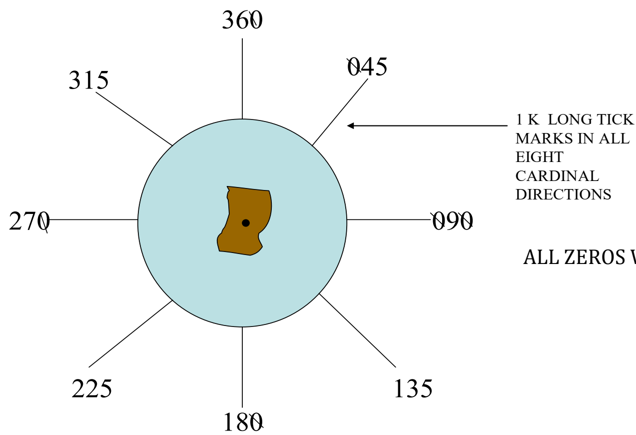


III. MARK OP SITE:

- Place cross hair on op site grid dot
- Trace the outer edge of the inner circle from 270° to 090°
- Flip control zone scale over, and place cross hair on op site grid dot
- Trace inner circle from 090° to 270°
- This complete circle is called the “Control Center”

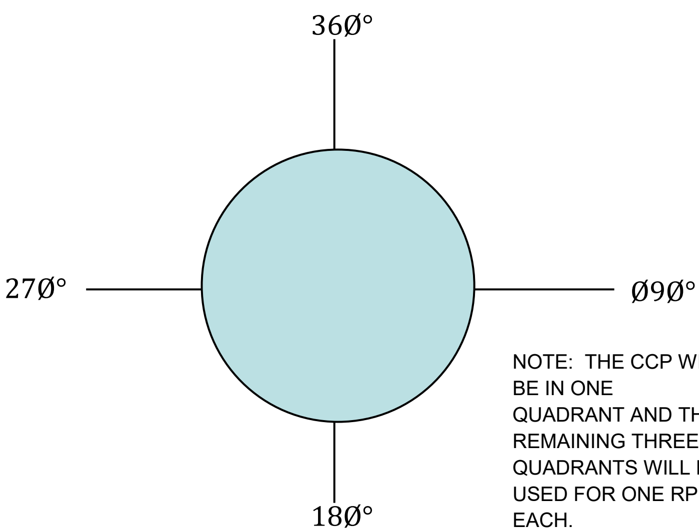
IV. MARK CONTROL CENTER CARDINAL DIRECTIONS:

- Locate the eight cardinal directions on GTA 7-4-5
- Make 1K tall tick marks in each of these directions around control center circle
- 360-045-090-135-180-225-270-315-- These are the eight cardinal directions
- These azimuths are marked on the map as a quick reference for the GTA
- Azimuths will be marked in 1K tall numbers, must have 3 digits
- Map will ALWAYS be oriented north



ALL ZEROS WILL BE CROSSED

V. DIVIDE CC INTO FOUR QUADRANTS



NOTE: THE CCP WILL BE IN ONE QUADRANT AND THE REMAINING THREE QUADRANTS WILL BE USED FOR ONE RP EACH.

VI. LOCATE COMMUNICATIONS CHECKPOINT (CCP)

- Communications Checkpoint
- Grid will be predetermined by the GUC and AVN CDR
- Must be a major terrain feature or man-made feature
- Easily identified from the air
- One way traffic only
- CCP will be located no more than 6-8 kilometers from the center of the op site to the center of CCP or 3-5 kilometers from the edge of control center to the center of the CCP.

VII. LOCATE RP'S

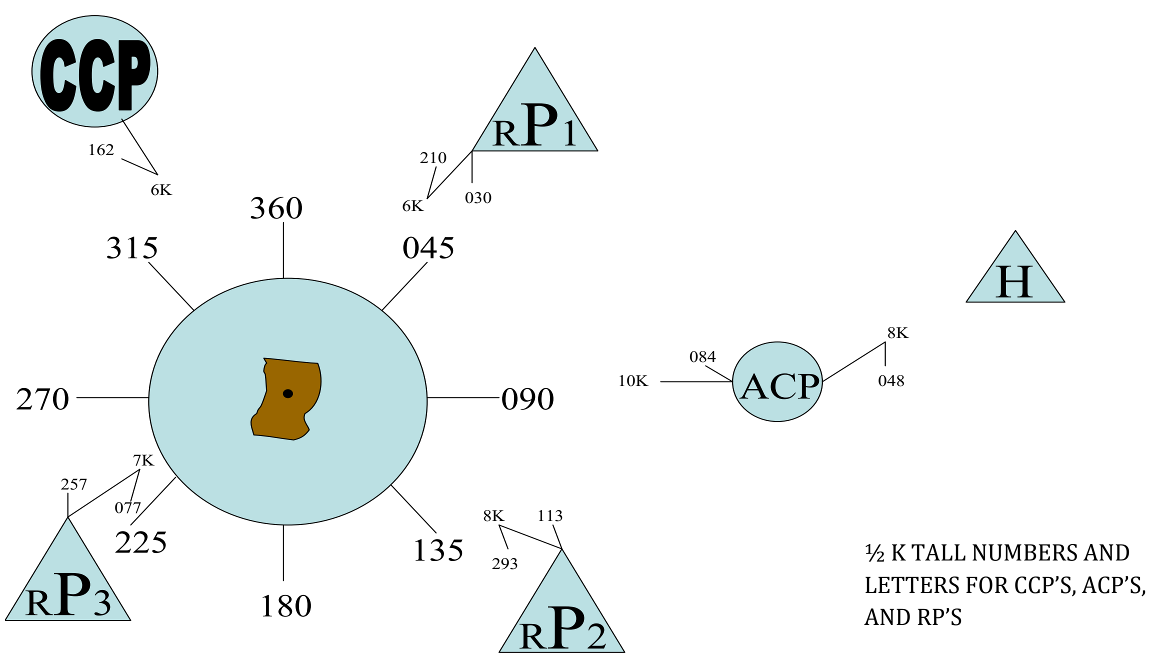
- Planned by the PFDR and presented to AVN CDR for approval
- Used for emergencies
- One per quadrant, to maintain spacing, not in "No Fly Area" or over impact areas
- Will not be in the same quadrant as the CCP
- Will not exceed 6 to 8 kilometers from the center of the CC to the center of the RP or 3 to 5 kilometers from the edge of the CC to the center of the RP.

VIII. LOCATE HOSPITAL

- Hospital will be marked on all maps
- Locate hospital and mark with grid dot
- Use triangle on GTA 7-4-5
- Place grid dot center mass and trace triangle. Mark it with an "H"
- Aircraft will usually not be coming from the hospital

IX. AERIAL CONTROL POINTS

- The ACP is a topographic feature that is easily identifiable from the air that can be used as a navigational aide. It is normally located at each point where the flight route changes direction. A flight route can contain as many ACP's as necessary to control the air movement.



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DO NOT PROCEED UNTIL DIRECTED BY AN INSTRUCTOR

Do not proceed to sections until covered by the formal block of instruction. You may review any previously covered sections throughout this handout for reference.

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HELICOPTER LANDING ZONES

REFERENCES:

FM 3-21.38 PATHFINDER OPERATIONS

FM 3-99 AIRBORNE AND AIR ASSAULT OPERATIONS (ATTP 3-18.12)

INSTRUCTIONAL INTENT: TO ENABLE THE PATHFINDER STUDENT TO PLAN FOR AND OPERATE DAY OR NIGHT AIR ASSAULT OPERATIONS. THE STUDENT WILL LEARN HOW TO PLAN, ORGANIZE, AND OPERATE A HLZ; COORDINATE WITH GROUND UNIT COMMANDERS AND THE DUTIES AND RESPONSIBILITIES OF THE DIFFERENT ELEMENTS INVOLVED IN THE OPERATION OF AN HLZ.

HELICOPTER LANDING ZONE OPERATIONS

Consideration Factors:

The factors that contribute to the process of HLZ site selection are grouped into two main categories:

Tactical Considerations: The considerations that pertain to the actual mission of the unit being moved. These considerations are the responsibility of the ground unit commander (GUC), and his staff and include the following:

The estimate of the situation using METT-TC (Mission, Enemy and friendly situations, Troops, Terrain and weather, Time available, and Civilians on the Battlefield).
Location of the objective from the tentative HLS.
Size of the element being moved.

Technical Considerations: The considerations that pertain to the technical aspect of selection and operation of a day or night HLS. These are the responsibility of the Pathfinder and are subdivided into the **seven selection factors**:

- **Size of HLP** (Helicopter Landing Point):
    - i. Size/ type of aircraft
    - ii. Pilot/unit proficiency,
    - iii. Whether the operation will take place during the day or at night
    - iv. Atmospheric conditions
- **Landing formations**
- **Surface conditions**
- **Obstacles**
- **Approach and departure routes**
- **Atmospheric conditions**
- **Type of load**

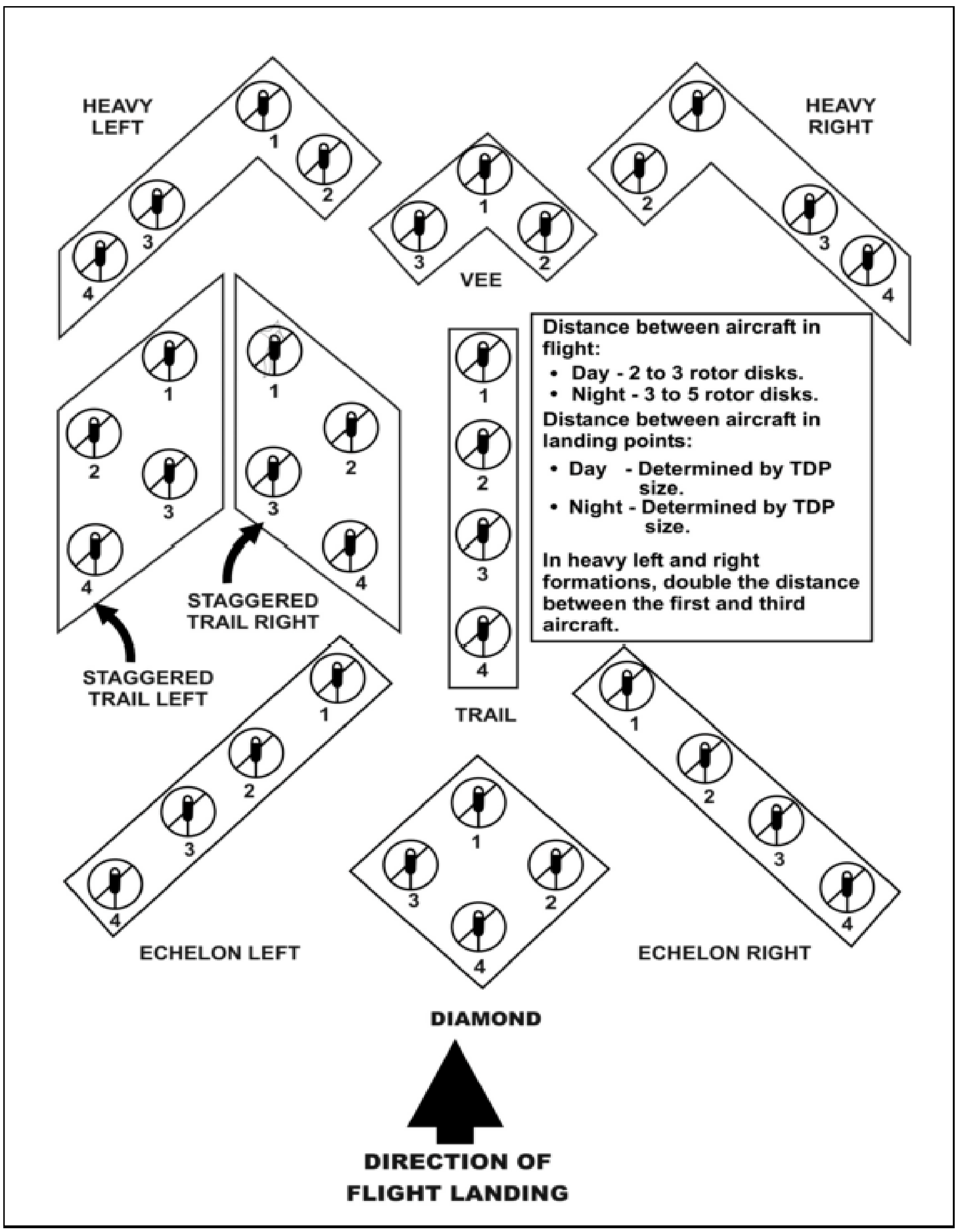
AIRCRAFT TOUCHDOWN POINT SIZES

	Type of AC:	Diameter of TDP
1	OH-6, OH-58, MH-6, AH-6, UH-72A	25 Meters
2	AH-1W/Z, UH-1Y/N	35 Meters
3	AH-64, UH-60A/L/M, SH-60	50 Meters
4	ALL CH A/C, to include MV/CV-22B	80 Meters
5	ALL Slingload A/C **(Daytime)**, A/C of unknown origin **(Any A/C not on this chart is considered to be of unknown origin for the purposes of this course)**	100 Meters
6	ALL Slingload A/C using long lines	125 Meters
7	ALL Slingload A/C **(Nighttime)**	150 Meters

LANDING FORMATION AND NUMBER OF AIRCRAFT

There are nine standard aircraft formations:

- **Trail**
- **Staggered trail left**
- **Staggered trail right**
- **Echelon left**
- **Echelon right**
- **Heavy left**
- **Heavy right**
- **Diamond**
- **Vee**



Surface Conditions at The Site

Firm enough to support the weight of the aircraft and free of loose sand, snow, or debris (brown-out or white-out conditions).

***NOTE**: Add Environmental considerations for Cold Weather, desert, and mountains.

Obstacles at or Near The Site

All obstacles will be removed, reduced or marked. A landing point will never contain an obstacle. (Obstacles are anything that are 18" high, wide or deep)

FOUR R's:

- **Remove**
- **Reduce**
- **Red (mark in red)**
- **Radio (advise pilot)**

***NOTE**: Ground slope can be considered an obstacle.

Always attempt to land the aircraft up-slope or side-slope. **NEVER** land an aircraft down-slope if at all possible!

GROUND SLOPE RESTRICTIONS

- All A/C can land where ground slope measures 7 degrees or less and no advisory is required.
- When the slope exceeds 7 degrees, OH & UH A/C that utilize skids for landing must terminate at a hover.
- When the slope measures between 7 and 15 degrees, large UH & CH A/C that utilize wheels for landing, are issued an advisory, and they will land upslope.
- If the slope exceeds 15 degrees, all A/C must terminate at a hover.

DETERMINING GROUND SLOPE

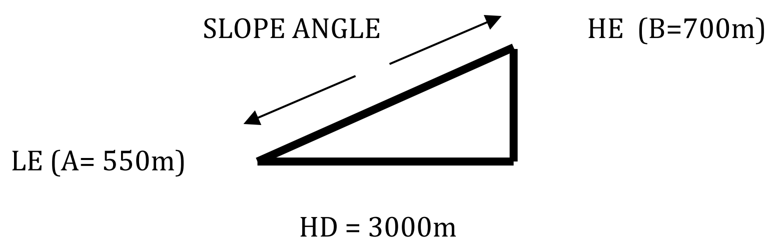
Ground slope is expressed in **degrees.** The approximate slope angle may be calculated by multiplying the gradient by **57.3** this method is reasonably accurate for slope angles **under 20 degrees**.

SLOPE FORMULA:

$$\frac{\boldsymbol{Difference\ in\ elevation}}{\boldsymbol{Horizontal\ distance}}\ \boldsymbol{x\ 57.3}$$

*__NOTE__: When calculating the gradient, ensure that you use the same units of measurement (ie. convert both to feet or to meters).

- To convert feet to meters, divide by 3.28
- To convert meters to feet, multiply by 3.28



VD = B - A
VD=700-550= 150m
HD= 3000m
DEGREE OF SLOPE = (150/3000) x 57.3
8595/3000 = 2.865 rounded up to next whole = 3 degrees

APPROACH AND DEPARTURE ROUTES

Land Heading

- Ideally, approaches and departures are made along the **long axis** of the HLS over the lowest obstacle, and into the wind.

Obstacle Buffer

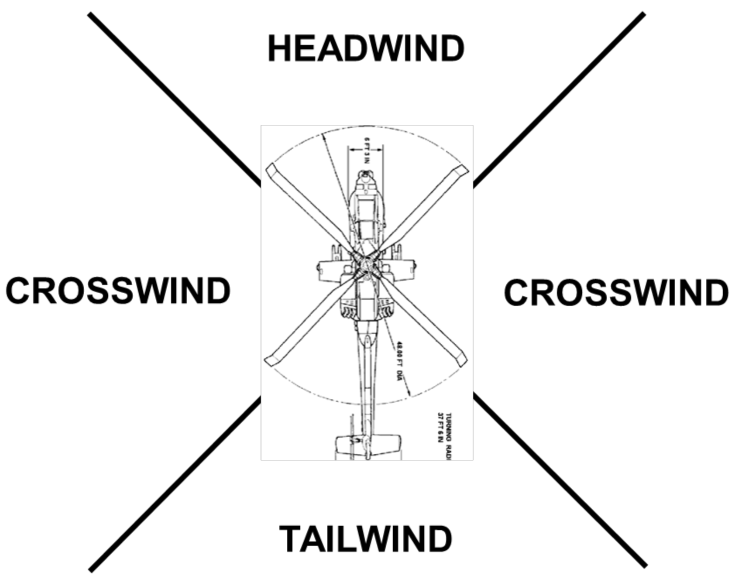
- A 100 meter buffer or a 10:1 Obstacle Ratio (whichever is greater) will be given on approach and departure ends of the Helicopter landing site.
- A 10 meter buffer will be given to both sides of the site.

***NOTE:** When given the authority, by the GUC, Pathfinders may reduce the obstacle ratio to no less than 5:1 or 50 meters.

Prevailing Winds

- **ALWAYS ATTEMPT TO LAND A/C FACING INTO THE WIND.** Wind direction of 45 degrees left or right of land heading IS considered a head wind.

***NOTE**: Depending on the A/C capabilities, the A/C can land if the crosswind speed is between 0-9 knots and the tailwind speed is between 0-5 knots. When the speeds exceed 9 knots, the pilot must land into the wind.



Departure Heading

- The departure heading can vary up to 45 degrees to either side of land heading.

ATMOSPHERIC CONDITIONS

Density altitude affects the aircraft allowable cargo load (ACL) for any given situation. It is comprised of three factors:

- **Humidity**
  Humidity, also called "relative humidity," refers to the amount of water vapor contained in the atmosphere, and is expressed as a percentage of the maximum amount of water vapor the air can hold. This amount varies with temperature; warm air can hold more water vapor, while colder air can hold less. While there are no rules-of-thumb or charts used to compute the effects of humidity on density altitude, hovering and takeoff performance will decrease in high humidity conditions.

- **Altitude**
  As altitude increases, the air becomes thinner or less dense. This is because the atmospheric pressure acting on a given volume of air is less, allowing the air molecules to move further apart. Dense air contains more air molecules spaced closely together, while thin air contains less air molecules because they are spaced further apart. As altitude increases, density altitude increases.

- **Temperature**
  Temperature changes have a large affect on density altitude. As warm air expands, the air molecules move further apart, creating less dense air. Since cool air contracts, the air molecules move closer together, creating denser air. High temperatures cause even low elevations to have high density altitudes.

As any of these factors increase, the performance capability of the aircraft decreases and the ACL is greatly reduced.

TYPE OF LOAD

Four Types of Load:

- Equipment
- Personnel
- Internal
- External

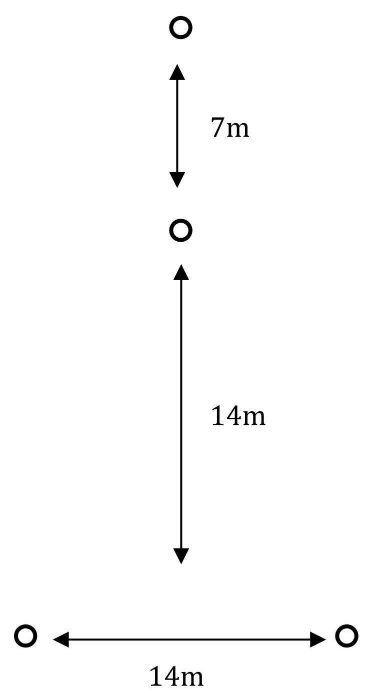
*__NOTE__: There can be many types of loads or combinations of loads. Ex. External Personnel (SPIE Rig) & Internal Equipment (sensitive equipment)

MARKING THE HLS FOR NIGHT OPERATIONS

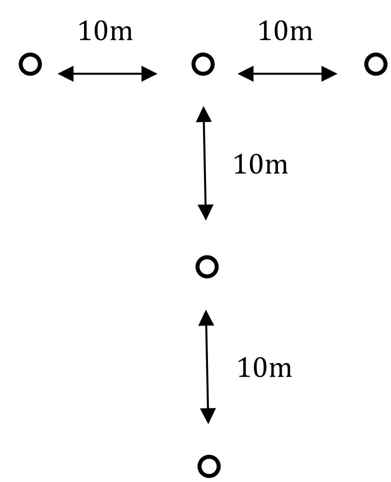
Placement of the inverted "Y" or NATO "T" at the #1 TDP.

- Inverted "Y" for cargo aircraft will have 5 lights.
- The location of the fifth light will be determined through prior coordination with the supporting aviation unit.
- NATO landing "T" will be utilized if aircraft are approaching the site from 500 feet AGL or above or it is coordinated for.
- When using a Nato “T” you must add 20 meters to the useable length of the site.

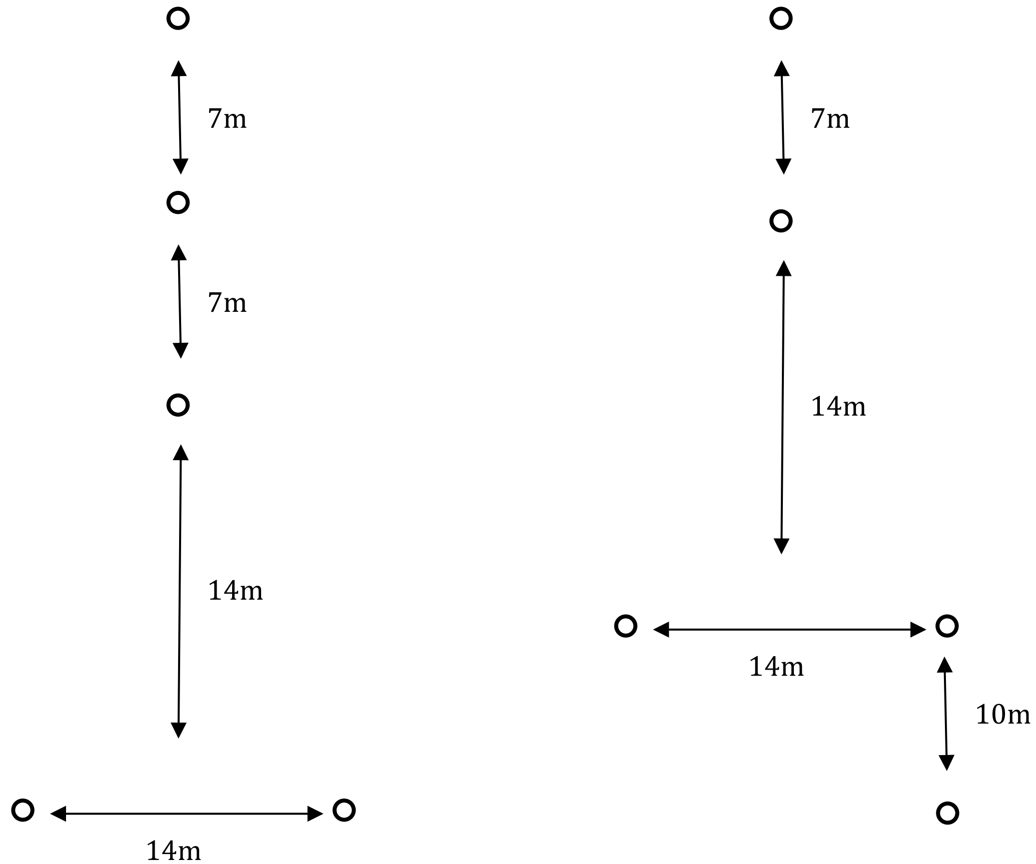
INVERTED "Y"



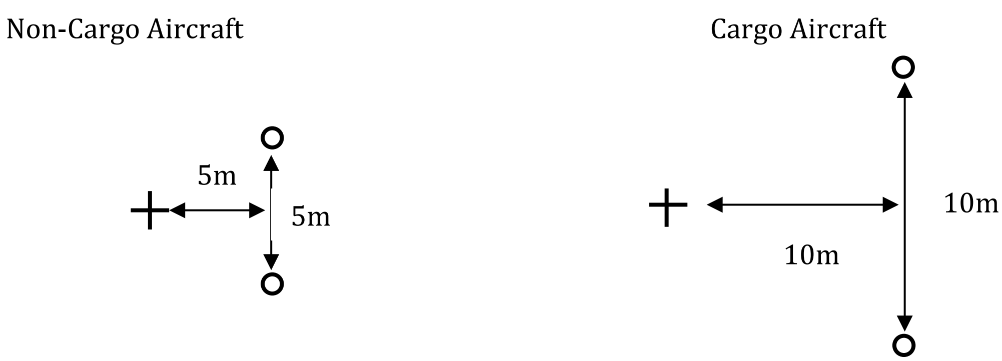
NATO "T"



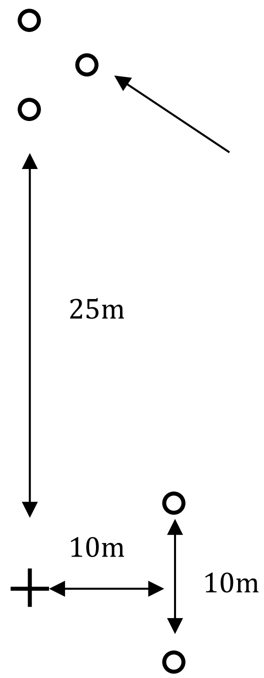
INVERTED "Y” with 5th light on top and bottom right (For Cargo AC or when coordinated for)



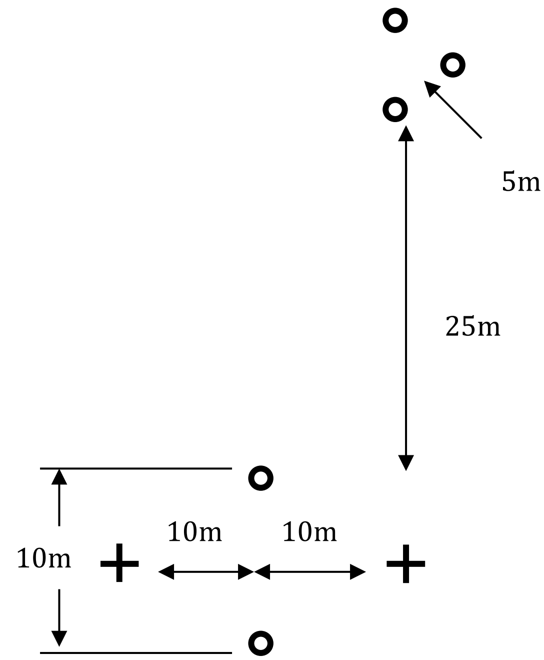
TDP landing lights emplaced (10 meter separation for cargo aircraft, 5 meter separation for non-cargo aircraft).



SLP landing lights and load reference lights (if needed, placed in relation to the load)



(When SL aircraft is not landing)



(When SL aircraft is to land)

Obstacle lights emplaced will be a steady red. At night, red lights will look like white light when wearing NVG's. Also, aircrew members wear NVGs with filtered lenses. These filters do not allow the aircrews to see blue or green chem-lights. Colors such as yellow, orange, red, and infrared can be seen by pilots wearing ANVIS.

For security, pathfinders and the ground unit turn off, cover, or turn all lights upside down until the last practical moment before a helicopter arrives. Then they orient the lights in the direction from which the lead helicopter is approaching, and a signalman directs its landing.

MARKING HLS FOR DAYTIME OPERATIONS:

A ground guide will mark the PZ or LZ for the lead aircraft by use of a signalman, by holding a rifle over his head, by displaying a folded VS-17, or by other identifiable means.

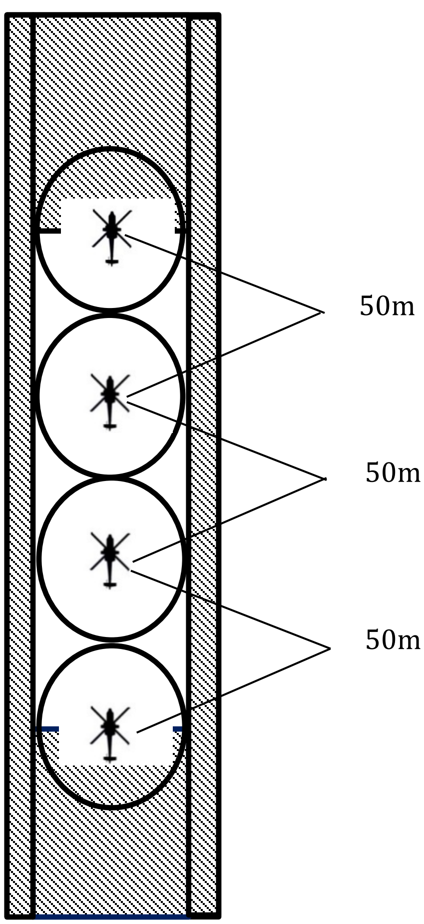
LENGTH AND WIDTH CALCULATIONS:

To calculate the length and width for an HLS that has a trail formation:

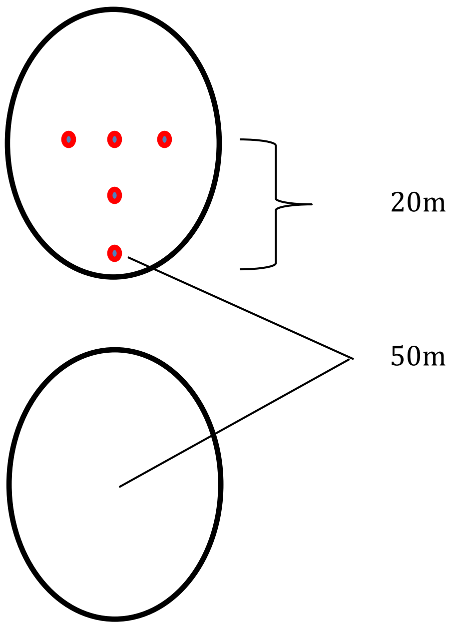
The useable length can be calculated by taking the total number of A/C in your formation that is landing at your site, subtract one, and multiply that number by the diameter of the TDP. In the example below: 4 x AH-64 are landing at your site, subtract one: 3 x 50 = 150m of useable length.

The useable width is simply the width of the TDP. In the example below: your site has 50m of useable width.

Explanation of subtracting a TDP: You subtract a full TDP on trail formations because half of the first aircraft (A/C) and half of the last A/C are in the departure and approach buffer respectively, and will not need to be accounted for in the useable area.

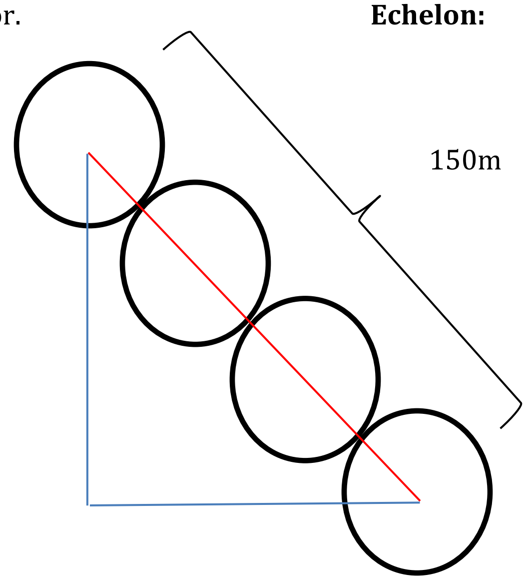


If there is a NATO T, you will add 20m to your useable length (it stays calculated for the total length because total length is the useable length plus the buffers).



For **all other formations** you will need to use the SINE function, or the “SIN” button on your calculator.

Echelon:



In the case of the above echelon right formation there are two methods to solve for length and width.

Method one:

SIN 45 (50) = 35.35 x 3 (The number of A/C, minus one)= 106.06 (round down; when you use the SIN funftion, all rounding is proper) 106m

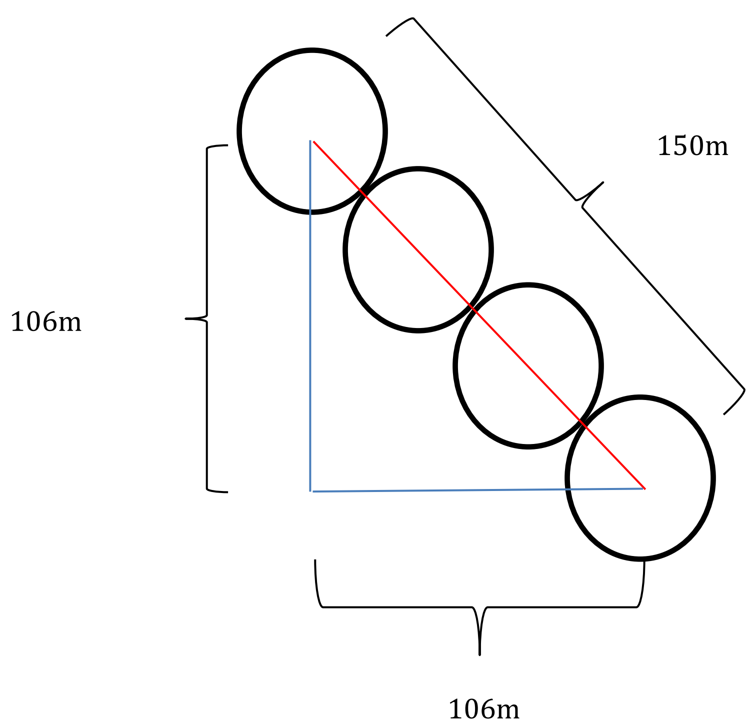
NOTE: When using method one, you must round at the END of the equation, do NOT round until you have multiplied by 3 (or the number of A/C in your formation minus 1).

Method two:

SIN 45 (150) = 106.06 (round down; when you use the SIN funftion, all rounding is proper) 106m

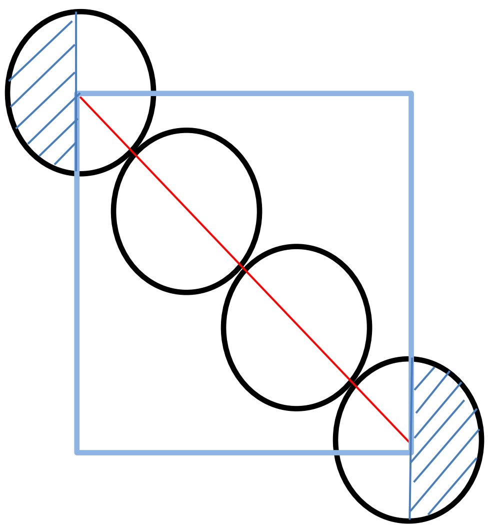
The 150 comes from taking the number of A/C, subtracting one, and multiplying that number by your TDP diameter. (4 (A/C) – 1 = 3 x 50 (size 3 TDP)

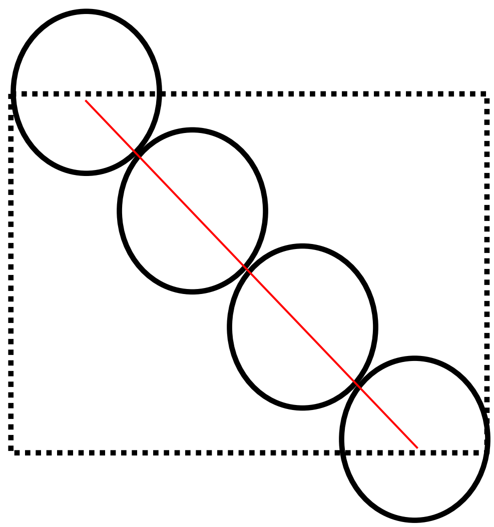
106m is the **useable length.**



The **useable width** is determined by taking the width of the formation at its widest point (in this echelon right, 4 A/C and adding the width of a TDP; 50m in this case. The useable width of your site is 156m. For any formation that is as wide as it is long, you will be able to take the useable length (before adding anything for a NATO T if that is required) and add a TDP size to it.

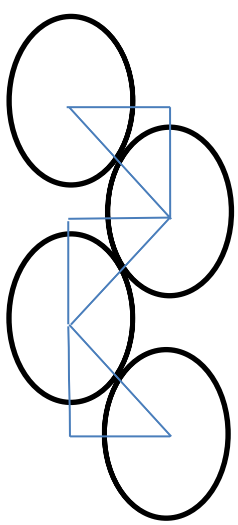
Width depiction:





You will **ALWAYS** have to add an entire TDP size to the width when using the **SIN** function on your calculator. If you don't it will leave half of the TDP on each side in the side buffer, and you can not have any of the TDP's cleared area in the side buffer. The image on the left depicts what will happen if you do not add the TDP size to the width, the image on the right is when you add the width.

Staggered Trail:



To determine the **useable length** for the staggered trail right (depicted above) and left, there are two methods:

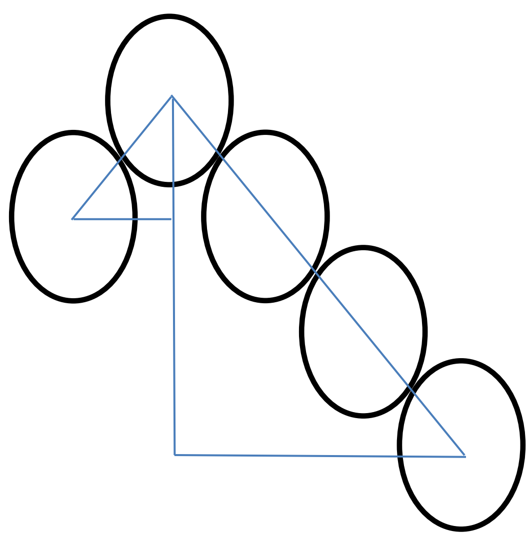
Method one: (Assuming the above TDPs are size 3 TDPs (50m)) SIN 45 (50) = 35.35 x 3 (the number of A/C minus one) = 106.06 (round down; when you use the SIN funftion, all rounding is proper)= 106m of **USEABLE LENGTH.**

Method two: SIN 45 (150) = 106.06 = 106m (The 150m comes from taking the number of A/C (4) and subtracting one = 3. The multiply 3 x 50 (TDP size)= 150m, that is the number you use in the SIN 45 formula.

Explanation of subtracting a TDP: You subtract a full TDP on all formations because half of the first aircraft (A/C) and half of the last A/C are in the departure and approach buffer respectively, and will not need to be accounted for in the useable area.

For determining **useable width**, determine how many A/C wide the formation is and subtract one; so in the example it will be 1 TDP and use that for SIN 45 (50)= 35.35 (Round up to 35). 35 + 50 = 85m. Your site is 85m wide in the above example.

Heavy:



Useable length can be determined by using one of two methods. We will calculate using a size 3 TDP (50m) for the example.

Method one: SIN 45 (50) = 35.35 x 3 (number of A/C, minus 1) = 106.06 (round down) = 106m Long

Method two: Taking the longest side (4 A/C) and subtracting one (3); multiply 3 x 50 (TDP size) = 150. SIN 45 (150)= 106.06 (round down)= 106m Long

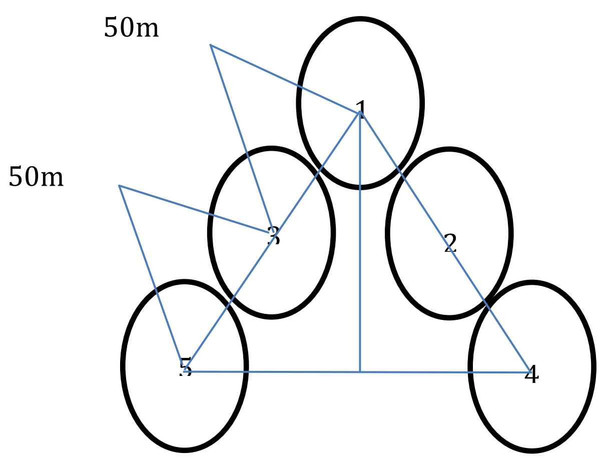
Useable width: Unlike the previous calculations, this formation is wider than it is long, so it's width will be determined independendtly from the length by using one of two methods:

Method one: SIN 45 (50) = 35.35 x 4 (number of TDP's across the formation is) = 141.42 (round down) = 141+ 50m (TDP size)= **191m**

Method two: SIN 45 (200) = 141.42 = 141 + 50m (TDP) = **191m**. The 200 comes from multiplying the TDP diameter by one less TDP than you have at the widest point, in this case 50 x 4 = 200.

The useable width of your site is **191 meters wide**.

Vee:



Useable length: To determine the useable length for a vee formation you can use two different methods. (For the purposes of the above example we will be utilizing a size 3 50m TDP)

Method one: SIN 45 (50) = 35.35 x 2 (the number of TDP's on the longest side minus one) = 70.71 (round up; when using the SIN button you always properly round)= 71m of useable length

Method two: SIN 45 (100) = 70.71 (round up) 71m of useable length

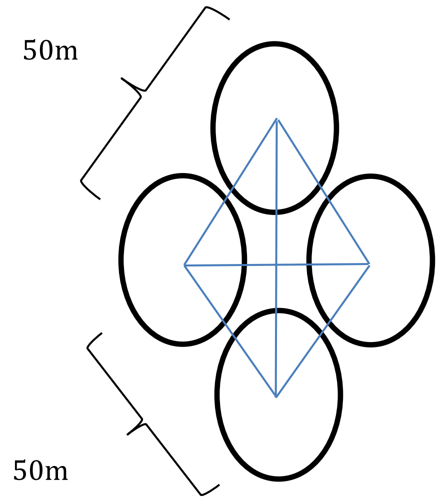
Useable width: There are also two methods for determining the width.

Method one: SIN 45 (50) = 35.35 x 4 (number of TDP's across the formation is) = 141.42 (round down) = 141+ 50m (TDP size)= **191m**

Method two: SIN 45 (200) = 141.42 = 141 + 50m (TDP) = **191m**. The 200 comes from multiplying the TDP diameter by one less TDP than you have at the widest point, in this case 50 x 4 = 200.

The useable width of your site is **191 meters wide**.

Diamond:



Useable length: To determine the useable length for a diamond formation you can use two different methods. (For the purposes of the above example we will be utilizing a size 3 50m TDP)

Method one: SIN 45 (50) = 35.35 x 2 (the number of TDP's on the longest side minus one) = 70.71 (round up; when using the SIN button you always properly round)= 71m of useable length

Method two: SIN 45 (100) = 70.71 (round up) 71m of useable length

Useable width: There are also two methods for determining the width.

Method one: SIN 45 (50) = 35.35 x 2 (the number of TDP's at the widest point minus one) = 70.71 (round up; when using the SIN button you always properly round)= 71m + 50m (TDP size) = **121m of useable width**

Method two: SIN 45 (100) = 70.71 (round up) 71m + 50m (TDP size) = **121m of useable width**

ESTABLISHMENT OF THE HLS:

Determine the land heading:

Prioritize as follows:

- Long axis of the site.
- Wind direction and speed
- Slope at the site

Place GTA/Consider the following:

- Good 360 degree observation of the site
- Not placed inside a cleared area
- Opposite the CCP

*__NOTE__: The site can now accept one aircraft "at a hover."

Determine the obstacle ratio at the approach and departure ends of the site and establish the location of the #1 TDP.

- Call the marking party forward. Place the INR using the same considerations as with the GTA. Ensure that the INR can cover any of the GTA's dead space. Make sure that a distance of not less than 25 meters separates all operating radios.

Establish/Mark the site:

- ATL supervises designation and marking of the TDP's in order, first to last.
- Other members of the marking party begin clearing the TDP's.
- The GTA and INR update the ATC block of their maps as each point is cleared.

SL point team leader selects the tentative location of the sling load point using the following criteria:

- SL point will be located no less than 100 meters from the nearest active TDP in the formation for unlike or unknown aircraft types.
- SL point can be located no less than 80 meters from the nearest active TDP in the formation if all the aircraft are alike. ("Like A/C" means same size TDP.)
- Diameter of the SL point is determined by four factors; Size of the aircraft, Day or night operation, Pilot/unit proficiency, and Atmospheric conditions.

All TDP's are cleared.

10 minutes prior to mission time the following will be accomplished:

- All radios set to the primary frequency.
- All personnel in the proper uniform and in position to perform their respective duties. All signalmen in their proper location ready to guide aircraft.
- ATC blocks of the GTA's and INR's maps are complete, accurate and alike. All signaling devices are out and ready for use.

Site is operational for daytime operations.

Air Loading And Safety

Prepare troops and their equipment for airlift:

- Brief loading procedures
- In-flight procedures
- Ensure all personnel have appropriate gear

Methods used to approach Army aircraft:

- Occupy and secure the PZ position and ready personnel and equipment for loading.
- Move towards the aircraft only after it has landed.
- Approach the aircraft at a crouch. Be aware of items such as antennas.
- If the aircraft has landed on a slope, approach it from the down slope side.
- Approach the following types of aircraft as indicated:
  - **UH-1 helicopter**: Approach from 45 degrees off the front of the aircraft.
  - **UH-60 helicopter**: Approach directly from the sides. Use this same approach for OH- 58, OH-6 and cargo helicopters when using the forward troop doors.
  - **For cargo helicopters (CH-47, CH-46, and MV-22B) when using the rear ramp**: Approach from 45 degrees off the rear of the aircraft.
  - **CH-53 helicopter:** Approach only from the right rear in order to avoid the tail rotor.

*__NOTE__: **NEVER** approach utility or light observation helicopters (Other than the UH-72A) from the rear due to the tail rotor hazard. The UH-72A is a right side as well as a tail loading Medevac A/C.

Loading the aircraft and actions while in flight:

- Load in reverse order; first in, last out.
- Secure all loose items and check all cargo lashings.
- **DO NOT** place equipment under troop seats. The seats are designed to collapse in the event of a crash, absorbing some of the energy of the impact.
- All seat belts will be fastened and remain fastened during the flight.
- All troops will remain seated during the flight.
- No smoking is allowed aboard aircraft.
- Individual weapons will not be fired from an aircraft at any time.
- Individual weapons will be oriented as indicated:
  - Muzzle up on board UH-1(N/Y) helicopter.

- Muzzle down on board UH-60, OH-58 and CH-47 helicopters.

Aircraft off-loading procedures:

- Do not off-load prior to being instructed to do so by the aircrew.
- Do not move toward the rear of observation or utility type helicopters due to the tail rotor hazard.
- For aircraft on a side slope, exit on the down slope side.
- Take 2 to 3 steps and assume a prone position, facing away from the aircraft, until the aircraft departs.

Emergency exits:

A/C Type	Emergency Exits
UH-1	(**4**) Total: 2 Pilot doors, 2 troop doors
UH-60	(**6**) Total: 2 cockpit doors, 2 troop cargo door windows, 2 gunner windows
CH-47	(**11**) Total: 3 Primary(RAMP/DOORS), 8 Secondary(WINDOWS)
MV-22B	(**6**)total: 1 Crew door,1 Ramp, 2 pilot windows and 2 blow out windows
OH-58	(**2**) Both Crew doors

Desert And Winter Operations

The three preferred landing formations are:

- Echelon Right
- Echelon Left
- Trail

*__NOTE:__ These formations will limit the amount of sand /snow sucked into the engines of the A/C

Run in Landings:

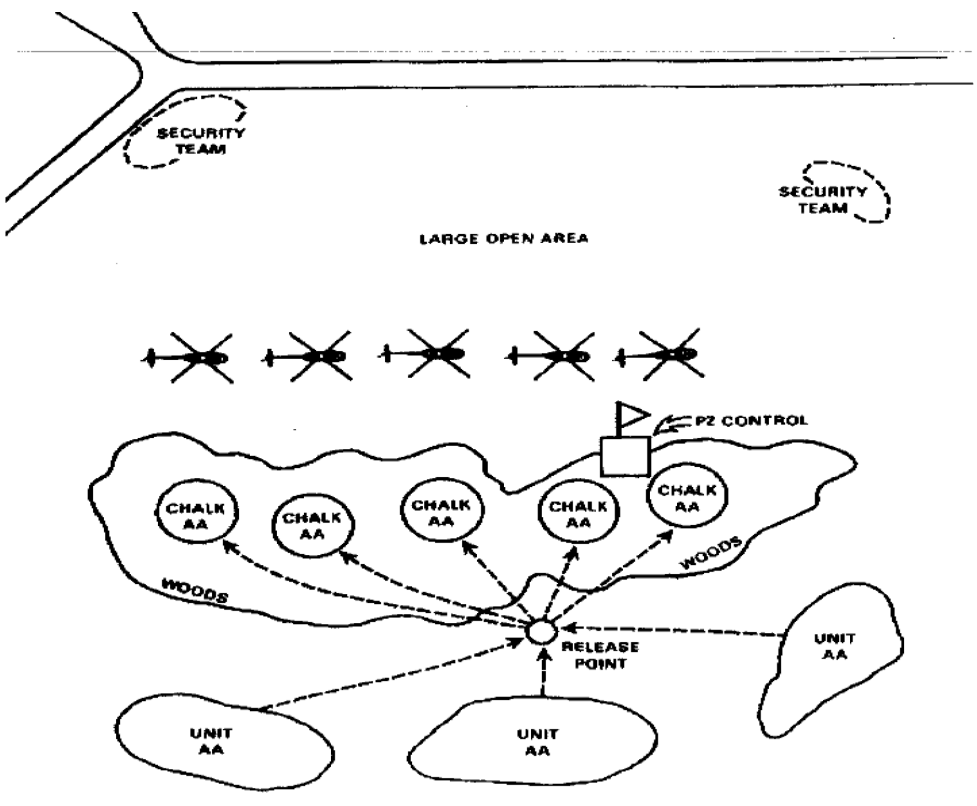
A run in type landing is when the A/C touches down and continues to roll forward to a stop so that the Brown out/ White out conditions are limited. When doing this the A/C typically will only do it in an Echelon formation.

Pick-up Zone

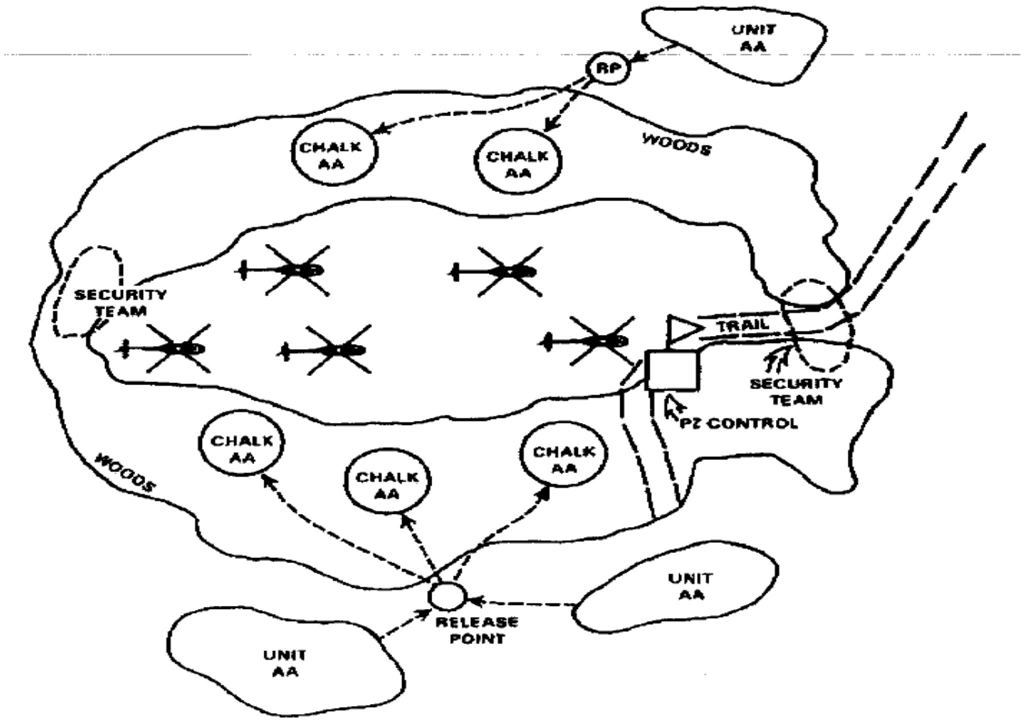
Movement to and occupation of chalk assembly area:

Linkup guides from the PZ control party will meet with designated units in the unit assembly area and coordinate movement of chalks to a release point. As chalks arrive at the release point, chalk guides will move each chalk to its assigned chalk assembly area. If part of a larger air assault, no more than three chalks should be located in the chalk assembly area at one time. Noise and light discipline will be maintained throughout the entire movement in order to maintain the security of the PZ. Additionally, no personnel should be allowed on the PZ unless loading aircraft, rigging for sling load, or directed by PZ control.

EXAMPLE OF A ONE-SIDED PZ:



EXAMPLE OF A TWO-SIDED PZ:



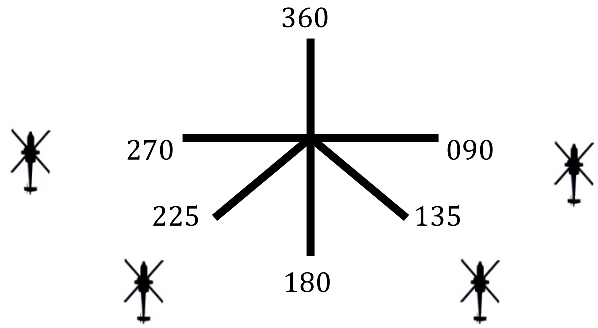
FORMATION MATRIX

Distance from SP

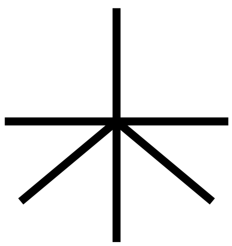
	FORMATION TYPE	TDP SIZE	# A/C 1	2	3	4	5
			L/W (in meters)				
	TRAIL R&L	1	25	25/25	50/25	75/25	100/25
		2	35	35/35	70/35	105/35	140/35
		3	50	50/50	100/50	150/50	200/50
		4	80	80/80	160/80	240/80	320/80
		5	100	100/100	200/100	300/100	400/100
½ TDP sizes	ST R&L	1	25	18/43	35/43	53/43	71/43
		2	35	25/60	49/60	74/60	99/60
		3	50	35/85	71/85	106/85	141/85
		4	80	57/137	113/137	170/137	226/137
		5	100	71/171	141/171	212/171	283/171
	E R&L	1	25	18/43	35/60	53/78	71/96
		2	35	25/60	49/84	74/109	99/134
		3	50	35/85	71/121	106/56	141/191
		4	80	57/137	113/193	170/250	226/306
		5	100	71/171	141/241	212/312	283/383
	HVY R&L	1	25	18/43	35/78	53/96	71/113
		2	35	25/60	49/109	74/134	99/159
		3	50	35/85	71/156	106/191	141/227
		4	80	57/137	113/250	170/306	226/363
		5	100	71/171	141/312	212/383	283/454
	DIAMOND	1	25	18/43	18/60	35/60	
1 ½ TDP sizes		2	35	25/60	25/84	49/84	
		3	50	35/85	35/121	71/121	
		4	80	57/137	57/193	113/193	
		5	100	71/171	71/241	141/241	
	VEE	1	25	18/43	18/60	35/78	35/96
		2	35	25/60	25/84	49/109	49/134
		3	50	35/85	35/134	71/156	71/191
		4	80	57/137	57/193	113/250	113/306
		5	100	71/171	71/241	141/312	141/383

CROWS FOOT EXERCISES

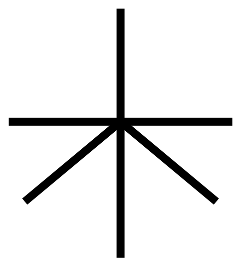
Land Heading- 360°



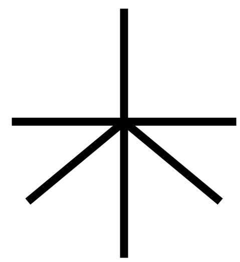
Land Heading- 021°



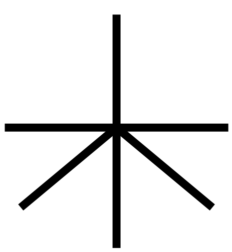
Land Heading-172°



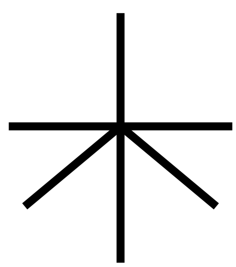
Land Heading-297°



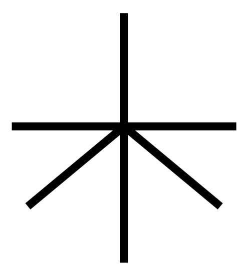
Land Heading- 324°



Land Heading-125°



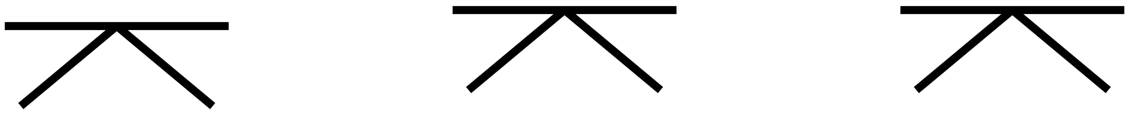
Land Heading-053°



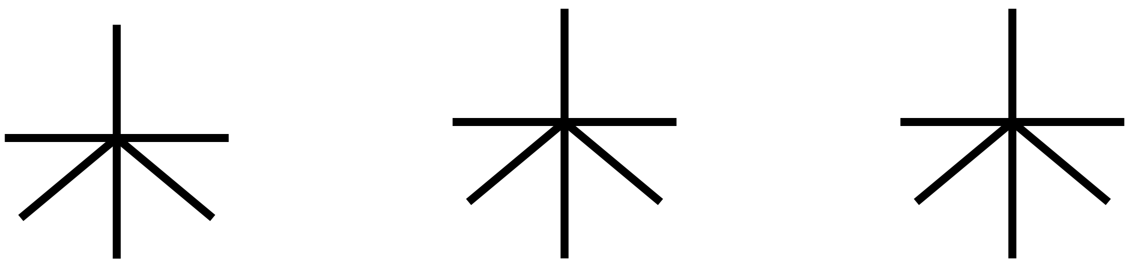
Land Heading- 268°

Land Heading- 112°

Land Heading-356°



Land Heading- 009° Land Heading- 217° Land Heading-047°



SLOPE HOMEWORK

INSTRUCTIONS:

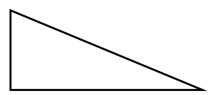
1. Determine the degrees of slope in each problem.
2. Determine which type of aircraft can land (observation, small utility, large utility, cargo).
   - If all aircraft can land, answer ALL.
   - If no aircraft can land, answer NONE.
3. Determine what advisories must be given and to which aircraft prior to landing, if any. Ex: “BE ADVISED….. All observation and small utility aircraft must terminate at a hover.”

Show your work

1. HE= 112’

   LE= 58’

   HD= 200 meters



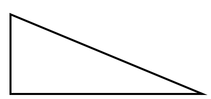
ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

2. HE= 45’

   LE= Sea Level

   HD= 200 feet

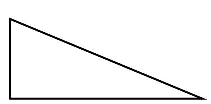


ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

3. HE= 462’

   LE= 425’

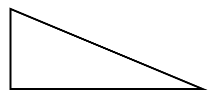


HD= 240 meters

ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

4. HE= 201’



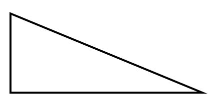
LE= 60’

HD= 500 feet

ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

5. HE= 720’



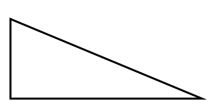
LE= 650’

HD= 100 meters

ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

6. HE= 312’



LE= 50M

HD= 1200M

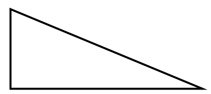
ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

7. HE= 360M

   LE= 220M

   HD= 4200’



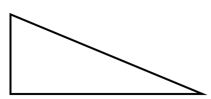
ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

8. HE= 670’

   LE= 240’

   HD= 1110M



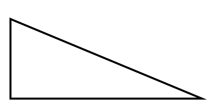
ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

9. HE= 110M

   LE= 37M

   HD= 400M



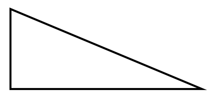
ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

10. HE= 390’

    LE= 233’

    HD= 4200’



ANSWER: TYPE OF AIRCRAFT:

ADVISORIES:

SLOPE HOMEWORK ANSWERS

1.	A) 5 degrees	B) All	C) No advisories
2.	A) 13 degrees	B) All CH, UH w/wheels	C) Skid aircraft must term. at hover
3.	A) 3 degrees	B) All	C) No advisories
4.	A) 17 degrees	B) None	C) Terminate at a hover
5.	A) 13 degrees	B) All CH, UH w/wheels	C) Skid aircraft must term. at hover
6.	A) 3 degrees	B) All	C) No advisories
7.	A) 7 degrees	B) All	C) No advisories
8.	A) 7 degrees	B) All	C) No advisories
9.	A) 11 degrees	B) All CH, UH w/wheels	C) Skid aircraft must term. at hover
10.	A) 3 degrees	B) All	C) No advisories

HLZ Practice Work

1. How much length do you have to add to your minimum amount of usable area needed when using the "Inverted Y" using the fifth light on the bottom right, to mark the #1 Touchdown Point?

2. What is the slope of your site if the High Elevation is 400 meters, the Low Elevation is 200 meters, and the Horizontal Distance is 1100 meters?

3. If you have 5ea. UH-1Ns landing on your HLZ in a Trail Formation and their land heading is 035 degrees; what is the distance and direction from the #1 TDP to the #4 TDP if the #1 TDP is marked with an "Inverted Y"?

4. If you have 3ea. UH-60Ms landing on your HLZ and there is a UH-60L with a sling load and landing; what is the minimum distance your sling load TDP must be from the last active TDP in the formation?

5. What is the slope of your site if your High Elevation is 1200 feet, the Low Elevation is 600 feet, and the Horizontal distance is 1000 meters?

6. You have 7ea. UH-60Ls attached to your element to execute the transportation of your 209 man element to LZ Moose Drool! However, LZ Moose Drool can only accept 3ea. of your A/C. How many Lifts, Serials, and Chalks will it take to execute the mission if each A/C can only hold 9 personnel?

7. What is the lowest level with sufficient personnel to execute an Air Assault Operation?

8. Who devises the bump plan for a battalion mission?

9. What are the only three landing formations used during desert and winter operations?

10. What are the formations used when conducting run in landings?

11. You have a CH-47F carrying a sling load into your site at 2100 hours and he will be landing on the right side of your site with a land heading of 030 degrees. What is the distance and direction you will pace off from the sling load start point to the A/C touch-down point?

12. There are 5 ea. UH-1Ys about to land onto your site in a Trail formation, with a land heading of 080 degrees. What is the distance and direction from the #2 TDP to the #5 TDP if the # 1 TDP is marked with a "Nato T?"

13. At 0800 you have 7ea. UH-72As landing in and Echelon Left formation on your site with 3ea. CH-53Es carrying sling loads and landing, with a land heading of 045 degrees and the #1 TDP is marked with an "Inverted Y". How lights will you need to mark your site?

14. If you have 8 meter tall trees on the approach end of your site, you have 33 feet tall trees on the departure end, and the total length of your site is 874 meters in length. How much of your site is usable?

15. Your site has 13 meter tall trees on the approach end, 45 feet tall trees and you are landing 4ea. AH-1Ws. What is the total length of your site?

16. When determining your land heading; what are the three things you must consider?

17. How many consideration factors are there and what are they?

18. How far away at a minimum must the GTA and the INR be apart on the HLZ?

19. 6 ea. AH-1Ws are landing on your site in an Echelon Right formation with a land heading of 065 degrees. What is the maximum left and right departure heading for your formation?

20. You have 5ea. OH-58Ds coming into your HLZ landing in a Trail formation at 2100 hours. There are also 3ea. CH-47Fs sling loading in your medical supplies and will not be landing. The #1 TDP is marked with a "NATO T". How many lights do you require to mark your site?

21. Which one of the following is not a Tactical Consideration?
    The enemy and friendly situation
    The location of the objective from the HLS
    Size of the element being moved
    Size of the HLZ

22. What color chem-lights will you never use to mark a helicopter touchdown point?

23. Who is responsible for the control of logistical PZs?

24. There is no existing unit below__________level that are capable of unilaterally conducting effective Air Assault Operations?

25. Tentative flight routes are developed to do what?

26. Where is the authority obtained to establish a flight corridor?

27. If it is necessary to restrict the operational area to the A/C directly involved in the operation; it is done thru who and at what level?

28. What plan is most important when mixing internal and external loads?

29. How many copies of the Loading Plan are distributed?

30. Who coordinates with the Pathfinders to make an Air Movement Table?

31. **True or False:** Each serial would use a different flight route?

32. The time to load is dependent on three key factors: What are they?

33. Whose primary duty is it to assist in the link up and movement of chalks from the unit AA to the chalk AA?

34. The planned use of attack helicopters, to include security and link-up locations should be included in what plan?

HLZ ANSWER KEY

1. 0 meters
2. 11 degrees
3. Distance: 105 meters Direction: 215 degrees
4. 80 meters
5. 11 degrees
6. 4 Lifts, 10 Serials, 24 Chalks
7. Company Level
8. Company XO, and 1SG
9. Echelon Left, Echelon Right, Trail
10. Echelon Left, Echelon Right
11. Distance: 95 meters Direction: 300 degrees
12. Distance: 105 meters Direction: 260 degrees
13. 0 Lights
14. 673 meters
15. 373 meters
16. Long axis of the site, Wind direction and speed, Slope of the site
17. 2: Tactical and Technical
18. 25 meters
19. Left: 020 degrees Right: 110 degrees
20. 28 Lights
21. Size of HLZ
22. Blue, Green, and Red
23. S-4
24. Division
25. Control, Protect, and Sequence A/C movement
26. Brigade/Division Commanders
27. AME at Corps Level
28. Loading Plan
29. 4
30. Aviation Liaison Officers and Ground Unit Commanders
31. True
32. Prior Training, Equipment being moved, Light conditions
33. Chalk Link-Up Guide
34. Air Movement Plan

HLZ Length/Width Homework

For each of the following scenarios, answer the questions:
A. What is your total length and width?
B. What is your usable length and width?

1. You are setting up a night time HLS that can support 5x UH-1Y landing in a Trail formation. Trees on the approach end are 20m tall and 67ft on the departure end. They are approaching from 2,000ft AGL.

2. You are setting up a resupply HLS for your unit in Afghanistan. You have 2x UH-60Ms and 1x CH-47F that will be landing in Trail. You have orchards on the approach end that are 3m tall, and buildings on the departure end that are 7m tall. You are authorized to reduce the obstacle ratio.

3. You are setting up a FAARP that can accept up to four UH-60s at any time in an Echelon Left formation. Trees are 22ft on the approach and 26ft on the departure.

4. You are supporting the Marine Corps and need to establish a night time HLS that can accept 3x CH-53Es approaching from 1,500ft AGL and landing in an Echelon Left formation. You have brush that is 1m tall on the approach and trees on the departure that are 20ft tall.

5. You must establish a night time HLS for two CH-47Ds flying Echelon Right, during the AMB they have coordinated for the 5th light to be on the bottom right. Trees at the site are 16m on the approach and 47ft on the departure.

6. You must establish a FAARP for 4x OH-58Ds flying in a Heavy Left formation. Trees on your site are 12m on the approach and 42ft on the departure.

7. You are supporting the Navy who will be operating in your BDE AO and need to establish a night time HLS for 4x Mi-17s flying in a Heavy Right formation. You have small clusters of trees that are 5m tall on the approach and a steep mountain slope on the departure. You have been given the authorization to reduce the obstacle ratio to 5:1.

8. You are establishing a FAARP to support your unit's training, your site must be able to accommodate four AH-64s landing HR. You have fuel blivets on the approach that are 5ft tall and there are trees on the departure that are 20m tall.

9. You must establish a PZ that can accommodate 2x CV-22Bs landing EL. Trees at your site are 5m tall on the approach and 11 m tall on the departure.

10. You must establish an HLS no later than 0500 that can accommodate two SH-60s and a CH-53K flying in a Staggered Trail Right formation. The aircraft will be approaching from 550ft AGL. Trees at your site are 21m on the approach and 69ft on the departure.

11. You are setting up a two sided PZ for your unit conducting an air assault mission that must accommodate 5x UH-60Ls in a STR formation. Trees are 17m tall on the approach and 56ft tall on the departure.

12. Your Pathfinder Company is tasked to support training for 3/75th IN. They have four MV-22Bs flying at night in a Heavy Right formation. Due to the size of your site they must land in a Vee formation. Trees at your site are 13m on the approach and 42ft on the departure. You are authorized to reduce the obstacle ratio. They have asked for the Number 1 TDP to be marked with a NATO T.

13. You must establish a night time HLS for 4x MH-6s landing in a Diamond formation. You have a basketball post that is 13ft high on the approach and 12m tall buildings on the departure. You are authorized to reduce the obstacle ratio.

14. You are tasked with establishing and operating a logistical HLS. Your site must accommodate up to 4 SL points, one in each quadrant, 24hrs a day. You have found a suitable spot that has 12ft high Hesco walls on the approach and 3m tall CONNEX's on the departure.

15. You are supporting the USAF 1st Services SQDN, you must establish an HLS NLT 0845 that can accommodate two UH-60Ls in Trail and a third UH-60L with sling load carrying their luggage landing directly behind them. There is an unused rappel tower that is 60ft tall on the approach end and trees that are 26m tall on the departure.

1. a. **565m long, 55m wide**
   b. 160m long, 35m wide

2. a. **260m long, 100m wide**
   b. 160m long, 80m wide

3. a. **306m long, 176m wide**
   b. 106m long, 156m wide

4. a. **333m long, 213m wide**
   b. 133m long, 193m wide

5. a. **361m long, 157m wide**
   b. 57m long, 137m wide

6. a. **302m long, 116m wide**
   b. 53m long, 96m wide

7. a. **312m long, 403m wide**
   b. 212m long, 383m wide

8. a. **406m long, 211m wide**
   b. 106m long, 191m wide

9. a. **267m long, 157m wide**
   b. 57m long, 137m wide

10. a. **554m long, 157m wide**
    b. 133m long, 137m wide

11. a. **482m long, 105m wide**
    b. 141m long, 85m wide

12. a. **263m long, 270m wide**
    b. 133m long, 250m wide

13. a. **145m long, 80m wide**
    b. 35m long, 60m wide

14. a. **350m long, 320m wide**
    b. 150m long, 300m wide

15. a. **573m long, 120m wide**
    b. 130m long, 100m wide

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DO NOT PROCEED UNTIL DIRECTED BY AN INSTRUCTOR

Do not proceed to sections until covered by the formal block of instruction. You may review any previously covered sections throughout this handout for reference.

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AIR ASSAULT PLANNING AND PATHFINDER EMPLOYMENT

REFERENCES:

FM 3-21.38 PATHFINDER OPERATIONS

FM 3-99 AIRBORNE AND AIR ASSAULT OPERATIONS (ATTP 3-18.12)

INSTRUCTIONAL INTENT: TO ENABLE THE PATHFINDER STUDENT TO PLAN FOR AND OPERATE DAY OR NIGHT AIR ASSAULT OPERATIONS AND TO ACTUALLY EMPLOY A PATHFINDER TEAM. THE STUDENT WILL LEARN COORDINATE WITH THE GROUND UNIT COMMANDER; AND THE DUTIES AND RESPONSIBILITIES OF THE DIFFERENT ELEMENTS INVOLVED IN THE OPERATION OF A PZ.

AIR ASSAULT TASK FORCE

Provides commanders with truly unique capabilities; they can extend the battlefield, move, and rapidly concentrate combat power like no other available forces. An air assault operation is designed to capitalize on the speed and mobility of the helicopters to achieve surprise.

INTRODUCTION

Pathfinders mainly provide navigational aid and advisory services to military aircraft in areas designated by supported unit commanders. The Pathfinders' secondary missions include providing advice and limited aid to units planning air assault or airdrop operations.

EMPLOYMENT

The Pathfinders provide navigational aid and air traffic advisories for aircraft assigned to the specific mission. This occurs at any phase of an air assault or ground operation that requires sustained support by military aircraft. The commander employs Pathfinders on a short-term basis for some missions. He can redeploy the Pathfinders after they complete a major troop lift or airdrop.

Primary Employment:

Ideally, the commander assigns a pathfinder team to each combat aviation battalion. This enhances the relationship between aviators and Pathfinders, who have to work well together and understand each other in order to successfully complete a mission. Aviators and Pathfinders must maintain a good working relationship because of the ever increasing amount of Pathfinder units and the assignment of Pathfinder-coded positions to ground units.

Even though the Pathfinder-coded positions are rising, many units might have no trained Pathfinder assets. In this case, higher headquarters must temporarily assign Pathfinder assets from an external source to train supported unit personnel and oversee the conduct of Pathfinder operations.

Non-Pathfinder-qualified soldiers receive training from the Pathfinders and form into a company-level Pathfinder team. Once trained, the team provides navigational aid, air traffic advisories, and any other relevant information. Around the clock, the Pathfinder team supports any type of air movement or resupply operation conducted by or for the ground unit and supported by an aviation unit.

Trained, equipped Pathfinders select, mark, improve, and control landing sites. Engineers in direct support (DS) of lifted ground units may help Pathfinders improve landing zones (LZs). In most situations, Pathfinders perform two or more of these jobs at the same time. In each case, they start out by setting up ground-to-air radio communications. Also, combat lifesaver-qualified Pathfinders supplement internal medical support.

Secondary Employment:

When not performing duties for supported units, Pathfinders remain with their equipment, near and in communication with the supported ground unit CP. While Pathfinders await further missions, the parent or supported CP may task them to help control the aviation unit base airfield, to perform minor demolition work, or, in staff sections, to perform map and aerial photographic work. However, before the Pathfinders perform secondary missions, they must first train and perform routine maintenance on their equipment.

AIR ASSAULT PLANNING

Successful air assault execution is based on a careful analysis of METT-TC, and detailed, precise reverse planning. Five basic plans that comprise the reverse planning sequence are developed for each air assault operation. They are:

- The Ground Tactical Plan
- The Landing Plan
- The Air Movement Plan
- The Loading Plan
- The Staging Plan

These plans should be developed concurrently by the Air Assault Task Force staff to make the best use of available time. The ground tactical plan is normally developed first and is the basis from which the other plans are derived.

Planning for air assault operations requires time; time to plan, time to prepare and time to brief (the 1/3; 2/3 rule). Planning for air assault operations is as detailed as time permits and should include completion of written orders and plans.

There are no existing units below division level that are capable of unilaterally conducting effective air assault operations. Pure units simply do not have adequate organic assets to ensure successful air assault mission accomplishment. Task-organizing or mission-specific tailoring of forces is the norm for air assault operations, however, the battalion is the lowest level that has sufficient personnel to plan, coordinate, and control an air assault operation. When company size operations are conducted, the bulk of the planning takes place at battalion or higher headquarters.

GROUND TACTICAL PLAN

The foundation of a successful air assault operation is the ground unit commander's tactical plan, around which subsequent planning is based. The ground tactical plan specifies actions in the objective area to ultimately accomplish the mission and address subsequent operations.

Elements of the Ground Tactical Plan:

- The ground tactical plan for an air assault operation contains essentially the same elements as any other infantry attack, but differs in that it is prepared to capitalize on speed and mobility in order to achieve surprise.
- Assault echelons are placed on or near the objective for rapid consolidation and for follow on operations.
- If adequate combat power cannot be introduced quickly into the objective area, then the air assault force must land away from the objective and build up combat power.
- The air assault force then assaults like any other infantry unit and the effectiveness of the air assault operation is diminished.

***NOTE:** Initially, there may be no other friendly units in the area. The AATF must land, prepared to fight in any direction.

The Landing Plan

The landing plan must support the ground tactical plan. This plan sequences elements into the area of operations, ensuring that units arrive at designated locations and times prepared to execute the ground tactical plan.

Elements of the landing plan should include, but are not limited to the following:

- The availability, location and size of the landing site.
- Offers flexibility for changes to landing direction and/or formations.
- Supporting fires (artillery, naval gunfire, CAS, attack helicopters) must be planned for around the landing site.
- Should include MEDEVAC and re-supply contingencies.

Advantages of using a single LZ:

- Allows concentration of combat power in one location.
- Facilitates control of the operation
- Concentrates supporting fires in and around the LZ
- Provides better security for subsequent lifts.
- Reduces the number of flight routes in the objective area.
- Centralizes any required resupply operations.
- Concentrates efforts of limited LZ control personnel and engineers on LZ.
- Requires less planning and rehearsal time.

Advantages of using multiple LZs:

- Avoids grouping assets in one location and creating a lucrative target.
- Allows rapid dispersal of ground elements to accomplish tasks in separate areas.
- Reduces the enemy's ability to detect and react to the initial lift.
- Forces the enemy to fight in more than one direction.
- Reduces the possibility of troop congestion in one LZ.
- Eliminates aircraft congestion on one LZ.
- Makes it difficult for the enemy to determine the size of the air assault force and the exact location of supporting weapons.

AIR MOVEMENT PLAN

The **Air Movement Plan** is based on the ground tactical plan and the landing plan. It specifies the schedule and provides instructions for air movement of troops, equipment, and supplies from PZ's to LZ's. It also provides coordinating instructions regarding air routes, air control points, aircraft speeds, altitudes, and formations. The planned use of attack helicopters, to include security and link-up locations (if different from PZ), should be included in the air movement plan (when operations involve multiple lifts from the same PZ, a lift table is prepared to ensure lifts are properly organized).

The air movement plan is normally developed in coordination with the Air Movement Commander, or the aviation liaison officer, who provides technical assistance and recommendations. While preparing for an operation, air liaison officers (ALOs) and ground unit commanders (GUCs) coordinate with Pathfinders to make an air movement table.

The air movement plan has two key elements:

- Flight routes, with flight route overlays.
- Air movement table.

Development of Flight Routes:

Tentative flight routes are developed to control, protect and sequence aircraft movement. Careful consideration is given to the terrain and enemy forces. The AATF S-2, S-3 and AMC assist the AATFC in developing flight routes. The basic methods of developing tentative routes is by map study or by photo review when time permits, considering the locations of friendly units, enemy dispositions and air defense systems, and PZ's and/or LZ's.

The fire support plan should include fires planning along the routes.

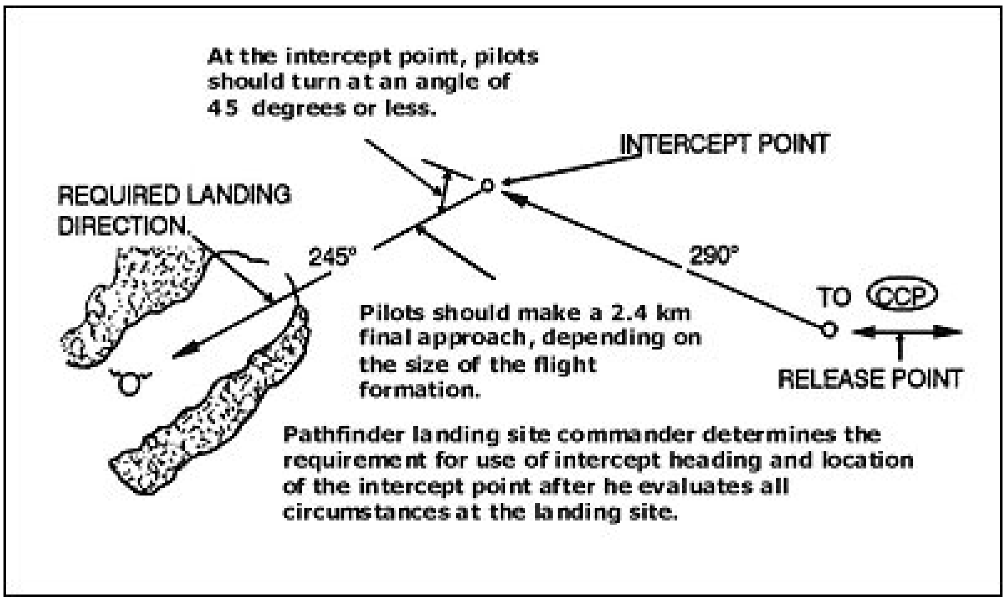
A flight route consists of a start point (SP), release point (RP), and a flight path between the two.

Start Point (SP): The SP is a topographic feature easily identifiable from the air that can be used as a navigational aid. It is normally located no closer than 3 to 5 kilometers from the PZ. The planning time for navigating this distance is 2 minutes.

Release Point (RP): The RP is a topographic feature easily identifiable from the air that can be used as a navigational aid. It is normally no closer than 3 to 5 kilometers from the LZ. The planning time for navigating this distance is 2 minutes. This will allow the flight leader time to reconfigure the flight formation and execute the tactical landing formation.

Air Control Points (ACP): The ACP is a topographic feature that is easily identifiable from the air that can be used as a navigational aid. It is normally located at each point where the flight route changes direction. However, a flight route can contain, as many ACP's as necessary to control the air movement.

Intercept Headings: The heading from the RP (or CCP if the Pathfinders do not use an RP) to the landing site coincides as closely as possible with the landing direction to keep the helicopter from having to turn sharply. The larger the formation, the more important this becomes. If a pilot cannot approach the landing site straight on, Pathfinders will set up an intercept heading. They choose an intercept point far enough from the touchdown to allow helicopters in formation a final approach of at least 1 to 2 miles.



Flight routes are developed based on tactical and technical factors. It may be necessary for a route to pass through an adjacent unit's sector. When that is the case, approval from that unit is obtained and coordinations are made. Regardless of route direction or location, certain criteria are considered.

Seldom are all characteristics present in any one situation; one or more may have to be omitted.

Flight routes:

- Are as short as possible, consistent with other considerations.
- Avoid turns in excess of 45 degrees, when formation flying is required, to facilitate control of the aircraft formation.

- Provide terrain masking to deny exposure to enemy observation, direct fire weapons, and radar acquisition, if possible.
- Provide cover when terrain permits, placing terrain mass and/or vegetation between the enemy and the aircraft.
- Provide for ease of navigation (day or night).
- Avoid masking friendly fires, particularly supporting artillery.
- Avoid known enemy units and air defense positions.
- Avoid over-flight of built up areas.

There are **THREE** types of flight routes:

- **Restricted flight route**: The aircraft is restricted as to their heading and altitude.

- **Flight corridor**: The corridor reserves airspace around a flight route for AATF use, and prevents artillery, Tactical Air, and other elements from flying or firing through it when it is in use. The size of the corridor varies. Normally, they extend 200 - 300 meters on either side of the designated flight route, and 500 feet above or below the flight altitude. Authority to establish a flight corridor is obtained from the brigade and/or division commander(s). If it is necessary to restrict the operational area to only those aircraft directly involved in the air assault operation, a restricted area can be established by the airspace management element (AME), normally at Corps level.

- **Flight axis**: The flight axis has a width (like a corridor) but does not have airspace reserved to a specified altitude (as does a corridor). The flight axis permits deviation laterally along the flight route. It gives the AMC a choice in selecting enroute formations, and freedom to alter direction without coordinating a new flight route.

Maps or overlays containing flight route information are prepared at AATF headquarters and disseminated to subordinate and support units (overlays are often used). A number, letter or a word designates flight routes and corridors.

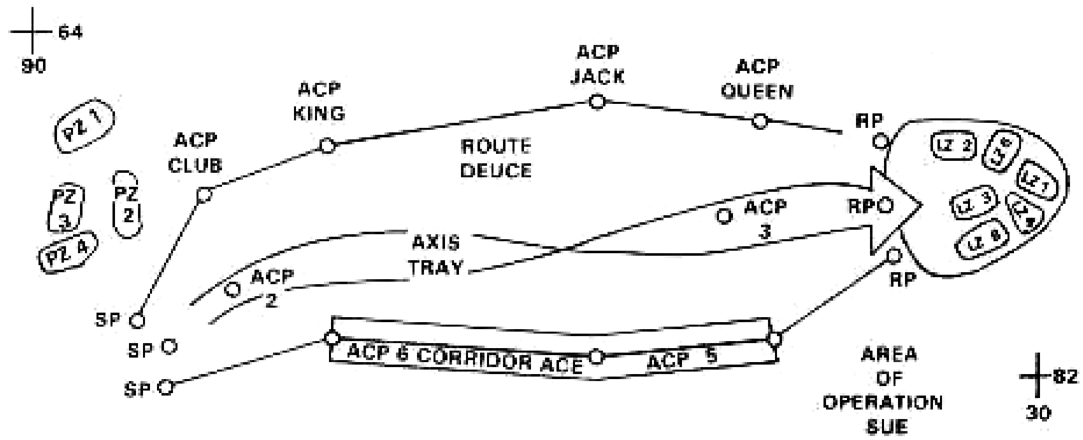


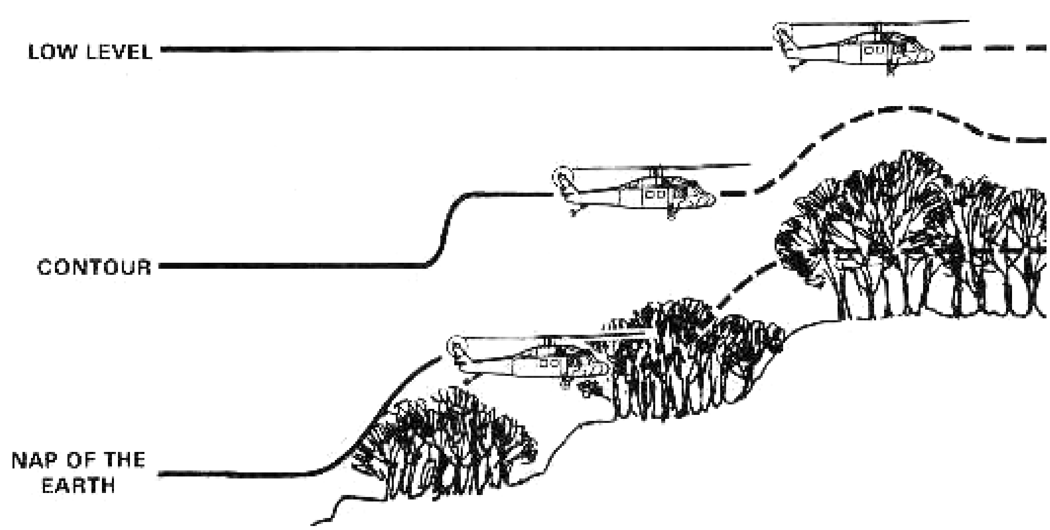
FIGURE DEPICTING FLIGHT ROUTES

Terrain Flight Modes: If specific in-route altitude is not designated, pilots may use one of **THREE** terrain flight modes as dictated by the mission and the threat.

Nap-of-the-earth flight: This is flown at varying airspeeds and altitudes as close to the earth's surface as possible, while following the contours of the earth. It is a weaving path that remains oriented along the general axis of movement and takes advantage of terrain masking.

Contour flight: This is flown at low altitude conforming generally to the contours of the terrain. The flight is characterized by varying altitudes and airspeed.

Low level flight: This is flown at low altitude with constant heading, airspeed and altitude to facilitate speed and ease of movement while minimizing detection. This mode of flight is normally used only in rear areas.



LOADING PLAN

The loading plan is based on the air movement plan and the ground tactical plan. It ensures that troops, equipment and supplies are loaded on the correct aircraft. Unit integrity is maintained when aircraft chalks are planned. However, assault forces and equipment may be cross-loaded so that command and control assets, all types of combat power and a mix of weapons arrive at the LZ ready to fight. Aircraft chalks are also placed in priority to establish a bump plan. A bump plan ensures that essential troops and equipment are loaded ahead of less critical chalks in case of aircraft breakdown or other problems.

Below brigade level, SOP's establishes loading plans. In any case, planning must cover the organization and operation of the PZ including chalk positions, day and night markings, and communications. The loading plan is most important when mixing internal and external loads and/or when mixing aircraft types (lift and medium sized helicopters).

Items of consideration in the loading plan:

- Coordination with Air Mission Control:
- Loading plans are carefully coordinated with the Aviation Liaison. Copies of the loading plan should be distributed to the aviation LNO, command and control elements, the AMC, and the PZ control officer.
- The loading plan must ensure that every soldier knows his location on the aircraft. Static loading and off-loading must be the rule before every air assault.

Pickup Zone Marking:

- The PZCO directs the marking of PZ's. An effective method is to name the PZ by color and mark it accordingly (by that color) to direct where aircraft will land.
- Red is **NEVER** used to mark aircraft landing positions.
- Regardless of the type of markers, the PZ is marked to indicate where aircraft are to land and coincides with the selected PZ aircraft formation.
- An effective method is to have several individuals in each unit paint (and carry) an extra camouflage cover or a modified (cut to size) VS-17 panel. The colored covers, when displayed, indicate where the lead aircraft lands. There are also many other effective means to mark PZ's.

Movement to the Pickup Zone:

Ground and aviation unit movement to the PZ is scheduled so that only the troops to load and the helicopter to be loaded arrive at the PZ at the same time. This prevents congestion, preserves security, and reduces vulnerability to enemy actions on the PZ.

To coordinate the movement of units to the PZ, the PZCO:

- Selects troop assembly areas, holding areas and routes of movement.
- Selects a holding area located close to the PZ; it is used only when the assembly area is some distance away and does not allow timely movement to the PZ.
- Determines movement time of ground units to the PZ.
- Specifies arrival time(s) and sees that movement of units remains on schedule.

AIR LOADING TABLE

At company and lower levels, the air-loading table assigns each man and major item of equipment or supplies to a specific aircraft (chalk).

The air-loading table is an accountability tool, a loading manifest for each aircraft.

When time is limited, the table can be put on a sheet of paper from a squad leader's notebook. It should list the soldiers (by name) and equipment to be loaded on each chalk.

These lists are left with a specified representative in the area for consolidation or exchange between aircraft troop commanders (senior person in each aircraft chalk). This procedure ensures that if an aircraft is lost a list of personnel and equipment on board is available.

LOAD PLANNING

During preparation of the load tables, unit leaders at all levels attempt to maintain the following:

- Tactical Integrity of Units.
- When planning loads for air assault operations, fire teams and squads are loaded intact on the same aircraft, and platoons in the same serial. This ensures integrity as a fighting unit upon landing. The commander's goal is to load his unit so that unit integrity is maintained at every level.

- Self-sufficiency of Loads: Each chalk should be functional by itself (whenever possible).
- Every towed item is accompanied by its prime mover.
- Crews are loaded with their vehicle or weapon.
- Component parts accompany the major item of equipment.
- Ammunition is carried with the weapon.
- Sufficient personnel are on board to unload cargo carried.
- Communication between chalks, if possible, without using the aircraft radios.

Tactical Cross Loading

Chalks should be planned so that all leaders or crew-served weapons are not loaded on the same aircraft. Thus, if an aircraft is lost, the mission is not seriously hampered.

Example: Loading the platoon leader, platoon sergeant, and all the squad leaders on the same helicopter; or loading more than one machine gun team on the same aircraft, are violations of cross loading principles.

Another consideration is to determine whether internal or external loading is the best delivery method of personnel, equipment, and supplies. Helicopters loaded internally can fly faster and are more maneuverable. Externally (sling) loaded helicopters fly slower and are less maneuverable, however, they can be loaded and unloaded more rapidly than internally loaded helicopters. The method used depends largely on availability of sling and rigging equipment.

***NOTE:** Supplies loaded externally (although loaded rapidly) can present problems if the supplies are destined for more than one location or unit.

STAGING PLAN

The staging plan is based on the loading plan and prescribes the arrival time of ground units (troops, equipment and supplies) at the PZ in the proper order of movement.

Procedures:

- Chalks must be ready before aircraft arrive at the PZ; usually, ground units are expected to be at the PZ (1) hour prior to load time and in PZ posture 15 minutes before aircraft arrive.
- Restates the PZ organization,
- Defines flight routes to the PZ
- Provides instructions for linkup of all elements.
- Air-to-air linkup of aviation units should be avoided, especially at night when night vision goggles are being used.

PATHFINDER PLANNING

To ensure success of the ground mission, Pathfinders plan their own missions in detail. The more time they have to plan, the more detailed a plan they can make.

Warning Order:

As soon as they receive word of a pending operation, the senior Pathfinder issues a mission alert. They immediately follow with a warning order. They include just enough information to allow the other Pathfinders to start preparing for the operation

Initial Preparation:

On receiving the alert or warning order, Pathfinders inspect and, as needed, augment personnel and equipment. Pathfinders prepare equipment in the following order, from the most to the least important:

- Radios
- Navigation aids (electronic and visual).
- Weapons
- Essential individual equipment.
- Assembly aids.
- Other items as needed (mission specific)

The Pathfinder element leader (or their representative) and the air mission commander begin coordinating with the supported aviation unit(s), ground unit(s), or both.

As the Pathfinders receive more information, they reorganize personnel and equipment to better accomplish the mission. If time permits, they rehearse. They use available briefing aids, and they rehearse on terrain that most nearly resembles the AO.

To succeed, an operation must have security. So, each person receives only the information he must have to complete each phase of the operation. For example, the commander isolates any soldiers who know the details of the operation. The situation dictates the extent of security requirements.

Coordination- Ground and Aviation Commanders work together to coordinate and plan the details of operations for which they require pathfinder assistance.

In any type of operation (combat assault, reinforcement, artillery displacement, resupply, or evacuation), the pathfinders might have to recommend

- Exact locations for DZs or LZs.
- A time schedule.
- Landing formations
- Employment techniques.

Air Movement Table: While preparing for an operation, air liaison officers (ALOs) and ground unit commanders (GUCs) coordinate with Pathfinders to make an air movement table. The following table shows who coordinates what.

SEQUENCE	ALO	GUC	COORDINATE WITH PATHFINDERS
1.	X	X	Operational location (coordinates).
2.	X		Locations of the primary and alternate communications
3.	X		Location of release point: Coordinates / Whether manned or
4.	X	X	Time the site can begin operating.
5.	X		Aircraft information: Formation / Time interval / Time of flight. Drop speed / Drop altitude
6.	X		Pathfinder transportation and time available for briefing.
7.	X		Pathfinder transportation station time.
8.	X	X	Routes into the objective area.
9.	X	X	Call signs: Aircraft / Pathfinders / Supported units / Other
10.	X	X	Primary and alternate frequencies: Aircraft / Pathfinders / Supported units Other friendly units / Homing beacon
11.	X	X	Fire support: Artillery / Tactical air support
12.	X		Weather forecast: Ceiling / Visibility / Temperatures (high and low)
13.	X	X	Logistical support, including locations of Medical aid station / Prisoner collection point / Fuel
14.	X	X	Alternate plans (ALO and GUC): Evacuation plan / Escape and
15.	X	X	Friendly unit locations
16.	X	X	Authority to implement mission change.
17.		X	Support personnel required
18.	X		No-land or no-drop signals (day and night)
19.			Markings for obstacles (only on request of flight commander)
20.	X		Marking of objective site for identification from the air
21.	X	X	Time allowed for approval.

AIR MISSION BRIEFING

The Air mission briefing (AMB) is the last coordination meeting of key participants in an air assault mission and ensures that key aviation personnel are briefed and that the details of each plan are finalized.

Content:

The briefing covers the details of all planning and preparation. It covers the operation from beginning to end, which includes the five plans explained previously, and the completed air movement table.

Participants:

The AMB should include, as a minimum, the S2, S3 fire support officer, aviation liaison officer (LO), ADA liaisons, aviation unit operations officer, AMC, battle team captains from air recon and attack helicopter units, and the ground tactical commander of the unit being inserted. It may also include the S3 Air, communication-electronics officer, and the S4. (See Annex A.)

TERMS - LIFTS, SERIALS AND CHALKS

To maximize operational control, aviation assets are designed to lifts, serials and chalks.

> **Chalks**: Within each lift, there are also a specific number of chalks. A chalk is personnel and/or equipment that are designated to be moved, by a specific aircraft. When planning the air movement, each aircraft within the lift is termed a chalk. For example, within a lift of 10 aircraft, there are aircraft one through ten. For each lift thereafter, there will also be chalks one through ten. Each aircraft is accounted for within each lift. An aircraft chalk may also be referred to as a "load," "chalk number," or "chalk load." Chalks also must be designated within serials just as they are within lifts. Counting within the serials is continuous up to the total of aircraft within the lift.

Example: In a lift of 16 aircraft, in lift one, serial one; there may be chalks 1 through 4. In lift one, serial four, there may be chalks 13 through 16.

Serials: There may be times when a lift is too large to fly in one formation. In such cases the lift is organized into a number of serials. A serial is a tactical group of two or more aircraft but no more than six under the control of a serial commander (aviator) and separated from other tactical groupings within the lift by time or space. The use of serials may be necessary to maintain effective control of aviation assets.
For example, if a Nap-of-the-Earth flight were used, it would be difficult to control 16 aircraft as a single increment. However, a 16 aircraft lift made up of four serials of four aircraft each could be more easily controlled.

Serials may also be required when the capacity of available PZ's or LZ's is limited. If there is a lift of 16 aircraft and the available PZ's and/or LZ's will accommodate only four aircraft; it is best to organize into four serials of four aircraft each.

Serials are employed to take advantage of available flight routes. If there are several acceptable flight routes, the AATFC may choose to avoid concentrating his force along one flight route. If the commander wants all of his forces to land simultaneously on a single LZ, he does so by having all the serials converge at a common RP before landing. With a lift of 16 aircraft and four available flight routes, the AATFC could use four serials of four aircraft each. Each serial would use a different flight route. Each time there is a new lift; a new serial begins. For example, in lift one, there are serials one through four. In lift two, serials start again with one.

Lifts: A lift is one sortie of all utility and cargo aircraft assigned to a mission. That is, each time all assigned aircraft pick up troops and/or equipment and set them down on the LZ, one lift is completed. The second lift is completed when all aircraft place their second load on the LZ.

Sequence of Departure: The sequence of departure from PZ's is based upon the mission to be accomplished by each subordinate unit upon landing. Unit priorities are based on the sequence of arrival at their LZ's; Units are scheduled to depart (in order) based on flight route time to the LZ.

Example: If Company A is to land first (at H-hour) and Company B second (at H+5), and Company B is 15 minutes farther (in flight time) from the LZ, it may depart the PZ before Company A.

Time / Distance planning factors

When estimating the distance of a flight route or the time needed to fly a specific flight route, refer to the following factors:

If the time required to fly a specific flight route is between one-minute increments, round up to the next whole minute. (Example – 3.5 minutes would be rounded up to 4.)

If the distance of a specific flight route is between one kilometer increments, round up to the next whole kilometer. (Example- 16.5 kilometers would be rounded up to 17 kilometers.)

The distance for the PZ to SP is 3-5 km or 2 minutes of flight time, and the distance from RP to LZ is also 3-5 km or 2 minutes of flight time

Flight time is computed using this formula:

T= (D x 60) / (S x 1.84)
T= Time in minutes
D= Distance in kilometers (km)
S= Groundspeed in knots (AMC provides this by computing airspeed (knots) and converting it to ground speed (KPH)

*__Note__: The number **60** used in the formula converts hours to minutes. The number **1.84** converts knots to kilometers per hour. A fraction of a minute is always rounded up.

Air Movement Table

The Air Movement Table:

- Contains aircraft allocations.

- Designates number and type of aircraft in each serial.

- Specifies departure point, route to and from the loading area and loading, lift-off and landing times.

- Is prepared jointly by the AATF staff and aviation personnel, and is completed in detail since it derives as the primary movement document.

- Is disseminated to the PZCO, the Pathfinder team sergeant, and the air mission commander.

***NOTE**: The table controls AATF movement from PZ to LZ as air assault forces fly to the LZ utilizing radio listening silence, if possible.

AIR MOVEMENT TIMING

A successful air assault operation is a sequence of actions carefully planned and precisely executed.

The basis for timing is the time when the first aircraft in the first lift of the operation touches down on the LZ. It is referred to as **H-hour**. In FM 3-99 H-hour is defined as, "The specific hour on D-day at which a particular operation commences." All times in air assault operations are referenced from the H-hour (landing column, air movement table). The H-hour in an air assault operation is equivalent to the attack time in an OPORD. If delays are encountered due to weather or aircraft delays, the commander announces a new H-hour.

Loading time:

- Loading time is the time required, before lift-off, to load the aircraft. Time to load is normally dependent on prior training, equipment to be carried and light conditions. Night operations require more loading time. Once loading time is determined, it is added to the previously computed times.

- During day time operations allow 3 minutes for load time and for night operations allow 5 minutes for load time.

- For instructional purposes **1800 to 0559** will be considered **Night time** conditions.

- For instructional purposes **STAGING TIME** is 1 hour prior to the first lifts load time and dictates the arrival time for all personnel participating in air assault operation.

- **PZ POSTURE** is 15 minutes prior to the loading time for whichever lift is specified.

AIR LOADING TABLE

The Air Loading Table:

- Assigns a specific chalk numbered aircraft to carry personnel and major items of equipment to the objective area

- Is used as a loading manifest (copy should remain with stay behind element)

- Is annotated to reflect the bump priority of loads

Aircraft Bump Plan: At a company level the **1SG** or **XO** is responsible for devising and disseminating the bump plan. As the levels go up, positions remain the same, for example; a 1SG or Company XO is responsible for the bump plan.

- Each aircraft load has a bump sequence designated on its air-loading table. Bump priority ensures that the most essential personnel and equipment arrive at the objective first. It specifies personnel and equipment that may be bumped and delivered later.

- If all personnel within the chalk cannot be lifted, individuals must know who must off-load and in what sequence. This ensures that personnel are not bumped arbitrarily. Also, bump sequence is designated for aircraft within each serial or flight. This sequence is listed on the air movement table.

- This also ensures that key aircraft loads are not left on the PZ. When aircraft within a serial or flight cannot lift off, and key personnel are on board, they off-load and re-board another aircraft that has priority.

Aircraft Bump and Straggler Control: Company or lower units specify PZ bump and straggler collection points. Personnel not moved as planned report to this point, are accounted for, re-grouped and rescheduled by the PZCO for later delivery to the appropriate PZ's.

DUTIES AND RESPONSIBILITIES OF KEY POSITIONS DURING A COMPANY AIR ASSAULT

COMPANY COMMANDER: Has overall responsibility for the Air Assault operation. He plans the operation, briefs subordinate leaders, issues the OPORD, and conducts rehearsals. He rides in the AMC's Aircraft to ensure better command and control.

PZ CONTROL OFFICER: He may be the XO, 1SG, or a Platoon Leader.

PZ CONTROL NCOIC: Is the 1SG, a PLT SGT, Section SGT, or a Squad Leader.

RTO: With two radios: one on Combat Aviation Net and one on Company Command Net, sometimes called a PZ Control Net.

CHALK-LINKUP GUIDES: One per chalk. Their primary duties are to assist in link-up and movement of chalks from the unit AA to the chalk AA.

#1 TDP SIGNALMAN: Provides visual guidance for the A/C. He should have a seat on the lead A/C.

SLINGLOAD TEAM: A signalman, a hook-up man, and a static probe man.

Aircraft Troop Commander/ Chalk Leader - Each chalk has a designated troop commander. The aircraft troop commander is responsible for inspecting his chalk. He briefs his personnel on:

- Seating arrangement
- Loading procedures
- Use of safety belts
- In-flight procedures
- Offloading procedures

Pickup Zone Control Officer: Pickup zone control officer organizes, controls and coordinates operations in PZ's selected by the AATFC (S-4 selects and controls logistical PZ's).

The PZCO accomplishes the following:

- Forms the control group: To manage operations, the PZCO forms a control group to assist him. It may include air traffic control, subordinate units and support personnel (manpower to clear the PZ, security). The PZCO selects a central location to position the group. The PZCO is designated by the AATFC, usually the S-3 Air. For battalion air assault operations, each company commander appoints a PZCO who operates a company PZ for the battalion.

- Establishes communications: The PZCO should communicate on two primary radio frequencies; one to control movement and loading units and one to control aviation elements (combat aviation net). Alternate frequencies are provided as necessary.

- Plans and initiates fire support: He plans fires near PZ's to provide all around protection (from available support) without endangering the arrival and departure of troops or aircraft.

- Plans and initiates security: The PZCO ensures that adequate security is provided. Security protects the main body as it assembles, moves to the PZ, and is lifted out. Other forces should provide security elements if the PZ is within a friendly area. Security comes from AATF resources if it is to be extracted from the objective area.

- Clears the PZ of obstacles.

  Pathfinder Team Responsibilities:
  - Ground to air communications
  - Inspect chalks / sling loads
  - Prepare / mark site
  - Assist PZCO

Site Team Leader: The site team leader reconnoiters, establishes, and operates the landing site. He supervises it and, at any time, might supervise the GTA radio operator.

Some of his responsibilities include the following:
- Organizing at an objective rally point
- Reconnoitering to determine –
- Long axis.
- Usable area.
- Ground slope (compute).
- Land heading.
- Best landing formation.
- Designating sling-load point(s)
- Emplacing and briefing the GTA radio operator.
- Clearing touchdown and sling load points.
- Organizing personnel and loads for air movement
- Clearing or marking obstacles.
- Preparing for day or night operations.
- Continuing to improve the site.

Extra Pathfinders: These Soldiers operate the GTA radio and the pathfinder internal radio net (if established), position and operate navigation and assembly aids, and clear or mark obstacles.

Four factors dictate the number of extra pathfinders employed:

- The size of landing site.

- The expected density of air traffic.
- The number and type of visual and electronic aids used.
- The tactical situation

DEVELOPING UNIT SOPS

The CO may use helicopters when inserting or extracting patrol units, positioning weapons and crews, conducting resupply, and evacuating casualties. The company should have an SOP for working with helicopters.

The SOP should cover the following:

- LZ and PZ selection
- LZ and PZ security
- LZ and PZ operation and activities
- LZ and PZ marking procedures
- Downed aircraft procedures
- Load plan preparation
- Loading procedures
- Organization for an air assault operation

Air assaults involve assault forces (combat, CS, and CSS) using the firepower, mobility, and total integration of helicopter assets and maneuver on the battlefield to engage and destroy enemy forces or to seize and retain key terrain.

Air movement operations involve the use of Army airlift assets for other than air assaults.

AIR MOVEMENT TABLE

Copy No ________________

Eq ____________________

Place __________________

Reference: OPORD

Time Zone Used Throughout the Order:

1	2	3	4	5	6	7	8	9	10	11	12	13	
AVN UNIT	LIFTED UNIT	LIFT	SERIAL	LOADS	PICKUP ZONE	LOAD TIME	TAKEOFF TIME	SP TIME	RP TIME	LANDING ZONE	LAND TIME	REMARKS	
ENTER SUPPORTING UNIT	ENTER SUPPORTED UNIT	ENTER THE LIFT NUMBER	ENTER THE NUMBER FOR WHICH SERIAL IT IS	ENTER THE NUMBER OF LOADS FOR EACH LOAD ON THE SERIAL	ENTER NAME OF PICKUP ZONE AND FORMATION USED	ENTER LOAD TIME	ENTER THE TIME THE A/C WILL TAKE OFF FROM THE PZ	ENTER THE TIME THE A/C WILL BE AT THE SP	ENTER THE TIME THE A/C WILL BE AT THE RP	ENTER THE LANDING ZONE AND FORMATION USED	ENTER THE TIME THE A/C WILL BE "WHEELS DOWN" ON THE LZ	ENTER ADDITIONAL INFORMATION. I.E.- A/C BUMP PLAN, WHICH A/C HAVE SLINLOADS ETC.	

AAP&PE

AIRLOADING TABLE

071-FRCCA004

1	2	3	4	5	6	7	8	9
Personnel Equipment	Pickup Zone	Arrival Time	Load Time	Avn	Lift	Serial	Load	Remarks
ENTER NAME, RANK AND DUTY POSITION OF PERSONNEL FLYING	ENTER THE NAME OF THE PICK-UP ZONE, FORMATION USED, AND 8-DIGIT GRID	ENTER THE ARRIVAL TIME OF THE UNIT TO BE LIFTED	SAME AS AIR MOVEMENT TABLE	SAME AS AIR MOVEMENT TABLE	SAME AS AIR MOVEMENT TABLE	SAME AS AIR MOVEMENT TABLE	SAME AS AIR MOVEMENT TABLE	ENTER ANY ADDITIONAL INFORMATION TO INCLUDE A BUMP PLAN, PRIORITY OF BUMP, SLING LOAD PRIORITY ETC.

ANNEX A

Air Mission Brief

This appendix addresses the air mission brief. Included are samples of the air mission brief agenda and the air mission brief checklist. The air mission brief is the information required by subordinate units to complete their mission in accordance with the commander's intent. It details the scheme of maneuver and how supporting elements act to support it.

Air Mission Brief Agenda

See table P-1 for a sample AMB agenda.

Table P-1. AMB agenda

Air Mission Brief Agenda	
Task organization and roll call	AATF S3
Time hack	AATF S6
Enemy forces	AATF S2
Friendly forces	AATF S3
TF mission	AATF S3
BCT/Bn commander's intent	AATFC
Ground scheme of maneuver	AATF S3
Concept of fires (SEAD and ground tactical)	AATF FSO
Aviation mission	ASLT AVN S3
Staging plan	TF XO
Loading plan	AATF S3 Air
Air movement plan	ASLT S3/ MSN Lead
Landing plan	ASLT S3/ MSN Lead
Laager plan	ASLT S3/ MSN Lead
Attack reconnaissance AVN mission/concept	ATK S3/Cdr

Tasks to subordinate units	AATF S3
Coordinating instructions	AATF S3
Service support (FARP plan)	ASLT AVN S4
MEDEVAC/CASEVAC plan	HSSO/Med. Co. Cdr
Command	AATF S3
Signal	AATF S6
Operational risk assessment	AATFS3
AATFC comments	AATFC

AMB checklist

Air Mission Brief Checklist			
Roll Call Time Zone Time Hack Packet Check References Task Organization (Infantry Brigade TF)			
1. SITUATION			
	a. Enemy forces (synopsis of overall enemy situation) (TF S2).		
		(1) Air IPB. (2) Enemy air capability. (3) Enemy ADA capability.	
			(a) Type / location.

(b) Night capability / range.

(c) Weather / NOTAMS.

Sunrise / Sunset.

Moonrise / Moonset.

Max Percent Illumination. Range: (during AASLT; i.e. 0% to 45%).

NVG Window / Ceiling / Visibility.

MAX Temp / MAX DA / PA.

EENT / BMNT.

b. Friendly forces (TF S3).

(1) Mission higher headquarters (include CDR's intent).

(2) BDE/BN Infantry scheme of maneuver (TF S3).

2. MISSION (TF S3).

a. Bde / Bn CDR's intent (AATFC).

b. Conditions for AASLT.

c. Mission risk assessment (TF S3).

d. Aviation mission (AVN S3).

3. EXECUTION.

a. Aviation commander's intent (AMC).

b. Concept of the aviation operation (AVN S3).

c. AVN tasks to subordinate units (AVN S3).

d. Fires (FSO).

(1) FA. ANNEX I (FS graphics).

(a) Purpose of supporting fires.

(b) Unit / location.

				(c) Priority of fires. (d) SEAD information/targets. (e) LZ prep.
		(2) CAS (ALO).		
			(a) Purpose / mission. (b) Coordinating altitude.	
				Rotary wing. Fixed wing.
		(3) Attack reconnaissance aviation. (ARB S3/CDR).		
			(a) Mission. (b) Concept. (c) BPs / ABFs / sectors / routes in/out.	
	e. Staging plan. ANNEX A (PZ DIAGRAM) (TF XO).			
		(1) Name / number. (2) Coordinates. (3) Load time. (4) Take off time. (5) Markings. (6) Control. (7) Call-signs / frequencies. (8) Landing formation. (9) Heading. (10) Hazards / go a rounds. (11) Supported unit bump plan. (ANNEX A-1, Coordinating Instructions). (12) PZ arrival times.		

	f. Air movement plan. (ASSLT S3/MSN lead).
	(1) Routes / corridors. ANNEX B (ROUTE CARD).
	(a) Ingress primary / alternate. (b) Egress primary / alternate. (c) Others.
	(2) En route hazards. (3) Abort criteria.
	(a) Weather. (b) Aircraft available. (c) Time. (d) Mission essential combat power. (e) Mission criticality. (f) Enemy.
	(4) Penetration points. (5) En route formation / rotor separation / angle / airspeeds (as per crew brief). (6) Deception measures / false insertions. (7) Air movement plan. ANNEX D. (8) Cargo doors. (9) External lighting (SOP). (10) Restricted operations area (ROA) locations.
	AASLT C2. ATK C2. QUICKFIX.
	(11) MEDEVAC / CASEVAC aircraft plan. (12) Aircraft decontamination plan.

	g. Landing plan. ANNEX C (LZ DIAGRAM) (ASSLT S3 / MSN lead).
	(1) Name / number. (2) Coordinates. (3) LDG times (as per AMT). (4) Markings. (5) Control. (6) Call signs / frequencies. (7) LDG formation / direction. (8) LZ abort criteria (based on GTCs guidance). (9) Go a round (flight / single ship - as per crew brief). (10) Departure (as per crew brief).
	h. LAAGER plan. (ASSLT S3/MSN Lead).
	(1) Name / locations. (2) Times / REDCON status. (3) Security plan. (4) Scatter plan. (5) Call forward plan.
	i. Extraction plan. (ASSLT S3 / MSN lead). j. Coordinating instructions (Aviation) (ASSLT S3).
	(1) MOPP level / CBRN warning status. (2) M60D control status. (3) ADA status. (4) IFF procedures / times. (5) Chaff / ALQ 144 employment. (6) NVG specific procedures (SOP).

		(7) VHIRP / IIMC (as per crew brief). (8) Mission contingencies (SOP).	
			(a) DAARP / SAR / EAE. (b) Downed aircraft / SERE / DART. (c) BDAR.
		(1) Spare aircraft procedures. (2) Special aircraft equipment / preparation. (3) PPC. (4) Mission brief sheet. (5) Risk assessment form (completed / signed). (6) Safety considerations / hazards. (7) OPSEC considerations (SOI, kneeboard sheets, maps). (8) Weather decision plan/times. (9) Debrief location / time.	
	k. Coordinating instructions (TF) (TF S3).		
4. SERVICE SUPPORT.			
	a. Class I (1 case MREs/5 gallons water/survival kits) (TF S4). b. Class III/V (III/V PLT LDR).		
		(1) Minimum fuel (as per crew brief). (2) Basic load. (3) FARP / FARP.	
	c. Class VIII (HSSO).		
		(1) CCP. (2) Evacuation plan/hospital location.	

d. MEDEVAC / CASEVAC plan (HSSO).

5. COMMAND AND SIGNAL (TF S3).

a. Command.

(1) A2C2. As per ACO, this AMB, and established tactical flight procedures.

(2) AATFC / location.

(3) AVN TF AMC / location.

(4) ABC / location

(5) Aviation chain of command (as per serial chain of command).

b. Signal (TF S6).

(1) Communication card day (ANNEX____).

(2) Execution matrix (ANNEX ____).

(3) Code words.

MISSION BRIEFBACK:

FINAL QUESTIONS:

COMMANDERS COMMENTS:

Time Distance Planning Homework

Problem 1

You are conducting air assault operations in Afghanistan with 223 personnel, flying in 6 UH-60M's in support of your infiltration. The A/C can hold 12 pax per A/C and will fly at 140 knots. The 1st boots on the ground is being planned for 0200. The LZ can accept 3 A/C at a time in a trail formation with a land heading of 145 degrees. The number 1 TDP is marked with a NATO "T" The distance between SP and RP is 25 KM. On the approach end you have 150 foot tall trees and on the departure end you have 30 meter tall trees.

What is the max left and right departure heading?

What is the distance and direction from the number 1 to number 2 TDP?

How many lights are required to set up the LZ?

What is the total width of your site?

What is the minimum useable length of your site?

What is the total length needed at your site?

What time must the unit arrive at the PZ?

What time will all troops be on the ground?

How many Lifts, Serials, and Chalks?

What time must the 1st A/C of the 1st lift return to the PZ?

What time will the last lift depart the PZ?

What is the slope restriction for your A/C?

What is the max crosswind and tail wind for your A/C?

Problem 2

You are supporting a unit conducting air assault operations in Iraq. C 1/325 is sending 3 platoons and a headquarters section. 1st PLT is sending 34 pax, 2nd PLT is sending 32 PAX, 3rd PLT is sending 30, and the headquarters is sending 8 men with a 9 man mortars section. They have 4 UH-60L traveling at 150 knots to LZ Jack which can accept 2 of those A/C. Your A/C can hold 9 personnel and is planning a land heading 106 degrees, landing in a trail formation. The first lift will take off from the PZ at 0530 and the distance from SP to RP is 95 km. The number 1 TDP is marked with an inverted Y with a 5th light at the bottom right. You have 15 meter tall trees on the approach end and 30 feet tall trees on the departure end.

From H-hour how long will it take for all troops to be on the ground?

When will the last lift reach LZ Jack?

How many lifts, serials, and Chalks?

What is the needed width of your site?

What is the distance and direction from the number 1 to number 2 TDP?

What is the total needed length of your site?

What is the max left and right departure heading?

How many lights must you use to set up the site and what colors can you use?

Problem 3

You are supporting a unit conducting air assault operations in Iraq. The 101st Airborne is sending 275 soldiers. They have 5ea. CH-47Ds traveling at 130 knots to LZ Jack which can accept 3 of them A/C. Your A/C can hold 36 personnel and is planning a land heading 020 degrees, landing in a Vee formation. The first lift will load at 0313 and the distance from SP to RP is 110 km. The number 1 TDP is marked with a NATO "T". You have 18 meter tall trees on the approach end and 90 feet tall trees on the departure end.

How many lifts, serials, and chalks?

What is the distance and direction from the number 1 TDP to the number 3 TDP?

What time will the 1st A/C of the final lift be on the ground at the LZ?

How many lights are required to set up the LZ?

What time must the unit be in PZ posture?

What is the max left/right departure heading?

What time must the 2nd lift load the A/C?

TIME DISTANCE PLANNING ANSWER KEY

Problem 1 Answer Key

100 Degrees Left, 190 Degrees Right

325 Degrees, 50 Meters

9 Lights (5 for Nato "T" then 2 for each additional A/C)

70 Meters (TDP diameter plus 20 for the buffers)

120 Meters (TDP size 50, multiply that by 2 then add 20 for Nato "T")

878 Meters (Take the usable and add the obstacle ratio)

0044 Hrs (1 Hour prior to Load Time)

0318 HRS

4 Lifts, 7 Serials, 19 Chalks

0210 HRS

0307 HRS

15 Degrees

9 Knot Crosswind 5 Knot Tailwind

Problem 2 Answer Key

163 Minutes

0837 HRS

4 Lifts, 7 Serials, 13 Chalks

70 Meters

50 Meters 286 Degrees

300 Meters

061 Degrees Left, 151 Degrees Right

7 Lights (5 Lights for Inverted why with 5th Light, and 2 for the additional A/C)

Problem 3 Answer Key

2 Lifts, 3 Serials, 8 Chalks

245 Degrees, 80 Meters

0500 HRS

9 Lights

0258 HRS

335 degrees Left, 065 Degrees Right

423 HRS

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DO NOT PROCEED UNTIL DIRECTED BY AN INSTRUCTOR

Do not proceed to sections until covered by the formal block of instruction. You may review any previously covered sections throughout this handout for reference.

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DROP ZONE OPERATIONS

REFERENCES:

AFI 13-217 DROP ZONE AND LANDING ZONE OPERATIONS

AFI 11-231 COMPUTED AIR RELEASE POINT PROCEDURES

FM 3-21.38 PATHFINDER OPERATIONS

TC 3-21.220 STATIC LINE PARACHUTING TECHNIQUES AND TRAINING

USASOC REG. 350-2 TRAINING AIRBORNE OPERATIONS

AFI 11-2C-130V3 C-130 OPERATIONS PROCEDURES

AFI 11-2C-17V3 C-17 OPERATIONS PROCEDURES

INSTRUCTIONAL INTENT: TO ENABLE THE PATHFINDER STUDENT TO PLAN FOR AND OPERATE DAY NIGHT AIRBORNE OPERATIONS. THE STUDENT WILL LEARN HOW TO PLAN, ORGANIZE AND OPERATE CARP, VIRS AND GMRS DROP ZONES, COORDINATE WITH ARMY/AIR FORCE PILOTS AND GROUND UNIT COMMANDER; AND THE DUTIES AND RESPONSIBILITIES OF THE DROP ZONE CONTROL TEAM.

DROP ZONES TEST SECTION BREAKDOWN

Test Section 1	The Eight Selection Factors
	Circular CARP Drop Zone Sizes
Test Section 2	CARP Drop Zone Sizes
Test Section 3	Duties and Responsibilities of the DZSTL
	DZST Equipment Familiarization
	Drop Zone Survey General Information
Test Section 4	Army V.I.R.S.
	Army G.M.R.S.
Test Section 5	Drop Zone Formulas
Test Section 6	Drop Zone Survey

DEFINITION OF A DROP ZONE

A designated area where personnel and/or equipment are delivered by means of a parachute or, in the case of certain items, by free drop. The ground unit commander is responsible for designating the drop zone location. All drop zones must be on government-owned or government-leased land with a current survey or tactical assessment.

THE EIGHT DROP ZONE SELECTION FACTORS

There are eight drop zone selection factors considered when determining the suitability of a drop zone. The Drop Zone Support Team Leader (DZSTL) must be able to advise the ground unit commander on the suitability of the drop zone. There is no selection factor of more importance than the others. They all must be taken into consideration equally.

- **A**irdrop Airspeed
- **D**rop Altitude
- **T**ype of Airdrop
- **M**ethod of Airdrop
- **O**bstacles
- **A**ccess
- **A**dequate Approach and Departure Routes
- **S**ize of Drop Zone

AIRDROP AIRSPEEDS

The aircraft airspeed will determine the amount of time the aircraft will fly over the drop zone. The slower the aircraft flies, the greater the number of jumpers or amount of equipment the aircraft can deliver. Airdrop airspeeds are measured in knots indicated airspeed or KIAS.

AIRDROP AIRSPEEDS (KIAS)	
TYPE OF AIRCRAFT	DROP SPEED
UH-Series Aircraft (UH-1 / UH-60)	50 to 90 KIAS (**Planning 70 KIAS)**
CH-Series Aircraft (CH-3 / CH-46 / CH-47 / CH-54)	70 to 110 KIAS (**Planning 90 KIAS**)
STOL Aircraft (C-23 Sherpa / Casa-212 / Twin Otter / OV-10 / etc.)	90 to 110 KIAS (**Planning 105 KIAS**)
C-130 / C-17 (personnel/door bundles)	130-135 KIAS (**Planning 130 KIAS**)

C-130 (CDS/Equipment/Combination)	130-140 KIAS (**Planning 140 KIAS**)
C-17 (CDS/Equipment/Combination)	140-150 KIAS (**Planning/Optimum 140 KIAS**)
C-17 Heavy Equipment	**Planning 150 KIAS**

USAF Fixed Wing Airdrop Airspeeds Personnel/Equipment (KIAS)		
TYPE OF LOAD	**C-130**	**C-17**
Personnel & Door Bundle Static Line	**130**	(130-135) 130
CDS/Combination & Equipment/Combination	130-**140***	145-+/-5
Heavy Equipment	**140**	**150**
Free Fall (Free Drop)	140	145-+/-5
High Velocity CDS	130-**140***	145-+/-5
Wedge	130-**140***	145-+/-5
Ahkio Sled	130-**140***	145-+/-5
CRRC (Combat Rubber Raiding Craft)	130-**140***	145-+/-5
HSLLADS	En Route Airspeed	

NOTE 1: *Used when gross weight is above 120,000 pounds. For combination drops, use the higher airspeed KIAS. A combination drop exist when different aircraft in a formation are dropping different types loads during the same pass over the drop zone or when different types of loads are exiting the same aircraft during the same pass over the drop zone.

Difference between knots and knots indicated airspeed (KIAS)

Knots (nautical mile per hour) – This is a speed measured relative to how fast something is traveling over the ground. Winds are measured in knots.

KIAS (Knots Indicated Airspeed) – This is the speed the aircraft is moving through its selected medium (the air) and is measured via a pitot-static system. Thus an aircraft flying 150 KIAS into a 30 knot headwind would only be traveling 120 knots in relation to the ground; if it were flying with a 30 knot tailwind, it would be traveling 180 knots in relation to the ground. Airspeed is usually (and in this course) measured in KIAS.

DROP ALTITUDE

Drop Altitude is measured from Above Ground Level (AGL). This is from the highest field elevation on the drop zone to the drop aircraft as the aircraft will maintain level flight while conducting an airdrop mission. However, some drop aircraft may request the drop altitude in Mean Sea Level (MSL) as measured from sea level. To calculate, take the field elevation and round it up to the nearest 50 feet. (e.g. 537 feet becomes 550 feet), then add the drop altitude in feet AGL. To convert map altitude in meters to feet multiply by 3.28.

EXAMPLE: Field Elevation = 537 feet roundup to 550 feet

550 ft. field elevation
<u>+ 800 ft. drop altitude AGL</u>
1350 MSL

Drop Altitudes		
Rotary-Wing & STOL Delivery Altitudes:		
Personnel	Day or Night	1500 Feet AGL (Planning)
Bundles	Day	300 Feet AGL (Planning)
	Night	500 Feet AGL (Planning)
LCLA	Day	150 Feet AGL (Planning)
	Night	150 Feet AGL (Planning)
NOTE: If the rotary-wing/STOL aircraft is flying 90 KIAS or faster the aircraft can drop personnel at 1250 Feet AGL (Minimum) – **NOT TO INCLUDE UH-series AIRCRAFT!!!**		

USAF Fixed Wing Delivery Altitudes Personnel:	Planning Drop Altitude 1000 Feet AGL
Combat Operations (War)	Determined Jointly by Airborne and Airlift Commanders
Tactical Training	1000 Feet AGL (Planning for Tactical Training)
Basic Airborne Training	1250 Feet AGL (Planning for BAC)
SATB-P	500 Feet AGL (Planning for SATB-P)

USAF Fixed-Wing Delivery Altitudes Door Bundles:	Planning Drop Altitude	1000 Feet AGL
Type of Parachute	Altitude C-17 (Minimums)	Altitude C-130 (Minimums)
G-14	300 Feet AGL	300 Feet AGL (Minimum)
T-10 Cargo	300 Feet AGL	400 Feet AGL

CDS Delivery Altitudes for C-17:	Planning Drop Altitude	600 Feet AGL
Type of Parachute	Number Parachutes or Containers	Airdrop Altitude
G-14	1 or 2 Containers	300 Feet AGL (Minimum)

CDS Delivery Altitudes for C-130:	Planning Drop Altitude	600 Feet AGL
Type of Parachute	Number Parachutes or Containers	Airdrop Altitude
G-14	1 or 2 Containers	400 Feet AGL (Minimum)

USAF Fixed Wing Delivery Altitudes Heavy Equipment:	Planning Drop Altitude	1100 Feet AGL
Type of Parachute	Altitude C-17 (Minimum)	Altitude C-130 (Minimum)
G-12E	550 Feet AGL	550 Feet AGL

USAF C17 Dual Row Delivery Altitudes Heavy	Planning Drop Altitude	1200 Feet AGL
Type of Parachute	Altitude C-17 (Minimum)	
G-12E	1000 Feet AGL	
G-11D	1200 Feet AGL	

USAF Fixed Wing Delivery Altitudes JPADS/I-CDS:	Planning Drop Altitude	10,000 Feet AGL
	Minimum Drop Altitude	3500 Feet AGL

***NOTE 1**: Combination drops will use the highest airdrop altitude. A combination drop exist when different aircraft in a formation are dropping different types loads during the same pass over the drop zone or when different types of loads are exiting the same aircraft during the same pass over the drop zone.

***NOTE 2**: Minimum airdrop altitude for equipment using the 5000 lb, 10,000 lb or 15,000 lb pound parachute release system is 1000 feet AGL or by parachute type (whichever is higher).

TYPES OF AIRDROP

There are three types of delivery for airdrop items. They are low velocity, high velocity, and free drop. The type of delivery will normally determine the location of the control center. The primary difference between the types of delivery is the type of parachute used or the lack of a parachute, and the loads being delivered.

Low Velocity: Utilized for sensitive equipment and personnel drops. The canopy attached is used to slow the rate of decent to prevent damage to equipment or injury to the jumper.

High Velocity: The chute is designed to stabilize the load and reduce the rate of descent to a magnitude, which ensures acceptable landing shock.

Free Drop: Used for non-sensitive items only. No parachute is attached to the load

***NOTE**: When determining the suitability of the drop zone and considering method of delivery, caution should be taken when using high velocity or free drop around built up areas or airfields because risk of damage to buildings or airstrips.

METHODS OF AIRDROP

The type of load and the method it exits the aircraft will determine the amount of time it takes for the load to exit that aircraft based on drop zone type.

- **Personnel and Door Bundles**: This type of airdrop load self-exits, is pushed, or is skidded from the paratroop/aircraft door or aircraft ramp.

  Personnel:

  On all drop zones allow **one second for each jumper** to exit the aircraft. The one-second interval begins after the first jumper exits the aircraft.
  Ex. 10 jumpers require 9 seconds to exit the aircraft.

  Door Bundles:

  On GMRS and VIRS drop zones allow three seconds for each door bundle to exit the aircraft. The three-second interval begins after the first bundle exits the aircraft.
  Ex. 3 door bundles require 6 seconds to exit the aircraft.

  On CARP drop zones door bundles are treated the same as personnel. For CDS and Heavy Equipment, the time requirement between loads is already factored into the minimum CARP DZ sizes found in AFI 13-217.

  ***NOTE**: There is no set amount of time to wait in between exiting bundles and personnel, however the jumpmaster team must ensure all bundles have been exited from the aircraft and that no unsafe condition exist before starting to exit personal in accordance with FM 3-21.220 chapter 10. Under no circumstances will bundles and personnel ever exit the aircraft simultaneously.

- **Gravity**: The aircraft maintains a “nose-high” attitude (if required) and in-flight release of load restraint allows the load to roll out of the aircraft. A rigging system may be used to initiate and accelerate load movement.

- **Extraction**: An extraction parachute pulls the load from the cargo compartment

OBSTACLES

The DZSTL is responsible for conducting a reconnaissance and declaring obstacles on and near the drop zone.

Obstacles to personnel: Any feature, either natural or man-made that would pose a hazard to the jumper or prevent the jumper from accomplishing his or her mission.
Obstacles to equipment: Any feature, either natural or man-made that may hinder the recovery of the load or cause damage to a load.

Three Primary Obstacles:

TREES: 35 feet or higher impeding recovery of personnel or equipment. (35 feet is the distance from the top of a personnel parachute to the harness.)
WATER: 4 feet deep or deeper AND 40 feet wide at the widest point, within 1000 meters of any edge of the DZ. The DZSTL can declare any body of water a water obstacle.
POWER LINES: 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, first attempt to site the DZ so no power lines are located within 1000 meters of any DZ boundary.

If power lines are located within 1,000 meters of any boundary, coordinate with the Power Company to shut off power **NLT 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. Include as a minimum; 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, consider altering the mission profile to raise/lower drop altitudes, change DZ run-in/escape headings, or remove inexperienced jumpers from the stick. If possible, mark power lines with visual markings (lights or VS-17 panels).

WARNING: At no time will military personnel attempt to climb power line poles to position or affix markings to wires or poles. Smoke will not be used to mark power lines as you risk obscuring the obstacle from jumpers.

ACCESS

Avoid major obstacles to personnel and equipment between the drop zone and the objective. Ensure that adequate routes are available for equipment recovery.

ADEQUATE APPROACH AND DEPARTURE ROUTES

Routes for the aircraft both into and away from the drop zone must be considered.

No-Fly areas (Impact areas are **NOT** No-Fly areas)
Obstacles to the aircraft, e.g. TV towers, high-tension lines, etc (Man-made objects)
Terrain higher than the drop zone (Natural objects)
Enemy situation and location

SIZE OF THE DROP ZONE

Verbally Initiated Release System (VIRS) size dictated by **FM 3-21.38**
Ground Marked Release System (GMRS) size dictated by **USASOC Reg. 350-2**
Computed Air Release Point (CARP) size dictated by **AFI 13-217**

COMPUTED AIR RELEASE POINT DROP ZONES

Primary Reference: AFI 13-217 **Secondary Reference: AFI 11-231**

POINT OF IMPACT LOCATIONS

Table 2.2. Standard Point of Impact Placement.

TYPE DROP	DISTANCE FROM APPROACH END	
C-130	**DAY**	**NIGHT**
CDS	200 yds / 183 m	250 yds / 229 m
Personnel	300 yds / 274 m	350 yds / 320 m
Equipment	500 yds / 457 m	550 yds / 503 m
C-17	**DAY / NIGHT / IMC**	**NIGHT Pilot Directed Airdrop (PDA)**
CDS / DRAS	225 yds / 206 m	275 yds / 251 m
Personnel	300 yds / 274 m	350 yds / 320 m
Equipment	500 yds / 457 m	550 yds / 503 m

NOTES:

1. For lateral placement, the PI must be located at least one-half the width of the minimum size DZ (based upon type airdrop and airdrop formation) from the closest side of the DZ. EXCEPTION: C-17 personnel drops may use an offset PI of 125 or 250 yds left/right of planned PI, depending on formation size.
2. The PI may be located anywhere within the surveyed DZ boundaries as long as the minimum required DZ size for that type airdrop and airdrop formation fits within the boundaries, and provided the distance from the leading edge and sides is complied with. All participants must be briefed when using this option.
3. JPADS guided systems PI will be the DZ centerpoint unless otherwise coordinated by the supported forces commander as designated supported forces authority by respective Division Commander

***NOTE** : PI location may be adjusted to meet specific mission requirements. Participants must be briefed.

***NOTE 2**: PI location may be adjusted for aircrew PI acquisition training. The PI may be located anywhere within the surveyed DZ boundaries as long as the minimum required DZ size for that type airdrop and aircraft formation fits within the boundaries, and provided the distance from the leading edge listed above is complied with. For lateral placement, the PI must be located at least one-half the width of the minimum size DZ (based upon type airdrop and aircraft formation) from the closest side of the DZ. All participants must be briefed when using this option.

***NOTE 3**: For **HAARS** position the PI in the center of the DZ.

***NOTE 4**: For **HV-CDS** positon the PI in the center of the DZ for the **1st** Item released.

***NOTE 5**: PI distance from sides of DZ must be at least one-half the minimum width for that type airdrop.

***NOTE 6**: All new PI Locations must be relayed to C-17 and C-130J crews NLT 15 minutes prior to TOT. If inside the 15 minute windows crews will advise as to the new supportable TOT.

RANDOM POINTS OF IMPACT, MULTIPLE POINTS OF IMPACT, RANDOM APPROACH DROP ZONES

Random Points of Impact (RPI):
When mission requirements dictate, the RPI placement option may be used. This option may be exercised in two ways.

Option One: The mission commander will notify the DZSTL at least 24 hours in advance that RPI placement will be used. When the DZ is established, the DZSTL will randomly select a point on the DZ and establish that point as the PI for the airdrop. In this case, the DZSTL will ensure that the DZ minimum size requirements for the load being dropped are met and that the entire DZ falls within the surveyed boundaries.

Option Two: The mission commander or supported force commander may request the DZ established with the PI at a specific point on the DZ. Requests should be made at least 24 hours in advance. The requester will ensure that the minimum DZ size criteria is met for the type load being dropped and that the entire DZ falls within the surveyed boundaries.

Multiple Points of Impact (MPI):
MPI airdrops are authorized if all personnel involved have been properly briefed. MPI airdrops are defined as an aerial delivery method that allows for the calculated dispersal, both laterally and longitudinally, of airdropped loads to predetermined locations on a DZ. The DZ must meet the minimum size requirements for each PI and the precise location of each PI must be provided to aircrews.

Offset PI Locations:
C-17 aircraft conducting personnel airdrops and flying in formation may require offset (laterally displaced) PIs. Offset PIs are PIs 250 yards left and right of the surveyed PI for a 3 ship formation and 125 yards left and right of surveyed PI for a 2 ship formation. The DZ width must be increased accordingly to meet the distance criteria from the DZ edge to the PI. This manner of placement reduces the effects of wake turbulence across the DZ.

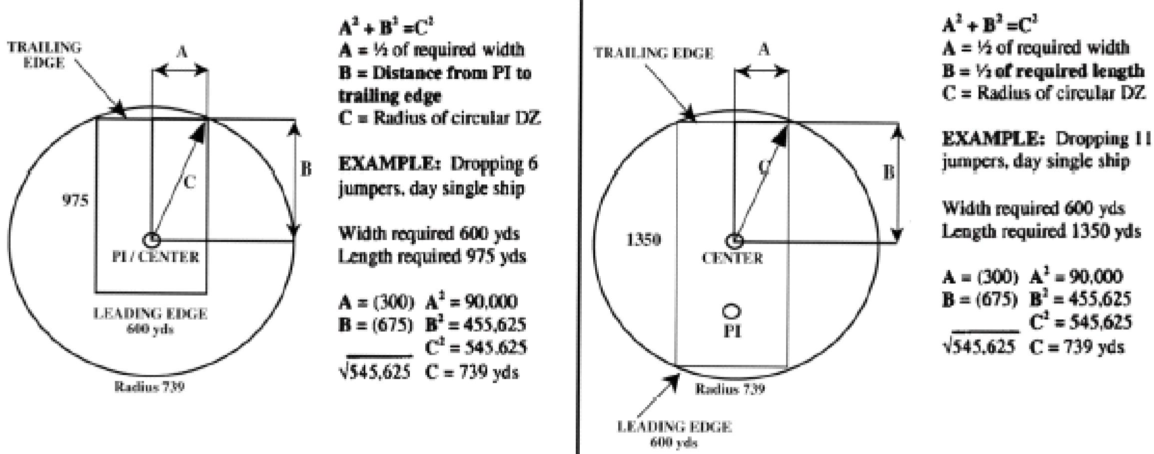
RANDOM APPROACH / CIRCULAR DROP ZONES

Random Approach DZ:
A random approach DZ is a variation of a previously surveyed DZ and of sufficient size to permit multiple run-in headings. Any axis of approach may be used as long as the resulting DZ meets the minimum criteria for the load being airdropped and remains within the boundaries of the original surveyed DZ. This may be accomplished by conducting a circular DZ calculation in order to confirm the drop zone meets minimum size criteria from any axis of approach. In all cases, perform a safety-of-flight review IAW AFI 13-217 Paragraph 2.22.1.2 prior to use.

Circular DZ:
The size of the DZ is governed by mission requirements and usable terrain. The PI of a circular DZ is normally at the DZ center to allow for multiple run-in headings. For specific missions, the PI location may be adjusted to allow for sequential heavy equipment (HE), mass container delivery system (CDS), etc., on circular DZs. However, this limits the run-in heading to only one direction.

In all cases, the minimum DZ dimensions for the type and number of loads being dropped must completely fit into the surveyed circular DZ. Refer to the circular drop zone computation below to determine whether the minimum DZ fits into the surveyed circular DZ. For cases where the PI has been relocated, use Option 2.

Option 1 (Surveyed) | **Option 2 (Mission Specific)**



Point of Impact located at circlular DZ center. The radius of the circular DZ is the minimum distance between the Point of Impact and one of the trailing edge corners on a rectangular DZ.

Point of Impact offset from circular DZ center. The radius of the circular DZ is the minimum distance between the Center of Mass and one of the trailing edge corners on a rectangular DZ.

***NOTE**: The circular DZ size recorded on drop zone survey forms will be calculated using Option 1. This will prevent confusion and reduce the risk of off DZ drops if the circle center point is used as the PI.

MARKING CARP DROP ZONES

The DZSTL and DZ party marks the PI on the DZ, and the aircraft navigator computes the release point from the air. Code letters for all CARP Drop Zones are restricted to J, C, A, R, S for rectangular drop zones and H and O for circular or random approach drop zones.

<u>Daytime</u>

- Minimum daytime marking should be the raised angle marker (RAM) for all peacetime operations.
- A Block Letter may be used to supplement the RAM when it is necessary to provide authentication and/or to differentiate between drop zones within the same local area. Both markers are made from VS-17 panels. The RAM will be aligned into the aircraft line of flight with the base placed at the PI.
- A minimum of 9 panels will be used to form a block letter for day time operations with a minimum size of 35 feet by 35 feet.
- Either side of the VS-17 panel may be used based on the contrast with the surrounding environment.

<u>Night time</u>

- For night time operations a minimum of 9 omni-directional white lights will be used to form the block type code letter at the bottom of the PI with a minimum size of 35 feet by 35 feet.
- If utilized, at the request of the airborne or airlift commander, the following optional lights may be placed:
- 2 white omni-directional flanker lights placed 250 meters left and 250 meters right of the PI.
- An amber rotating beacon placed a minimum of 1000 meters from the PI on drop heading or at the trailing edge of the surveyed DZ whichever is closer.

*__NOTE 1__: A circular/random approach drop zone is one that does not have a predetermined drop heading. Therefore, the aircraft can approach the drop zone from any direction. The PI markings are the only markings required on a circular CARP drop zone.

*__NOTE 2__: The panels in the block code letter are not elevated.

*__NOTE 3__: For Multiple Points of Impact, the surveyed PI will be marked IAW regulations and aircrews will briefed on the location of offset PIs.

Control Center Locations (CARP Drop Zones)

The control center is the location where the DZSTL will control and observe the airborne operation. This is one of the locations where wind readings are taken. The DZSTL should have all radios, signaling devices, and appropriate forms positioned at the control center.

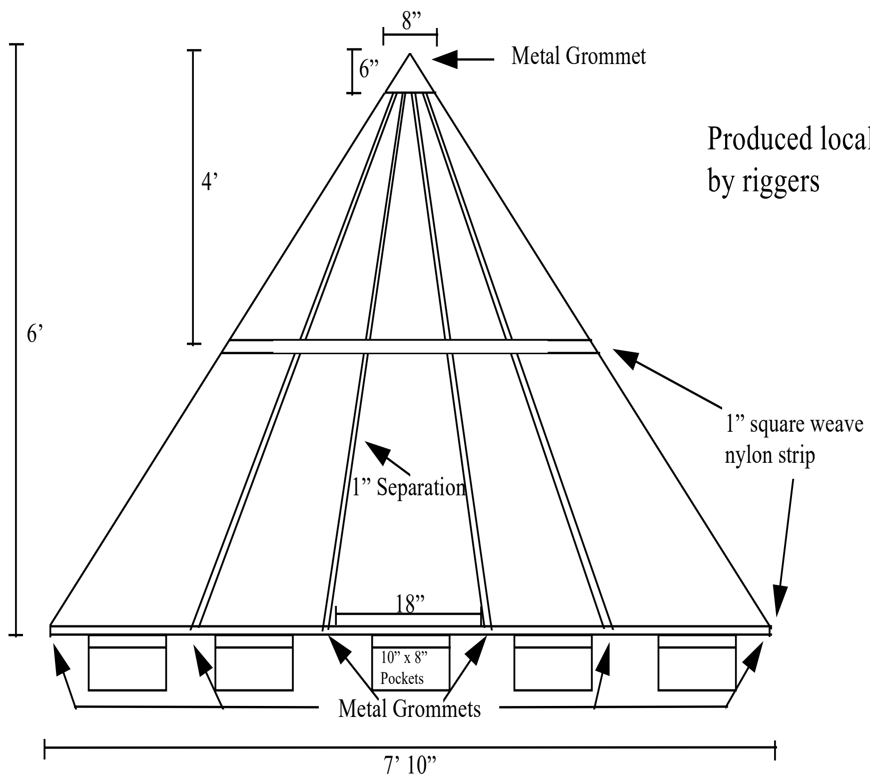
The location of the control center will be determined by the type of mission:

- Personnel drops/door bundles: Control center is located at the PI.
- CDS drops: Control center is located 200 yards to the 6 o'clock off the PI.
- Heavy equipment drops: Control center is located 300 yards to the 6 o’clock off the PI
- High Velocity/High Altitude Aerial Release System (HAARS), Free drops, and AWADS: Control center will be located off the drop zone. However, it should be located so that the approaching aircraft can be observed along with the PI if possible. For example the leading edge may be a poor location due to obstruction by the wood line.

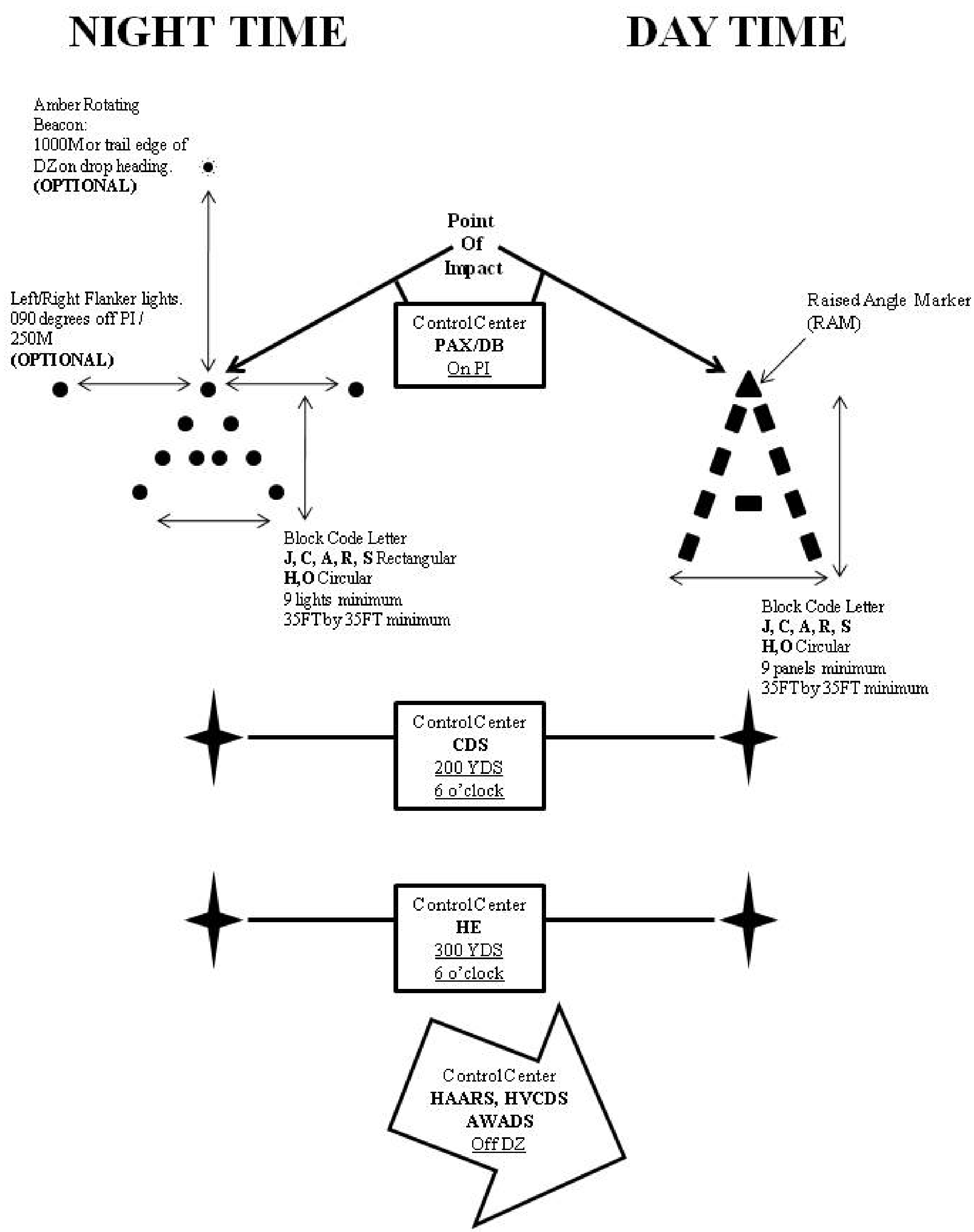
*__NOTE__: A ceiling of 600 feet or less requires the control center for all drops to be located off the drop zone.

RAM MEASUREMENTS

Raised Angle Marker (RAM)



CARP MARKINGS



Strike Report

AF 4304

The AF 4304 is basically a score card for the Air Force. Since the release point is computed by the aircrew on the CARP drop zone, the Air Force must have some documentation of the crew's performance. It is forwarded to S3 Air.

DROP ZONE/LANDING ZONE CONTROL LOG

LOCATION	CCT AND UNIT	DZ/LZ CONTROL OFFICER AND UNIT	DATE
			DROP ZONE SAFETY OFFICER AND UNIT

LEGEND

AH-Airland *(Heavy)*
AL-Airland
CD-CDS/CRL/CRS
GM-GMRS

HE - Heavy Equipment
HO - HALO/HAHO
IL - Inverted "L"

LS-Instrument Landing System
PE-Personnel
RB-Radar Beacon Drop

SCORE METHOD
M - Measured
P - Paced
E - Estimated

LINE NO	TYPE ACFT	UNIT	CALL SIGN	TYPE MSN	ETA	ATA	STRIKE REPORT		LZ		SURF WIND	SCORE METHOD	MEAN EFFECTIVE WIND			REMARKS
						ATD	YDS	CLOCK	S	U			TIME	ALT	DIR & VEL	
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

AF IMT 4304, 20020903, V1 REPLACES AMC 168, DEC 92

AF Form 4304, Drop Zone / Landing Zone Control Log. It is the responsibility of the DZSTL to ensure this form is complete and accurate. Use the instructions listed below to complete AF Form 4304.

- **DATE**. Enter date and year. Use either calendar or Julian date. When a “time” is required use local or GMT consistent with the date.
- **LOCATION**. Enter DZ name.
- **CCT AND UNIT**. DZSTL name and unit.
- **DZ/LZ CONTROL OFFICER AND UNIT.** Identification of the individual controlling the DZ.
- **DROP ZONE SAFETY OFFICER AND UNIT**. These may all be filled out with your name if you are filling the capacity of all these positions. If the duty positions are filled by separate individuals, fill it out as such.
- **LINE NO**. Mission sequence number of each aircraft. Each line number on any given drop zone mission represents individual passes over the drop zone. If you have a multiple aircraft drop zone, each line number still represents individual aircraft. An example being a 3 ship operation utilizing three lines. No drop passes should use a line number also. The remarks column should reflect the reason for the no drop situation.
- **TYPE ACFT**. Mission design series.
- **UNIT**. Unit of aircraft.
- **CALL SIGN**. Call sign of lead and, if applicable, formation position number.
- **TYPE MSN**. Refer to LEGEND for abbreviations.
- **ETA**. Estimated time of arrival, estimated TOT, or S3 air brief. Keep the unit of time consistent throughout the form (e.g., local or GMT).
- **ATA/ATD**. Actual time of every pass or actual time of departure. STRIKE REPORT.
- **STRIKE REPORT**: The strike report YDS/clock is the actual purpose of the 168. The DZSTL will observe the first parachute suspended item from the control center and will determine the distance in yards and the clock direction in relationship to the point of impact. 12 o'clock is magnetic drop heading. If the first parachute lands within 25 yards of the point of impact, then you will put the letters PI in these blocks to indicate a PI strike. If it was impossible to maintain visual contact with the first parachute, especially during multiple aircraft operations, then mark with an "S" or a "U" (Satisfactory or Unsatisfactory). If 90% of the parachutes land on the drop zone than an "S" will be put in these blocks. If less than 90% of the parachutes land on the drop zone than a "U" will be put in this block. If radio communications is maintained with the drop aircraft, it would be an asset to the operation if strike reports are relayed to the drop aircraft so that the aircrew can make adjustments on preceding passes over the drop zone.
- **YDS**. Distance first jumper/container/pallet lands from PI in yards. If within 25 yards is scored a PI.
- **CLOCK**. Use direction of flight as 12 o’clock and back its azimuth as 6 o’clock, estimate direction from PI to first jumper/container/pallet. If time and conditions permit, the actual measurement is preferred.
- **LZ**. Mark the “S” box if a landing occurred between the beginning of the touchdown zone and the first 500 feet. If the landing was not successful (i.e., go-around), short of the touchdown zone, or 500 feet beyond the beginning of the touchdown zone, mark the “U” box and provide comments in the REMARKS box.

- **SURF WIND**. Surface wind direction in degrees, and velocity in knots. This should be the highest wind reading during the 10 minute window for that pass.
- **SCORE METHOD**. Refer to LEGEND for abbreviations for the method on which you determine the distance to the first parachute from the PI.
  - **E** = Estimated--- Estimated is making a calculated guess.
  - **P** = Paced--- Paced is using your pace count to determine the distance to the first parachute.
  - **M** = Measured--- Measured is when a calibrated measuring device is used to determine the distance to the first parachute.
- **MEAN EFFECTIVE WIND**. Time taken and at what altitude.
- **TIME**. Self-explanatory.
- **ALT**. Should be drop altitude.
- **DIR & LVL**. Wind direction in degrees and velocity in knots.
- **REMARKS**. Enter remarks as appropriate. Anything pertaining to the drop zone operation that can be useful to the Air Force during pilot debriefing.

*__Note__: The DZSTL forwards the AF 4304 to his air operations officer who in turn submits it through the chain of command to the USAF representative (usually the air mobility liaison officer – AMLO). If the DZSTL has radio communication with the aircraft, the strike report should be transmitted directly to the aircraft.

Phraseology: "Lifter one-six, strike report, three o'clock two-hundred yards."

Phraseology: "Lifter one-six, strike report, PI."

CARP Drop Zone Sizes

Established and tactically assessed CARP drop zones have size requirements that must be met in order to accommodate a variety of missions such as personnel, heavy equipment, and various CDS. The DZSTL may be expected to calculate drop zone size requirements to accomplish a survey for a specific mission or be expected to specify what can be delivered in one or multiple passes for an existing, surveyed drop zone. Both of these duties require the DSZTL to be able to apply restrictions and guidance from AFI 13-217 and AFI 11-231 to safely execute the airborne operations and meet ground commander's intent.

Essential to the process of these calculations is the minimum drop zone size requirements or "CARP Chart" from AFI 13-217 extracted over the next three pages.

Table 2.1. Standard Drop Zone Size Criteria.

ALTITUDE (AGL)	WIDTH (NOTE 1, 2, 4)	LENGTH (NOTE 3, 4)		
C-130 Container Delivery System (CDS) / Container Release System (CRS) / Container Ramp Loads (CRL) / Low Cost Aerial Delivery System – Low Velocity (LCADS-LV)				
To 600 feet	400 yds / 366 m	Single containers	Double containers	
		1	1-2	400 yds / 366 m
		2	3-4	450 yds / 412 m
		3	5-6	500 yds / 457 m
		4	7-8	550 yds / 503 m
		5-8	9-16	700 yds / 640 m
		9-12	17-24	850 yds / 777 m
Above 600 feet	Add 40 yds / 36 m to width and length for each 100 feet above 600 feet (add 20 yds / 18 m to each side of DZ, 20 yds / 18 m to each end)			
CDS / LCADS-LV (C-17)				
To 600 feet	450 yds / 412 m	Single containers	Double containers	
		1	1-2	590 yds / 540 m
		2	3-4	615 yds / 562 m
		3	5-6	665 yds / 608 m
		4-8	7-16	765 yds / 700 m
		9-14	17-28	915 yds / 837 m
		15-20	29-40	1065 yds / 974 m
Above 600 feet	Add 40 yds / 36 m to width and length for each 100 feet above 600 feet (add 20 yds / 18 m to each side of DZ, 20 yds / 18 m to each end)			
High Velocity (HV) CDS / HV-LCADS (using 12, 22, or 26 foot ring slot parachutes)				
To 3000 feet	580 yds / 530 m	660 yds / 604 m		
		Add 50 yds / 46 m to trailing edge for each additional row of containers.		
Above 3000 feet	Add 25 yds / 23 m to each side and 100 yds / 91 m to each end for every 1000 feet increase in drop altitude			
High Altitude Airdrop Resupply System (HAARS) CDS				
To 3000 feet	500 yds / 457 m	1 - 8 containers		1200 yds / 1098 m
		9 or more containers		1900 yds / 1739 m
Above 3000 feet	Add 25 yds / 23 m to each side and 50 yds / 46 m to each end for every 1000 feet increase in drop altitude			
High Speed Low Level Aerial Delivery System (HSLLADS)				
	300 yds / 274 m	600 yds / 549 m		

ALTITUDE (AGL)	WIDTH (NOTE 1, 2, 4)		LENGTH (NOTE 3, 4)
PERSONNEL (Static Line)			
To 1000 feet	600 yds / 549 m	1 Parachutist	600 yds / 549 m
		Additional Parachutists	Add 75 yds / 69 m to the trailing edge for each additional parachutist (PI for Special Tactics, Pararescue, and RQS assigned or supporting SERE personnel). Include safety zone if required (see Attachment 1 Safety Zone)
Above 1000 feet	Add 30 yds / 28 m to width and length for each 100 feet above 1000 feet (add 15 yds / 14 m to each side of DZ, 15 yds / 13 m to each end)		
HEAVY EQUIPMENT			
To 1100 feet	600 yds / 549 m	1 Platform	1000 yds / 915 m
		Additional Platforms	Add 400 yds / 366 m (C-130), 500 yds / 457 m (C-17) to the trailing edge for each additional platform
Above 1100 feet	Add 30 yds / 28 m to the width and length for each 100 feet above 1100 feet (add 15 yds / 14 m to each side of DZ, 15 yds /14 m to each end)		
C-17 DUAL ROW AIRDROP SYSTEM			
To 1200 feet	600 yds / 549 m	1 Platform	1000 yds / 915 m
		Additional Platforms	Add 400 yds / 366 m to the trailing edge for each additional platform
Above 1200 feet	Add 30 yds / 28 m to the width and length for each 100 feet above 1200 feet (add 15 yds / 14 m to each side of DZ, 15 yds /14 m to each end)		
Note	**18 ft platforms**: The number of platforms used to calculate the minimum size drop zone is determined by platform placement as well as the number of platforms actually on board the aircraft. The number of empty positions aft of an actual platform/pallet being dropped must be added to the overall number of pallets. For example: 1 platform in position 1L, and 1 platform in position 4R would require calculations based on 5 platforms. **463L or 8 ft training platforms**: Minimum drop zone size is 1600 yds long by 600 yds wide for the 2 or 3 pallet/platform training configuration.		
C-130E, H, J / C-17 JPADS GUIDED SYSTEMS (Note 5)			
Airdrop Altitude (AGL)	**Minimum DZ Size (Radius)**		
	Meters		**Yards**
<9,000'	**300**		**328**
9,000-15,000'	**500**		**546**
15,001-25,000'	**700**		**765**
>25,000'	**No Data**		**No Data**

Note: When computing width requirements for **MULTI-SHIP DRAS** add an additional **400 yards** to the **Total Width** IAW AFI 11-231, 19.12.2.1.

CARP DROP ZONE ADDITIONAL SIZE

NOTES:

1. **C-130 DZ width adjustments (N/A for CSAR assigned/gained aircraft, or AFSOC assigned/gained aircraft OPCON to USSOCOM or a theater special operations command):**
   a. Day visual formations; increase width by 100 yds / 92 m (50 yds / 46 m on each side)
   b. Night visual single ship; increase width by 100 yds / 92 m (50 yds / 46 m on each side)(N/A for C-130J GPS drops)
   c. Night visual formation; increase width by 200 yds / 184m (100 yds / 92 m on each side)
   d. SKE formation; increase width by 400 yds / 366 m (200 yds / 184 m on each side)
2. **C-17 DZ width adjustments (more than one may be required)**
   a. Day/Night visual formation, increase width by 100 yds / 92 m (50 yds / 46 m on each side)
   b. Night pilot directed airdrops; increase width by 100 yds / 92 m (50 yds / 46 m on each) (N/A for C-17 GPS drops)
   c. SKE formation (HE/CDS); increase width by 400 yds / 366 m (200 yds / 183 m on each side)
   d. Personnel formation, minimum DZ basic width using center PIs is 1240 yards for 2-ship elements and 1800 yds for 3-ship elements. When using offset PIs, minimum basic width is 1050 yds for 2-ship elements and 1300 yds for 3-ship elements. Drop altitude adjustments from chart still apply.
3. **Length Adjustments (N/A for AFSOC assigned/gained, aircraft OPCON to USSOCOM, or a theater special operations command)**
   a. Night visual airdrops; increase length by 100 yds / 92 m (50 yds / 46 m on each end)
4. I-CDS DZ length and width requirements will be IAW 2.5.2. and normal high-altitude CDS/HVCDS adjustments in Table 2.1.
5. Normal training minimum JPADS DDZ size requirements
   a. These minimum DZ size requirements are for normal JPADS training outside of Yuma Proving Grounds (YPG). DZ size requirements at YPG are at the discretion of AMC/A3D, NATICK and YPG as necessary for testing, development and evaluation of JPADS systems. JPADS upgrade training for aircrews may occur at YPG or DZ sizes smaller than stated above with the concurrence of AMC/A3D.
   b. During contingency use, recommended minimum JPADS DZ size is 200-300 meters (218 – 328 yards) radius circular. Ultimately, minimum JPADS DZ size restsmwith the user and the Joint Force Commander (or Director of Mobility Forces if so delegated).

ARMY VIRS

SIZE REQUIREMENTS AND BUFFER ZONES – VIRS

Proponent Agency: United States Infantry Military Center of Excellence; US Army Pathfinder School (Executor of the Proponent)

Primary Reference: FM 3-21.38 (Transitioning to ADP 3-21.38)

The minimum size of a VIRS drop zone is **275 meters wide x 275 meters** long (**300 yards wide x 300 yards long**). Additional size requirements will be determined using the D=R x T formula. Green light calculations will be determined using the T = D / R formula.

- A 100 meter buffer zone will be established on all edges of VIRS drop zones for personnel operations. The 100 meter buffer on all edges for personnel drops will be **inclusive** of the minimum size.
  - The point of impact will not be placed closer than 100 meters to the leading edge tree line.
  - The planned location for the last jumper landing area will not be closer than 100 meters prior to the trailing edge tree line.

  This will decrease the risk of a tree landing.

- Buffer zones are not required for door bundle operations.

  NOTE: For any type of VIRS drop zone other than personnel or door bundles, the drop zone size will be determined based on the CARP size charts in AFI 13-217.

ESTABLISHING A VIRS DROP ZONE

When establishing a ground Verbal Initiated Release System drop zone, the first phase of establishment is determining the release point location. Follow the steps below to establish the release point for such drop zones. Remember that this process is "backwards planning"; everything is calculated from where the point of impact is located and adjusted accordingly.

STEP 1. Determine drop heading. If the drop zone was surveyed and an AF 3823 was published for the drop zone, use the magnetic course indicated. If the drop zone was surveyed as a circular DZ, a tactical assessment was done on the drop zone, or the drop zone is being established as a ARMY VIRS drop zone, determine drop heading taking into consideration these three factors:

- Long axis
- Wind direction
- Obstacles on the approach and departure ends of the drop zone

NOTE: This is ONLY "wind direction" NOT "wind direction and speed"

STEP 2. Determine the Point of Impact (PI). The PI for personnel will be centerline of the drop zone and 100 meters from the leading edge. The PI for bundles will be centerline of the DZ and on the leading edge. These may be adjusted forward, left or right if necessary. For CDS, and Heavy Equipment, use the surveyed PI locations indicated on the AF 3823. If a tactical assessment was done in lieu of an AF 3823, use the CARP PI planning locations for CDS and Heavy Equipment. The size for CDS and Heavy Equipment drop zones will be determined by the CARP charts.

STEP 3. Determine wind direction and speed. This should be done using the PIBALL. The MEW is more accurate. If PIBALL capabilities are not available then the surface wind direction and speed must be used. Once the wind direction and speed has been determined, calculate a D = K x A x V formula for drift in meters.

MEAN EFFECTIVE WIND

Mean effective wind is the average wind from ground level to drop altitude. It is measured by using the Pilot Balloon (PIBALL). If PIBALL capabilities are not available then surface wind will be used. If you have communications with the aircraft, it is beneficial to the mission if you transmit the MEW to the aircrew before the first pass. It will assist them in calculating an accurate release point.

To get a PIBALL reading follow the procedures below:

- Utilize the PIBALL chart on page 200 of this student handout or the applicable GTA 7-1-41.
- Ensure the correct chart is used for the type of PIBALL used. When using the 10 gram balloon make sure to use the 10 gram chart. Ensure the same for the 30 gram balloon.

The following equipment is required for MEW readings:
- PIBALL (10 gram or 30 gram)
- Drift Scale (zero to 90 degrees)
- Helium source
- Stop watch with seconds
- Compass

PIBALL circumferences

-10 gram for day: 57 inches
-10 gram for night: 74 inches
-30 gram for day: 75 inches
-30 gram for night: 94 inches

At night time, PIBALLS are filled to a larger circumference to compensate for the weight of a small liquid-activated light that is attached to the balloon to assist in observation. This will ensure the balloon will have the same ascension rate as the day balloon.

NOTE: A 6 inch chem light may be used in place of the small liquid-activated light.

Calculating the MEW

1. Refer to the TIME/HEIGHT ascent rate column of the PIBALL chart. Determine the altitude of the drop and the amount of time for balloon angle to be checked.

2. Fill balloon up to the correct circumference w/helium.

3. Release balloon and begin timing.

4. Determine angle to the balloon at completion of time.

5. Cross reference ANGLE to altitude on PIBALL chart for the MEW.

6. The magnetic azimuth to the balloon is measured and the reciprocal heading noted. This is the MEW wind direction to be reported.

NOTE: The MEW has NO influence on no-drop situations. Only the surface wind will determine whether a no-drop is applicable.

PI-BALL CHART

10-GRAM HELIUM BALLOON

Inflate balloon to 57-inch circumference for day and 74-inch circumference for night.

ELEVATION ANGLE	DROP ALTITUDE IN FEET											
	500	750	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500
70	02	02	01	01	01	01	01	01	01	01	01	01
60	03	02	02	02	02	02	02	02	02	02	02	02
55	03	03	03	03	03	03	03	03	03	03	03	03
50	04	04	03	03	03	03	03	03	03	03	03	03
45	05	04	04	04	04	04	04	04	04	04	04	04
40	06	05	05	05	05	05	05	04	04	04	04	04
35	07	06	06	06	06	05	05	05	05	05	05	05
30	08	07	07	07	07	07	07	07	06	06	06	06
25	10	09	09	09	08	08	08	08	08	08	08	08
24	11	10	09	09	09	09	08	08	08	08	08	08
23	11	10	10	09	09	09	09	08	08	08	08	08
22	12	11	10	10	10	10	09	09	09	09	09	09
21	12	11	11	10	10	10	10	10	10	10	10	10
20	13	12	11	11	11	11	11	10	10	10	10	10
19	14	13	12	12	11	11	11	11	11	11	11	11
18	15	13	13	12	12	12	12	12	11	11	11	11
17	16	14	13	13	13	13	12	12	12	12	12	12
16	17	15	14	14	14	13	13	13	13	13	13	13
15	18	16	15	15	14	14	14	14	14	14	14	14
14	19	17	16	16	16	15	15	15	15	15	15	15
13	21	19	18	17	17	17	17	17	17	17	17	17
12	22	20	19	19	18	18	18	18	17	17	17	17
11	24	22	21	21	20	20	20	19	19	19	19	19
10	27	25	23	23	22	22	22	21	21	21	21	21
09	30	27	26	26	25	24	24	24	23	23	23	23

ASCENSION TABLE	
TIME	ALT (FT)
0:10	80
0:20	170
0:30	250
0:40	330
0:50	400
1:02	500
1:10	540
1:20	610
1:30	670
1:43	750
1:50	790
2:25	1000
2:44	1100
3:05	1250
3:49	1500
4:30	1750
5:11	2000
6:34	2500
7:58	3000
9:22	3500
10:44	4000
12:08	4500

30-GRAM HELIUM BALLOON

Inflate balloon to 75-inch circumference for day and 94-inch circumference for night.

ELEVATION ANGLE	DROP ALTITUDE IN FEET											
	500	750	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500
80	01	01	01	01	01	01	01	01	01	01	01	01
70	03	03	03	02	02	02	02	02	02	02	02	02
60	04	04	04	04	04	04	04	04	04	04	04	04
55	05	05	05	05	05	05	05	05	05	05	04	04
50	06	06	06	06	06	06	06	06	05	05	05	05
45	07	07	07	07	07	07	07	07	07	06	06	06
40	09	08	08	08	08	08	08	08	08	08	08	08
35	10	10	10	10	10	10	10	09	09	09	09	09
30	12	12	12	12	12	12	12	11	11	11	11	11
25	15	15	15	15	15	15	14	14	14	14	14	14
24	16	16	15	15	15	15	14	14	14	14	14	14
23	17	17	16	16	16	16	15	15	15	15	15	15
22	18	18	17	17	17	17	17	16	16	16	16	16
21	19	19	18	18	18	18	17	17	17	17	17	17
20	20	20	19	19	19	19	18	18	18	18	18	17
19	21	20	20	20	20	20	19	19	19	19	19	18
18	22	22	21	21	21	21	21	20	20	20	20	20
17	23	23	23	22	22	22	22	22	21	21	21	21
16	25	25	24	24	24	24	23	23	23	23	22	22
15	27	27	26	26	25	25	25	25	24	24	24	24
14	29	29	28	27	27	27	27	27	26	26	26	25
13	31	30	30	30	30	29	29	29	28	28	28	27

ASCENSION TABLE	
TIME	ALT (FT)
0:10	120
0:20	240
0:30	360
0:42	500
0:50	600
1:02	750
1:10	830
1:17	1000
1:48	1250
2:10	1500
2:34	1750
2:56	2000
3:43	2500
4:31	3000
5:21	3500
6:09	4000
7:00	4500

STEP 4. Pace off the drift in meters into the wind. This should be the reciprocal heading of the PIBALL direction. If a PIBALL was not used, then field expedient means of determining wind direction may be used.

STEP 5. Pace off the forward throw on the back azimuth of drop heading. Forward throw is the effect that inertia has on a falling object. When an object leaves an aircraft, it is traveling at a speed equal to the speed of the aircraft. The load or jumper continues to move in the direction of flight until the dynamics of the parachute take effect. Once the forward throw has been paced off, this is the location of the Release Point (RP). If the direction and distance paced off for the forward throw causes the RP to go into the wood line, then the PI can be adjusted forward or left and right only. The RP is the location where the first load or jumper will exit the aircraft. The means of identifying the RP to the drop aircraft is dictated by the type of mission.

Note: If the direction and distance of the drift are paced into the wood line, adjust the PI as necessary. Forward or left and right only(ie. never opposite the direction of flight).

AIR FORCE AIRCRAFT FORWARD THROW

TYPE DROP	C-130	C-17
Personnel (Static Line) / Door Bundle	250 yds (229 m)	250 yds (229 m)
Personnel (MFF)	328 yds (300 m)	328 yds (300 m)
Heavy Equipment	500 yds (458 m)	700 yds (640 m)
CDS/CRS/CRL	550 yds (503m)	725 yds (663 m)
SATB	160 yds (147m)	N/A

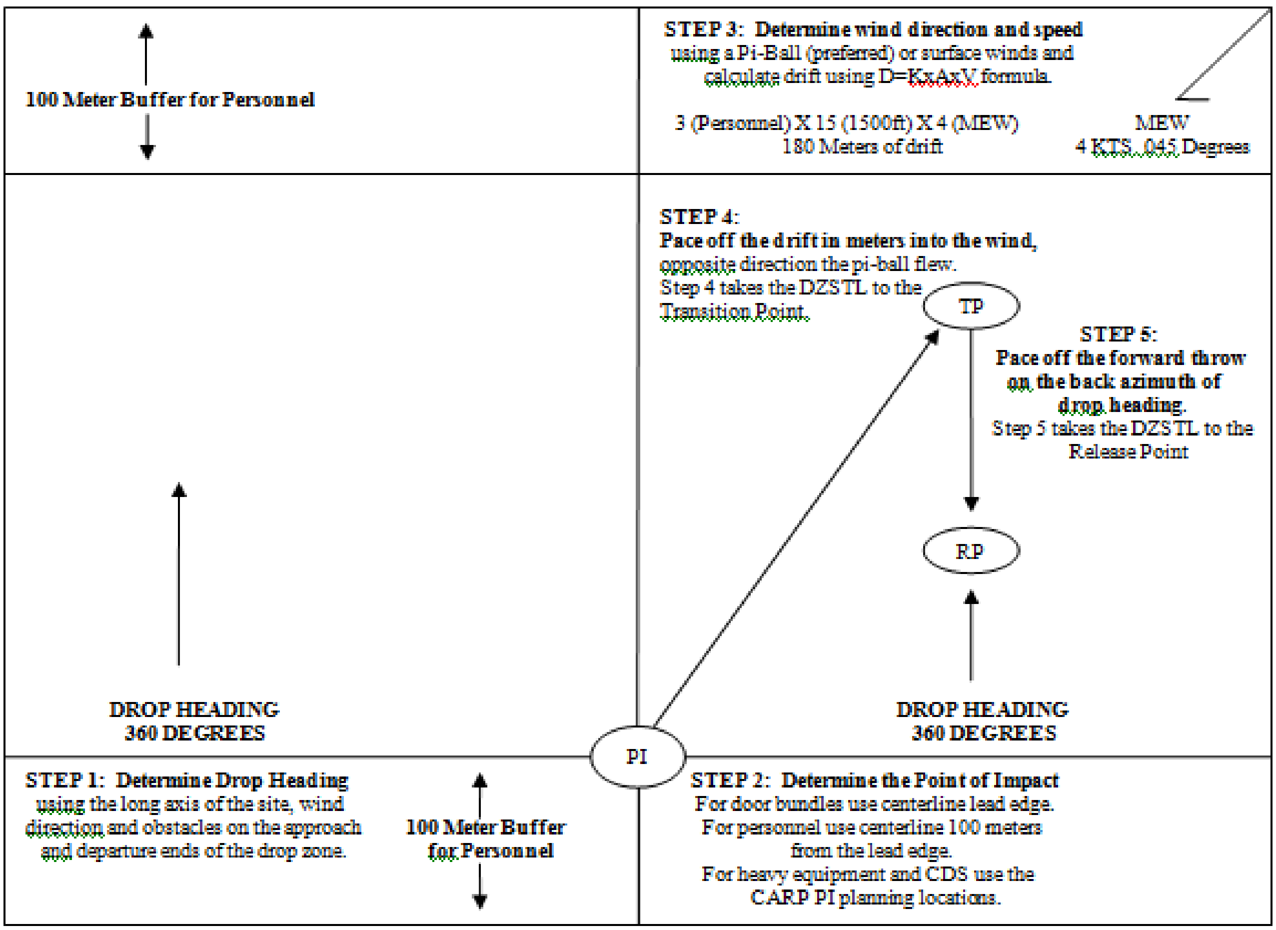
NOTE: To convert yards to meters, multiply yards by **0.9144.**
To convert meters to yards, divide meters by **0.9144**.

Forward throw for personnel and equipment using STOL or rotary-wing aircraft. To determine forward throw for STOL or rotary-wing aircraft, divide the drop speed of the aircraft in half. This yields the forward throw in meters. For example, an aircraft flying at 70 knots would have a forward throw of 35 meters.

EXAMPLE: 90 knots drop speed = 45 meters forward throw.

VISUAL DIAGRAM OF THE FIVE STEPS OF ESTABLISHING A VIRS DZ

The following diagram illustrates the five steps of establishing a VIRS drop zone.



US Army Drop Zone Code Letters

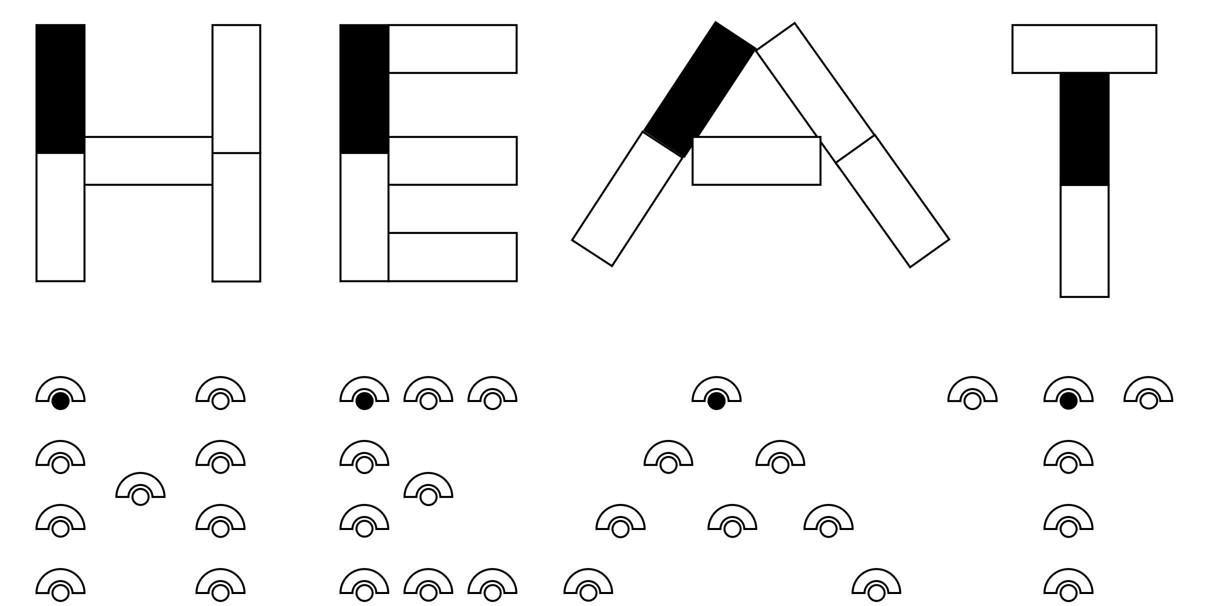
There are four Army code letters. They are "H", "E", "A", and "T". The letters are formed by VS-17 panels during the day and white lights at night. They are one panel wide by two panels high for day and three lights wide by four lights high at night. The panels are flush with each other. There is a 5 meter space in-between each light. The shaded panels or lights above indicate the base panel or light.

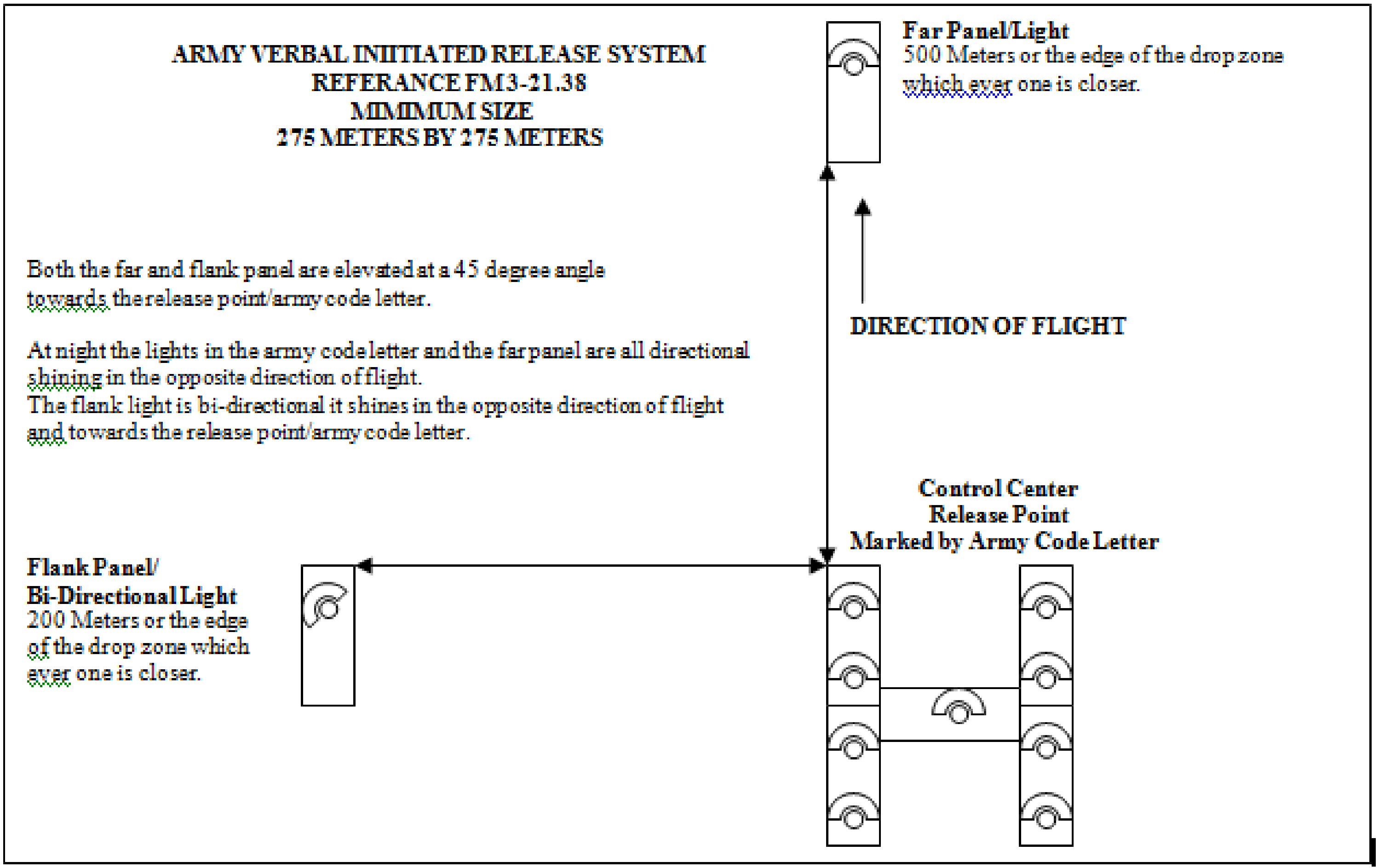
A standard Army code letter using VS-17 panels for daytime operations or lights for night time operations will be used to mark the release point (control center) . The DZSTL will be positioned at the release point. The base panel of this code letter will be positioned exactly on the release point. The code letter will be either "H", "E", "A", or "T". A flank panel is employed to the left (90 degrees left of drop heading) of the code letter at a distance of 200 meters or the edge of the DZ, whichever is closer. A far panel is employed 500 meters from the code letter along drop heading or at the end of the DZ, whichever is closer. Both far and flank panels are positioned with the long axis parallel to drop heading and raised at 45 degrees back toward the code letter.

At night the panels in the code letter are replaced with lights. The code letter and far light will be placed in directional holes (toward A/C approach route) and the flank light will be in a bi-directional hole (toward A/C approach route and control center).

In the event the release point falls off the DZ and the markings will not be visible or the DZSTL cannot see the aircraft, the parachute drop can be changed to a jumpmaster directed release operation using the wind streamer vector count or the DZSTL can utilize an offset release or a late release.

ARMY CODE LETTERS

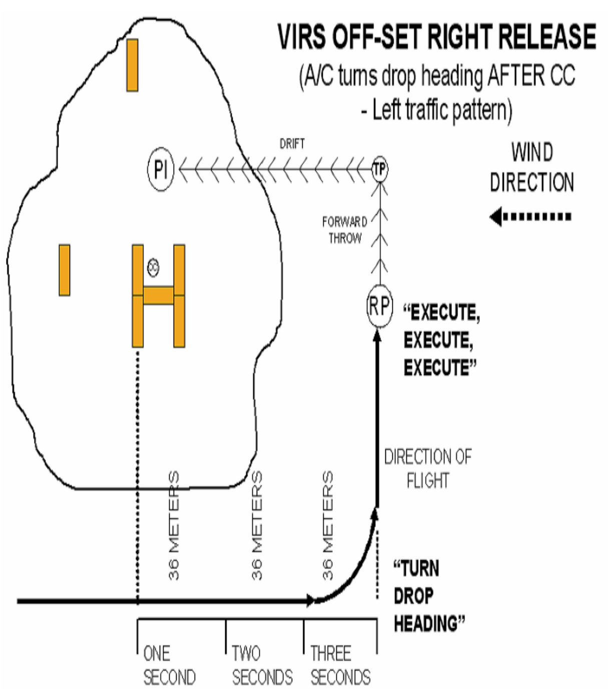


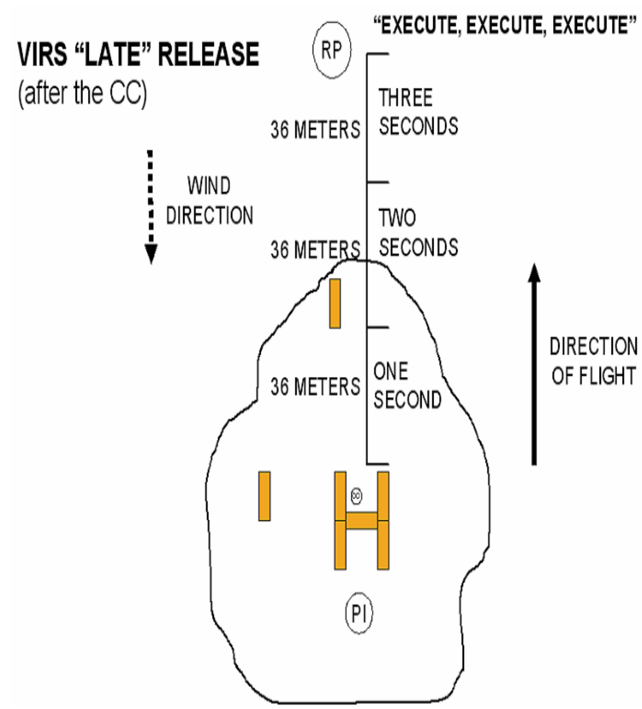

ARMY VERBAL INIITIATED RELEASE SYSTEM
REFERANCE FM3-21.38
MIMIMUM SIZE
275 METERS BY 275 METERS
Far Panel/Light
500 Meters or the edge of the drop zone which ever one is closer.
Both the far and flank panel are elevated at a 45 degree angle towards the release point/army code letter.
At night the lights in the army code letter and the far panel are all directional shining in the opposite direction of flight.
The flank light is bi-directional it shines in the opposite direction of flight and towards the release point/army code letter.
DIRECTION OF FLIGHT
Control Center
Release Point
Marked by Army Code Letter
Flank Panel/
Bi-Directional Light
200 Meters or the edge of the drop zone which ever one is closer.

ARMY VIRS OFF-SET RELEASE

In situations where the RP falls off the DZ, or the tactical situation does not allow the DZSTL to be positioned at the release point, an off-set release (left, right or late) may be conducted. This is done by determining how many seconds the aircraft must fly past you before the release is initiated. These diagrams depict a DZ in which the release point falls off the edge of the DZ. This A/C is given steering corrections to fly over the RP, just as in a standard VIRS. However, the Pathfinder will give the command to "turn drop heading" or "execute" when the A/C has flown a determined distance past the control center.

In this example, the drop speed is 70 KIAS. The release point falls approximately 80 meters off the DZ and the control center is now 118 meters from the newly designated control center. 70 KIAS X .51 = 36 meters per second of flight. Three seconds of off-set will place the release point approximately 118 meters from the control center / code letter. The DZSTL/code letter/control center is positioned on the drop zone at a distance from the release point that is rounded off to the nearest second.





ARMY GMRS

SIZE REQUIREMENTS AND BUFFER ZONES - GMRS

Proponent Agency: United States Army Special Operations Command (USASOC)

Primary Reference: USASOC Reg. 350-2

The minimum size of a GMRS drop zone is **275 meters wide x 275 meters long** (**300 yards wide x 300 yards long**). In order to fit all of the markings and the release point on a GMRS drop zone, the minimum size required is **300 meters wide x 275 meters long**.

Additional size requirements will be determined using the D=R x T formula. Green light calculations will be determined using the T = D / R formula.

- A 100 meter buffer zone will be established on all edges of GMRS drop zones for personnel operations. The 100 meter buffer on all edges for personnel drops will be **inclusive** of the minimum size.
    - The point of impact will not be placed closer than 100 meters to the leading edge tree line.
    - The planned location for the last jumper landing area will not be closer than 100 meters prior to the trailing edge tree line.

  This will decrease the risk of a tree landing.
- Buffer zones are not required for door bundle operations.

NOTE: For any type of GMRS drop zone other than personnel or door bundles, the drop zone size will be determined based on the CARP size charts in AFI 13-217.

ESTABLISHING A GMRS DROP ZONE

When establishing a Ground Marked Release System (GMRS) drop zone, the first phase of establishment is determining the release point location. Follow the steps below to establish the release point for such drop zones.

STEP 1. Determine drop heading. If the drop zone was surveyed and an AF 3823 was published for the drop zone, use the magnetic course indicated. If the drop zone was surveyed as a circular DZ, or a tactical assessment was done on the drop zone, or the drop zone is being established as a ARMY GMRS drop zone, determine drop heading taking into consideration these three factors:

- Long axis
- Wind direction
- Obstacles on the approach and departure ends of the drop zone

.**STEP 2. Determine the Point of Impact (PI)**. The PI for personnel will be centerline of the drop zone and 100 meters from the leading edge. The PI for bundles will be centerline of the DZ and on the leading edge. These may be adjusted forward, left or right if necessary. For CDS, and Heavy Equipment, use the surveyed PI locations indicated on the AF 3823. If a tactical assessment was done in lieu of an AF 3823, use the CARP PI planning locations for CDS and Heavy Equipment. The size for CDS and Heavy Equipment drop zones will be determined by the CARP charts.

STEP 3. Determine wind direction and speed. This should be done using the PIBALL. The MEW is more accurate. If PIBALL capabilities are not available then the surface wind direction and speed must be used. Once the wind direction and speed has been determined, calculate a D = K x A x V formula for drift in meters.

MEAN EFFECTIVE WIND

Mean effective wind is the average wind from ground level to drop altitude. It is measured by using the Pilot Balloon (PIBALL). If PIBALL capabilities are not available then surface wind will be used. If you have communications with the aircraft, it is beneficial to the mission if you transmit the MEW to the aircrew before the first pass. It will assist them in calculating an accurate release point.

To get a PIBALL reading follow the procedures below:

- Utilize the PIBALL chart on page 209 of this student handout or the applicable GTA 7-1-41.
- Ensure the correct chart is used for the type of PIBALL used. When using the 10 gram balloon make sure to use the 10 gram chart. Ensure the same for the 30 gram balloon.

The following equipment is required for MEW readings:
- PIBALL (10 gram or 30 gram)
- Helium source
- Drift scale (zero to 90 degrees)
- Stop watch with seconds
- Compass

PIBALL circumferences

-10 gram for day:	57 inches
-10 gram for night:	74 inches
-30 gram for day:	75 inches
-30 gram for night:	94 inches

At night time, PIBALLS are filled to a larger circumference to compensate for the weight of a small liquid-activated light that is attached to the balloon to assist in observation. This will ensure the balloon will have the same ascension rate as the day balloon.

NOTE: A 6 inch chem light may be used in place of the small liquid-activated light.

Calculating the MEW

1. Refer to the TIME/HEIGHT ascent rate column of the PIBALL chart. Determine the altitude of the drop and the amount of time for balloon angle to be checked.

2. Fill balloon up to the correct circumference w/helium.

3. Release balloon and begin timing.

4. Determine angle to the balloon at completion of time.

5. Cross reference ANGLE to altitude on PIBALL chart for the MEW.

6. The magnetic azimuth to the balloon is measured and the reciprocal heading noted. This is the MEW wind direction to be reported.

NOTE: The MEW has NO influence on no-drop situations. Only the surface wind will determine whether a no-drop is applicable.

PI-BALL CHART

10-GRAM HELIUM BALLOON

Inflate balloon to 57-inch circumference for day and 74-inch circumference for night.

ELEVATION ANGLE	DROP ALTITUDE IN FEET												ASCENSION TABLE	
	500	750	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500	TIME	ALT (FT)
70	02	02	01	01	01	01	01	01	01	01	01	01		
60	03	02	02	02	02	02	02	02	02	02	02	02		
55	03	03	03	03	03	03	03	03	03	03	03	03		
50	04	04	03	03	03	03	03	03	03	03	03	03	0:10	80
45	05	04	04	04	04	04	04	04	04	04	04	04	0:20	170
40	06	05	05	05	05	05	05	04	04	04	04	04	0:30	250
35	07	06	06	06	06	05	05	05	05	05	05	05	0:40	330
30	08	07	07	07	07	07	07	07	06	06	06	06	0:50	400
25	10	09	09	09	08	08	08	08	08	08	08	08	1:02	500
24	11	10	09	09	09	09	08	08	08	08	08	08	1:10	540
23	11	10	10	09	09	09	09	08	08	08	08	08	1:20	610
22	12	11	10	10	10	10	09	09	09	09	09	09	1:30	670
21	12	11	11	10	10	10	10	10	10	10	10	10	1:43	750
20	13	12	11	11	11	11	11	10	10	10	10	10	1:50	790
19	14	13	12	12	11	11	11	11	11	11	11	11	2:25	1000
18	15	13	13	12	12	12	12	12	11	11	11	11	2:44	1100
17	16	14	13	13	13	13	12	12	12	12	12	12	3:05	1250
16	17	15	14	14	14	13	13	13	13	13	13	13	3:49	1500
15	18	16	15	15	14	14	14	14	14	14	14	14	4:30	1750
14	19	17	16	16	16	15	15	15	15	15	15	15	5:11	2000
13	21	19	18	17	17	17	17	17	17	17	17	17	6:34	2500
12	22	20	19	19	18	18	18	18	17	17	17	17	7:58	3000
11	24	22	21	21	20	20	20	19	19	19	19	19	9:22	3500
10	27	25	23	23	22	22	22	21	21	21	21	21	10:44	4000
09	30	27	26	26	25	24	24	24	23	23	23	23	12:08	4500

30-GRAM HELIUM BALLOON

Inflate balloon to 75-inch circumference for day and 94-inch circumference for night.

ELEVATION ANGLE	DROP ALTITUDE IN FEET												ASCENSION TABLE	
	500	750	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500	TIME	ALT (FT)
80	01	01	01	01	01	01	01	01	01	01	01	01		
70	03	03	03	02	02	02	02	02	02	02	02	02		
60	04	04	04	04	04	04	04	04	04	04	04	04		
55	05	05	05	05	05	05	05	05	05	05	04	04	0:10	120
50	06	06	06	06	06	06	06	06	05	05	05	05	0:20	240
45	07	07	07	07	07	07	07	07	07	06	06	06	0:30	360
40	09	08	08	08	08	08	08	08	08	08	08	08	0:42	500
35	10	10	10	10	10	10	10	09	09	09	09	09	0:50	600
30	12	12	12	12	12	12	12	11	11	11	11	11	1:02	750
25	15	15	15	15	15	15	14	14	14	14	14	14	1:10	830
24	16	16	15	15	15	15	14	14	14	14	14	14	1:17	1000
23	17	17	16	16	16	16	15	15	15	15	15	15	1:48	1250
22	18	18	17	17	17	17	17	16	16	16	16	16	2:10	1500
21	19	19	18	18	18	18	17	17	17	17	17	17	2:34	1750
20	20	20	19	19	19	19	18	18	18	18	18	17	2:56	2000
19	21	20	20	20	20	20	19	19	19	19	19	18	3:43	2500
18	22	22	21	21	21	21	21	20	20	20	20	20	4:31	3000
17	23	23	23	22	22	22	22	22	21	21	21	21	5:21	3500
16	25	25	24	24	24	24	23	23	23	23	22	22	6:09	4000
15	27	27	26	26	25	25	25	25	24	24	24	24	7:00	4500
14	29	29	28	27	27	27	27	27	26	26	26	25		
13	31	30	30	30	30	29	29	29	28	28	28	27		

STEP 4. Pace off the drift in meters into the wind. This should be the reciprocal heading of the PIBALL direction. If a PIBALL was not used, then field expedient means of determining wind direction may be used.

STEP 5. Pace off the forward throw on the back azimuth of drop heading. Forward throw is the effect that inertia has on a falling object. When an object leaves an aircraft, it is traveling at a speed equal to the speed of the aircraft. The load or jumper continues to move in the direction of flight until the dynamics of the parachute take effect. Once the forward throw has been paced off, this is the location of the Release Point (RP). If the direction and distance paced off for the forward throw causes the RP to go into the wood line, then the PI can be adjusted forward or left and right only. The RP is the location where the first load or jumper will exit the aircraft. The means of identifying the RP to the drop aircraft is dictated by the type of mission.

Note: If the direction and distance of the drift are paced into the wood line, adjust the PI as necessary. Forward or left and right only(ie. never opposite the direction of flight).

AIR FORCE AIRCRAFT FORWARD THROW

TYPE DROP	C-130	C-17
Personnel (Static Line) / Door Bundle	250 yds (229 m)	250 yds (229 m)
Personnel (MFF)	328 yds (300 m)	328 yds (300 m)
Heavy Equipment	500 yds (458 m)	700 yds (640 m)
CDS/CRS/CRL	550 yds (503m)	725 yds (663 m)
SATB	160 yds (147m)	N/A

NOTE: To convert yards to meters, multiply yards by **0.9144.**

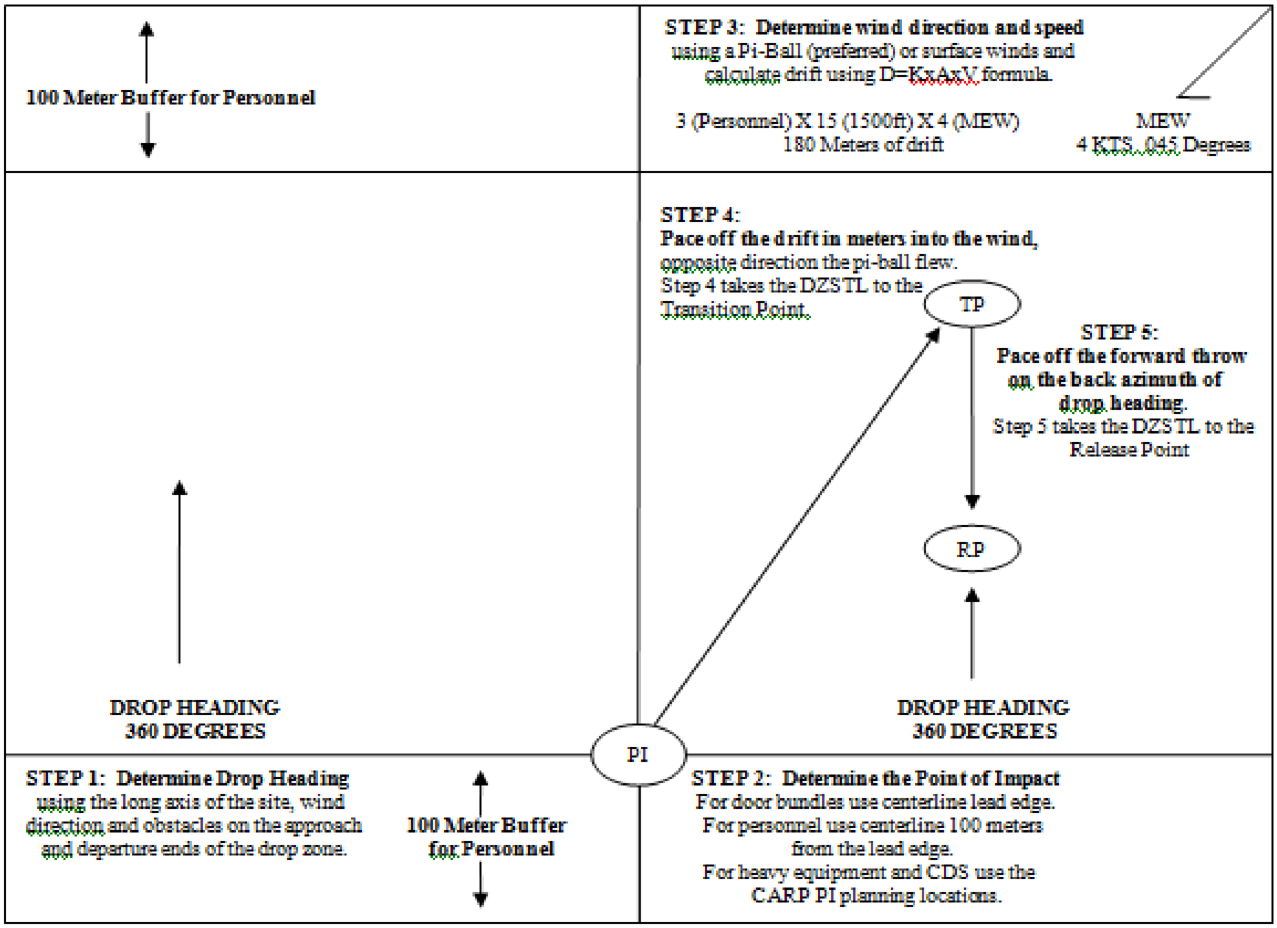
To convert meters to yards, divide meters by **0.9144**.

Forward throw for personnel and equipment using STOL or rotary-wing aircraft. To determine forward throw for STOL or rotary-wing aircraft, divide the drop speed of the aircraft in half. This yields the forward throw in meters. For example, an aircraft flying at 70 knots would have a forward throw of 35 meters.

EXAMPLE: 90 knots drop speed = 45 meters forward throw.

VISUAL DIAGRAM OF THE FIVE STEPS OF ESTABLISHING A GMRS DZ

The following diagram illustrates the five steps of establishing a GMRS drop zone.



ADVANTAGES OF A GMRS DZ

GMRS offers the DZST a way to identify the release point to the drop aircraft without using a radio. This method may be used with aircraft that do or do not have the navigational capability to conduct a CARP release. This method of establishing a drop zone was designed so that communications with the drop aircraft are not needed.

The pilot uses the ground markings to identify the DZ and adjust his flight path so the aircraft flies 100 meters to the right of the corner panel or light. When the aircraft is 100m to the right of the corner panel or light and aligned with the alignment and flanker panels or lights, it is directly over the release point. At this point, the pilot will turn on the “green light” to alert the jumpmasters that it is safe to release. When the Jumpmaster on the left door observes that the aircraft is 100m right of the corner panel, and the door becomes aligned with the alignment and flanker panel, he will release the first object.

Daytime GMRS drop zones will be marked with VS-17 Panels. Distances and azimuths are measured from the upper right corner (when seen facing drop heading) of each panel, to the upper right corner of the next, and from center-mass of the selected RP. During daylight airdrops, the marker panels should be raised at a 45-degree angle from the ground toward the aircraft approach path to increase the aircrew and jumpmaster's ability to see them. If security permits, smoke (other than red) may be displayed at the release point to assist in DZ acquisition. Mark the release point with some type of signal that is **distinguishable** from all other drop zone markings such as smoke or a signal mirror.

Night time GMRS drop zones will be marked with lights. At night, replace panels with lights--use one light for each panel. For operations requiring security, night DZ markings should be visible only from the direction of the aircraft's approach. Mark the release point with some type of identifiable light source to distinguish it from all other DZ markings.

NOTE: During night operations, per USASOC Reg 350-2, liquid-activated lights and chemlights will NOT be used to mark the DZ.

MARKING A GMRS DZ

When marking a GMRS DZ**,** place the markings where obstacles will not mask the pilot's line of sight. The DZ markings must be clearly visible to the aircrew on approach as early as possible. If conditions prevent placing the markings at the computed point, the DZSTL may have to adjust the location of the intended PI, (left, right or forward) ensuring the new PI location meets the requirements for the type of airdrop. Advise both the aircrew and the supported unit of the change in PI location when possible.

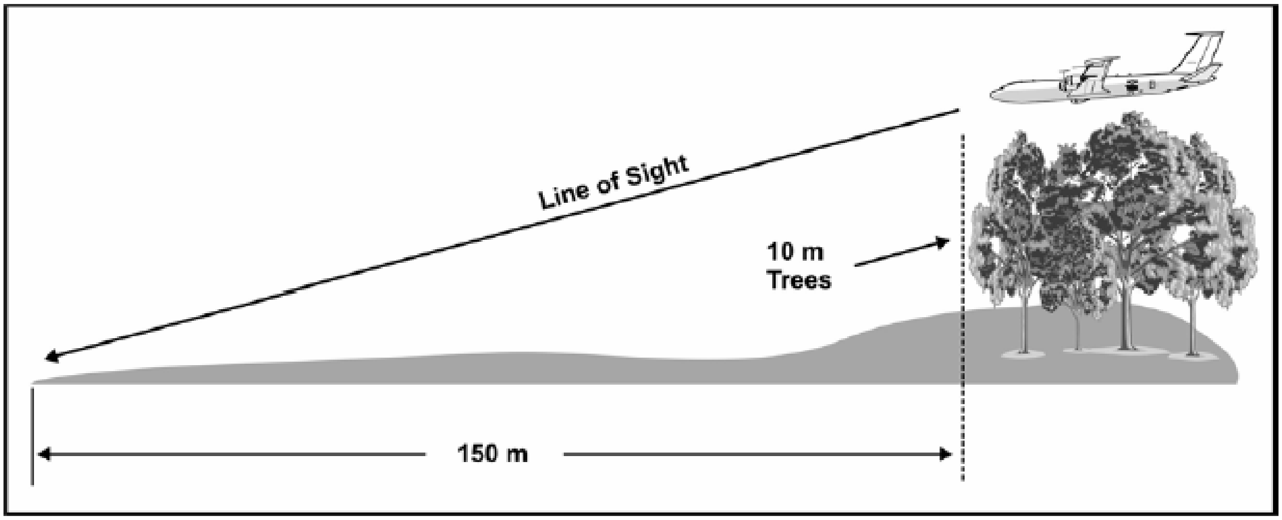
Use a mask-clearance ratio of 1 unit of height to 15 units of horizontal clearance in order to determine if any drop zones markings are visible to approaching aircraft.

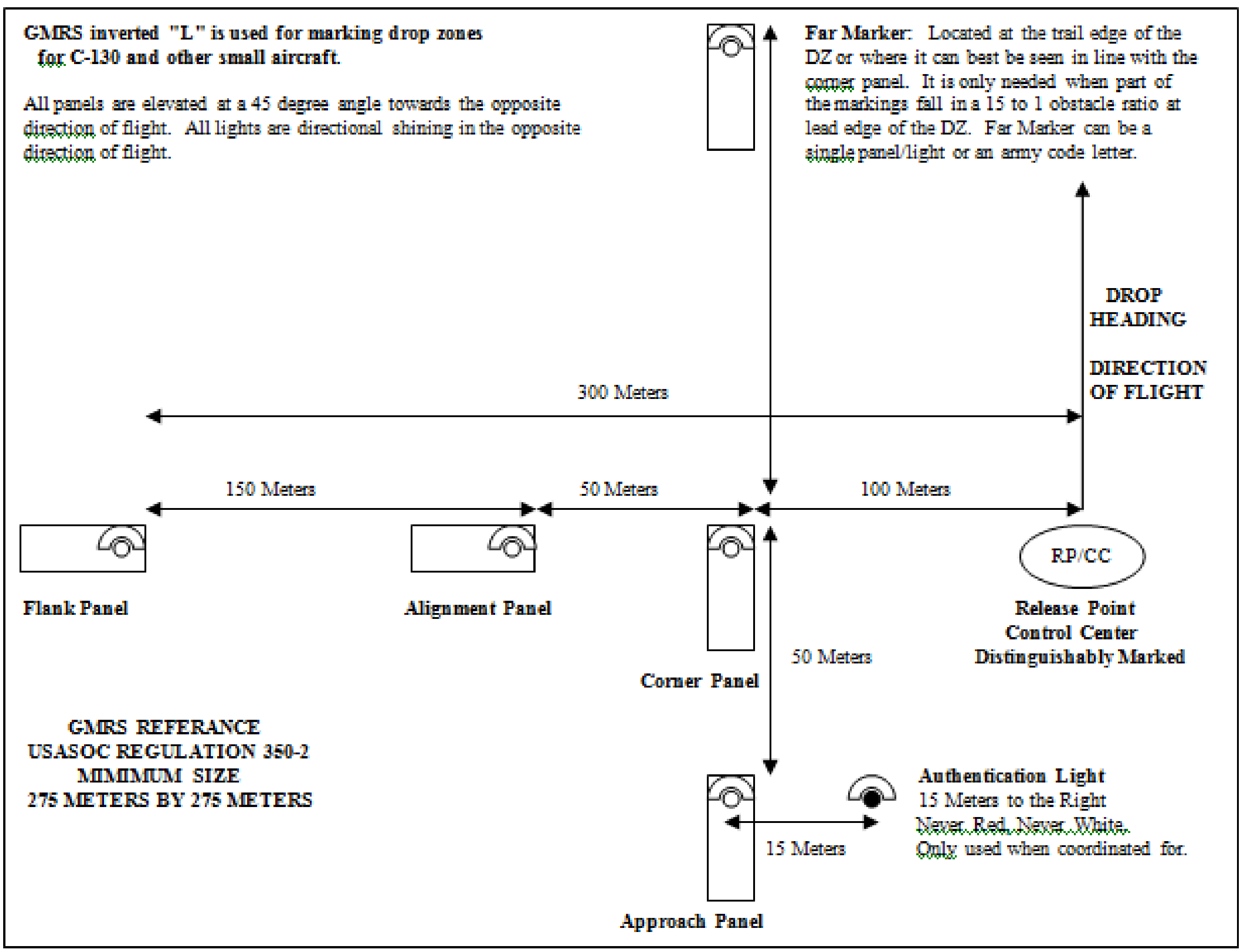
- For example, suppose you must position a drop zone marking near an obstacle that would mask the pilots view of the obstacle, such as the edge of a forest on the drop zone approach end. The trees measure 10 meters (33 feet) high. The markings would require 150 meters (492 feet) of horizontal clearance from the trees.

If any of the GMRS markings fall within a 15:1 masking clearance ratio on the approach end of the drop zone, and it is unfeasible to adjust the selected PI location, you must use a far marker (VS-17 panel or Army code letter H, E, A, T).

The far marker is located at the trailing edge of the drop zone or where the pilot can see it best, and aligned with the corner and approach panel, parallel to drop heading. The far marker should be coordinated for during the aircrew mission briefing. When using an army code letter the base panel / light will be on line with the corner light. The DZSTL (control center) is located at the Release Point on GMRS drop zones.

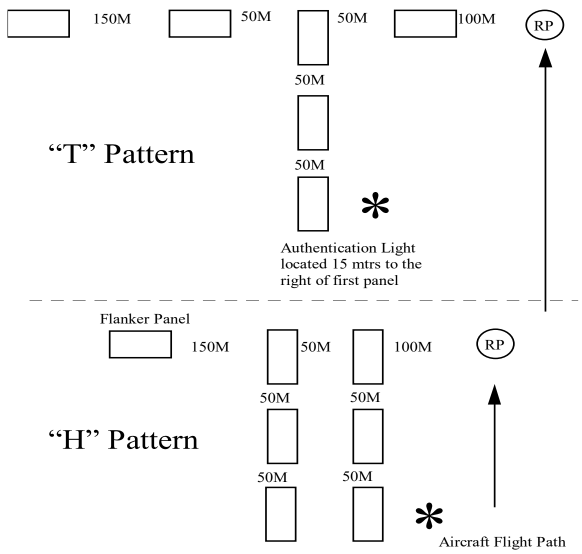
MASK-CLEARANCE RATIO



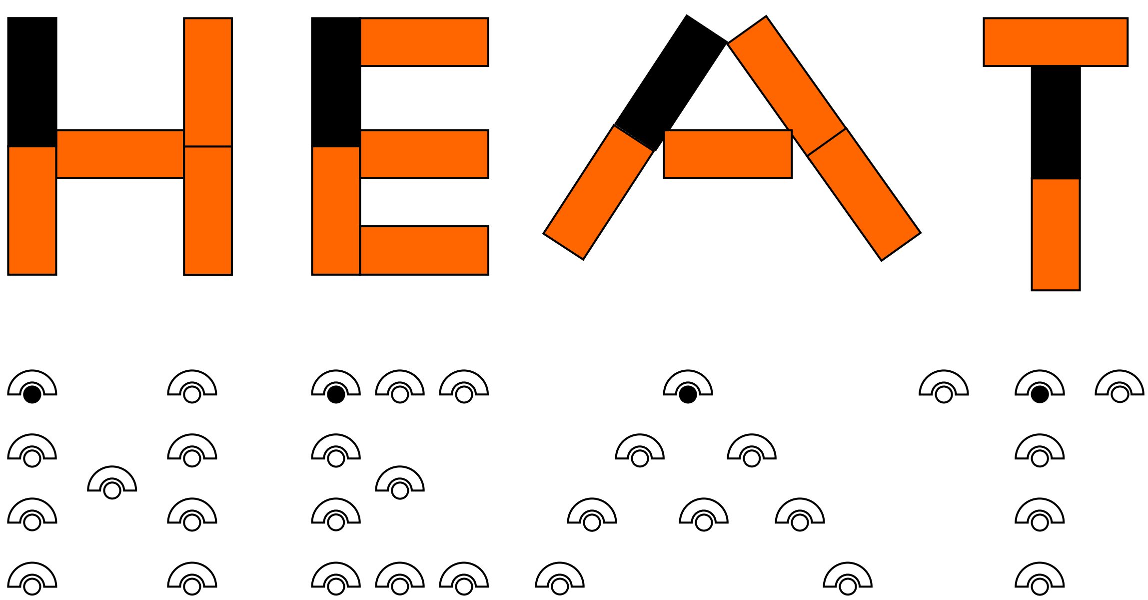


ALTERNATE GMRS PANEL PLACEMENT FOR C-17 OPERATIONS (OPTIONAL)

For C-17/C-5 GMRS operations, it is recommended that the "T" or "H" pattern be used due to the side angle vision limitations.



US ARMY DROP ZONE CODE LETTERS



There are four Army code letters. They are "H", "E", "A", and "T". The letters are formed by VS-17 panels during the day and white lights at night. They are one panel wide by 2 panels high for day and 3 lights wide by 4 lights high at night. The panels are flush with each other. There is a 5 meter space in-between each light. The shaded panels or lights above indicate the base panel or light.

DROP ZONE FORMULAS

The drop zone formulas covered in this section pertain to GMRS, Army VIRS, and Air Force VIRS operations. The DZSTL must have working knowledge of these formulas in order to successfully establish and operate the above mentioned drop zones.

$$\overset{\uparrow}{b}\left(\begin{array}{l}+200\text{m if there are}\\ \text{Jumpers}\\ +\text{ PI Shift Forward}\end{array}\right) = \underset{(\text{KIAS} \bullet .51)}{R} \bullet T$$

$$\underset{\downarrow}{T} = \frac{D\left(\begin{array}{l}-200\text{m if there are}\\ \text{Jumpers}\\ -\text{ PI Shift Forward}\end{array}\right)}{\underset{(\text{KIAS} \bullet .51)}{\overset{\uparrow}{R}}}$$

$$\overset{\uparrow}{b} = K\left(\begin{array}{l}3\text{ Personnel}\\ 1.5\text{ Equipment}\\ 2.4\text{ SATB/TTB}\\ 0\text{ High Velocity/Free Drop}\end{array}\right) \bullet \underset{\left(\frac{\text{Alt}}{100}\right)}{A} \bullet \underset{(\text{MEW})}{V}$$

TYPE DROP	K (Load Drift Constant)
Personnel (Static Line)	3.0
Heavy Equipment	1.5
CDS/CRL/CRS	1.5
HVCDS	Zero
Door Bundle	1.5
SATB	2.4

D = R x T

To calculate the amount of drop zone needed for a given number of jumpers or door bundles being dropped from assigned aircraft use the D = R x T formula.

> D = DISTANCE. Length of drop zone needed in meters (rounded up to the next whole number.)
> R = RATE. Rate of the aircraft's speed expressed in meters per second. To convert the aircraft drop speed in knots to meters per second, multiply knots by .51. Do not round the answer off.
> T = TIME. Amount of time required to exit the load from the aircraft. One second between jumpers, three seconds between door bundles. (10 jumpers = 9 seconds) (3 bundles = 6 seconds) (3 bundles and 10 jumpers=16 seconds) Refer to selection factors "Type of load"

Multiply the RATE of the aircraft by the TIME required to exit the load, equals DISTANCE of DZ needed to successfully accommodate the load in one pass. Round the answer up to the next whole number if there is a decimal.

NOTE: For personnel drops add 200 meters to the final answer for the buffer zones (a 100 meter buffer at the lead and trail edges of the drop zone.)

EXAMPLE: A C-130 traveling 130 knots prepares to deliver 10 jumpers on a GMRS drop zone. How much useable drop zone is required to support the operation in one pass?

D = ?

R = 130 knots X .51 = 66.3 meters per second.

T = 10 jumpers = 9 seconds

SOLUTION:

R = 66.3 meters per second

T = 9 seconds exit time

66.3 x 9 = 596.7 + 200.0 meters buffer zone

796.7 meters round-up to

797 meters

Note: Do not add 200 meter buffer zones for bundle drops.

T = D / R

To calculate the number of jumpers or door bundles the drop zone can accept in one pass use the T = D / R formula.

T = TIME? Amount of time that the aircraft will be over the drop zone in seconds(rounded down to the nearest second)

D = DISTANCE. Distance of drop zone in meters. Subtract 200 meters from drop zone length to accommodate for buffer zones on personnel drops (a 100 meter buffer at the lead and trail edges of the drop zone.)

R = RATE. Rate of aircraft speed expressed as meters per second. To convert aircraft speed in knots to meters per second, multiply knots by 0.51 (round up to the next whole number.)

Divide the DISTANCE of drop zone length by the RATE of the aircraft, equals TIME over the drop zone. Time over the drop zone will determine how many jumpers or door bundles can exit each pass.

EXAMPLE: How many jumpers can exit a C-130 traveling 130 knots over a GMRS drop zone 750 meters long?

T = ?

D = 750 meters minus 200 meters of buffer zones = 550 meters of usable drop zone.

R = 130 knots X .51 = 66.3 round-up to 67 meters per second

SOLUTION:

550 / 67 = 8.2 seconds (round down to 8 seconds)

8 seconds of drop zone = 9 jumpers per pass.

NOTE: For door bundle operations, do not subtract the 200-meter buffer zones.

EXAMPLE: For the same scenario as above for door bundles, use the entire 750 meters as usable drop zone.

750 / 67 = 11.19 seconds (round down to 11 seconds)

11 seconds of drop zone = 4 door bundles per pass

D = K x A x V

To calculate the amount of drift experienced by a load or jumper under a parachute use the

D = K x A x V formula.

D = DISTANCE. Distance of drift in meters (rounded up to the nearest whole number.)

K = CONSTANT.
- 3.0 jumpers
- 1.5 door bundles, CDS, heavy equipment
- 2.4 tactical training bundle (TTB)
- 2.4 simulated airborne training bundles (SATB)

*NOTE: When combining different types of loads you will use the highest constant.

A = ALTITUDE. Drop Altitude expressed in hundredths of feet (800 feet AGL is expressed as 8, 1250 feet AGL is expressed as 12.5) etc.

V = VELOCITY. Velocity of the wind. Preferably the Mean Effective Wind (MEW), otherwise the surface wind may be used.

Multiply CONSTANT by ALTITUDE by VELOCITY equals DRIFT.

EXAMPLE: How far will a jumper drift in meters from 1000 feet AGL with a mean effective wind of 8 knots?
D = ?
K = 3.0
A = 10
V = 8
SOLUTION:
3 x 10 x 8 = 240 meters of drift

EXAMPLE: How far will a door bundle drift in meters from 500 feet AGL with a mean effective wind of 9 knots?
D = ?
K = 1.5
A = 5
V = 9
SOLUTION:
1.5 x 5 x 9 = 68 meters of drift

THE DROP ZONE SUPPORT TEAM DUTIES AND RESPONSIBILITIES

The Drop Zone Support Team (DZST) will consist of two members as a minimum. The senior member of the DZST will function as the Drop Zone Support Team Leader (DZSTL). More personnel may be required depending on the complexity of the mission. The additional personnel do not have to be DZST qualified.

The DZSTL Must Meet the Following Requirements for CARP, GMRS and VIRS drop zones

- Must be an NCO (E-5 or above for Army/Navy - E-4 or above USAF/USMC), officer, or civilian equivalent.
- Must have completed an appropriate initial training as a DZST member and satisfy parent service requirements.
- For personnel and/or heavy equipment drops, the DZSTL must be a qualified and current Jumpmaster.
- For CDS on CARP drop zones and Door Bundle or LCLA on any drop zone the DZSTL does NOT have a jumpmaster requirement.

	DUTY TO PERFORM	**AIRDROP METHOD**	**TYPE AIRDROP**
1. JM SCHOOL GRADUATE BEFORE SEP 1988:			
(A) JM (C)	JM, DZSO, DZSTL	CARP, VIRS, WSVC, GMRS	CDS, HE, PERS, DB
(B) JM (NC)	NONE		
1. JM SCHOOL GRADUATE AFTER SEP 1988:			
(A) JM (C)	JM, DZSO	CARP	CDS, HE, PERS
(B) JM (NC)	DZSO	CARP	CDS
	DUTY TO PERFORM	**AIRDROP METHOD**	**TYPE AIRDROP**
1. USAIS PATHFINDER SCHOOL GRADUATE AFTER SEP 1988:			
(A) JM (C)	JM, DZSTL	CARP, *GMRS, VIRS	CDS, HE, PERS, DB
(B) JM (NC) DZST (C)	DZSTL	CARP	CDS, DB
(C) JM (C) DZST (NC)	JM		
(D) NONAIRBORNE DZST (C)	DZSTL	CARP	CDS, DB
C = CURRENT NC = NOT CURRENT * GMRS DZ NORMALLY RESERVED FOR SOCOM UNITS, AND REQUIRES DOCUMENTED TRAINING FROM DZSTL MTT			

DZSTL CURRENCY REQUIREMENTS:

DZST qualified individuals must have actively participated in an airdrop operation, either as the DZSTL or Assistant DZSTL within the last 6 months or attended a DZST refresher course within the last 6 months. A qualified and current DZST member must give the refresher course.

MISSIONS OF THE DZSTL

Primary Missions:

WARTIME

- Wartime CDS drops to battalion or smaller size units.
- LCLA (Low Cost Low Altitude) drops to battalion or smaller size units.

PEACETIME

- Visual Meteorological Conditions (VMC) drops involving 1-3 aircraft for personnel, door bundles, LCLA, CDS and heavy equipment.

Secondary Missions:

WARTIME

- Drops, brigade size or larger units.

PEACETIME

- C-130 AWADS (Adverse Weather Aerial Delivery System) involving 1-3 aircraft.
- VMC drops of 4 or more aircraft for personnel, door bundles, LCLA, CDS, and heavy equipment.

NOTE: Authorized personnel other than qualified combat controllers performing DZSTL duties are restricted to formation airdrops of four or less aircraft unless on a military range with active range control.

DZST/AIRCREW MISSION BRIEF CHECKLIST (EXAMPLE)

Below is an example of a DZST/Aircrew Mission Brief Checklist. This is a locally generated form that is used for coordination purposes and will be disseminated by the DZSTL or his designated representative. The DZSTL will ensure that the following individuals have an **identical** copy of the checklist:

1. Aircrew
2. S-3 Air
3. DZSTL

DZST/AIRCREW MISSION BRIEF CHECKLIST

1. DZ NAME/LOCATION AND JA/ATT LINE NUMBER: HOLLAND DZ, FT BRAGG, NC / LINE: _/ MSN ________

2. TOT/ BLOCK TIME AND NUMBER OF PASSES REQUESTED: / / 1 HE PASS, 1 PE PASS / N/A

3. DATE DROP ZONE APPROVED FOR USE: HOLLAND: 2/12/2003

4. TYPE DROP (HE, PE, CDS): HE

5. TYPE OF RELEASE: ☐ VIRS ☐ CARP ☐ GMRS ☐ VISUAL ☐ AWADS ☐ ZONE MARKER

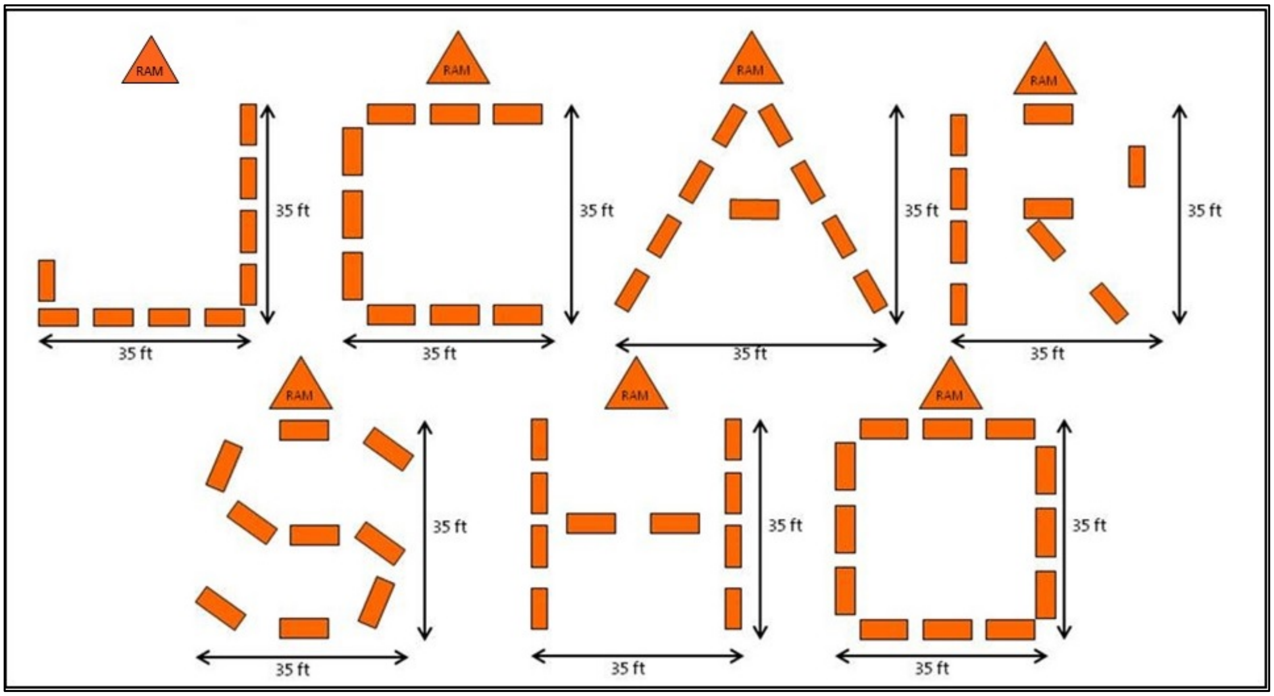
a. TYPE PARACHUTE/ALTITUDE: T-10D / 800' AGL N/A / N/A

b. GROUND QUICK DISCONNECTS: N/A

c. NUMBER OF JUMPERS/BUNDLES/PLATFORMS: JUMPERS / CDS-BNDLS / PLATFORMS

6. NUMBER AND TYPE OF AIRCRAFT: X C 130

7. DZ INFORMATION: HOLLAND/NETHERLANDS DZ: 3220 X 1750



a. MARKINGS /SIGNALS: (SKETCH MARKING(S) IN BOX)

8. PANELS/LIGHTS: 9 X VS 17 PANELS ORANGE

9. SHAPE DESIGNATOR/CODE LETTER: J /

10. EMERGENCY NO-DROP PROCEDURES: REMOVE THE CODE LETTER

SMOKE/FLARES: REMOVAL OF RAM X 0

b. DZ SUPPORT CAPABILITIES:

11. RADIOS AVAILABLE/FREQUENCIES: TRANSITION FREQ FM: UHF: VHF:

12. VISUAL ACQUISITION AIDS: AMBER ROTATING BEACON PI @ 1000yds

13. NAVAIDS AVAILABLE: N/A

14. MEW EQUIPMENT: ANEMOMETER

15. VERIFY AIRSPACE COORDINATION: RANGE CONTROL@ UHF: 249.9/ VHF 139.35 / FM 38.90

16. AIRBORNE COMMANDER (ARMY) NAME , RANK, UNIT, CONTACT PHONE NUMBER:

17. AIR MISSION COMMANDER (USAF) NAME, RANK, UNIT, CONTACT PHONE NUMBER:

18. DZSTL NAME, RANK, UNIT, CONTACT PHONE NUMBER:

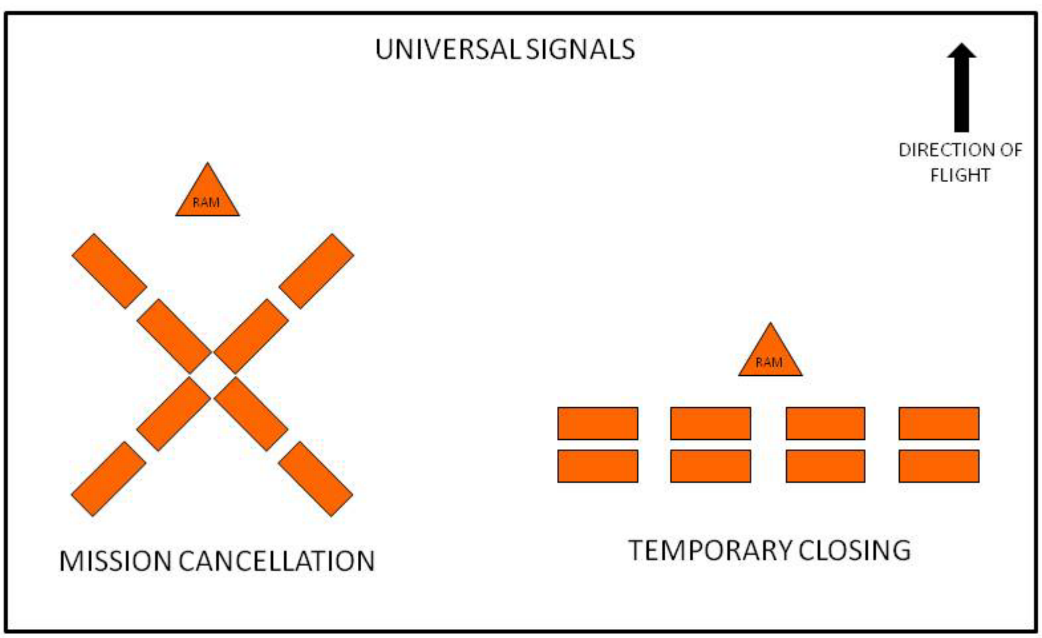
NO DROP SIGNALS/MISSION CANCELLATION SIGNALS

No Drop: The lack of markings, red smoke, red flares, red beam from a B-2 light gun, or any other pre -coordinated signal on the DZ indicates a "NO DROP" condition. Communications security permitting, these visual signals are confirmed by radio communication to the aircraft. The drop aircraft should continue to do racetracks until a signal for clearance to drop is given. A "NO DROP" may be given when winds exceed the maximum limitations for that type of drop, when there are vehicles moving on the drop zone, or any other unsafe act observed on the drop zone. In pre-coordination it should be determined how many "NO DROP" passes the aircraft will fly until the mission is canceled and the aircraft begin their return to base.

Mission cancellation: Form VS-17 panels into a block letter "X", remove the markings or any other pre-coordination signal on the drop zone.

Temporary closing: Form the VS-17 panels into two parallel bars placed perpendicular to drop heading.

Clear to drop: Unless radio communications are specifically required, any pre-coordinated markings, other than red smoke, flares, or lights, displaced on the DZ indicates clearance to drop.



RADIO COMMUNICATIONS

At a minimum, there should be a VHF-FM radio to have communication with range control. When possible a VHF-AM/UHF-AM radio should be on the drop zone in order to communicate with the aircraft.

Radio Communication is **mandatory** for:

- Instrumental Meteorological Condition (IMC) CARP operations
- Verbally Initiated Release System (VIRS) operations

Radio communication between the DZSTL and the aircraft is **not mandatory** for:

- Visual Meteorological Condition (VMC) CARP operations
- Ground Marked Release System (GMRS) operations

***Note -** It is not possible to execute GMRS or VIRS drops under IMC conditions.

DZ SUPPORT REQUIREMENTS

The DZSTL will ensure that the proper equipment to support the operation is available and that the support requirements that make up the drop zone control group are also available.

Equipment needed for each DZ:

- 10 VS-17 panels
- 1 raised angle marker (RAM) CARP DZ only
- 40 tent pegs
- 1 roll 1/4 inch cotton webbing
- 1 helium source
- 1 pi-ball kit
- 2 smoke grenades, yellow, green or white for each TOT
- 1 smoke grenade, red, for each TOT
- 1 shovel or E-tool
- 1 1:50,000 or 1:25,000 map of area of operations
- 2 lensatic compasses
- 1 signal mirror
- 1 tree recovery kit consisting of:
- 1 120' rope /w D-rings
- 1 pair of tree climbers
- 1 ax or chainsaw
- 1 or 2 wind measuring device(s) in operation:
  AN/PMQ-3A,Turbo meter, or DIC/DIC3

For night operations include the following:
- 11 white omni directional lights (beanbag, Whelen etc.)
- 1 light gun (SE-11, B-2, MAG) Must have a visual range of three miles w/red filter capabilities
- 1 strobe light
- 2 sets of night vision devices (1 for the DZSTL, & 1 for Malfunctions Officer)
- 1 amber rotating beacon

DZSTL BOOK:
- Consisting of Range Control SOP
- AF 3823 of DZ
- Blank AF 4304s,
- MEDEVAC procedures
- Any unit SOPs

NOTE: Other equipment may be needed as a result of pre-mission coordination or unit SOP.

DROP ZONE SUPPORT GROUP:

The DZSTL will ensure that support requirements that make up the drop zone control group are coordinated for and in place no later that one hour prior to TOT. There are two types of drop zone support group; a **complete control group** and a **partial control group.** If the drop zone is **2100 meters or longer in length or 20 seconds or more of exit time or more than one aircraft is executing the mission, then a complete control group must be used**. If none of these situations exist then a partial control group may be used. Below are the minimum requirements for each.

At a minimum, the Drop Zone Control Group will consist of the Drop Zone Support Team Leader (DZSTL) and the Assitant Drop Zone Support Team Leader (ADZSTL). All other members of the control group are required based upon mission parameters.

Complete control group:
- The assistant DZSTL must be DZSTL qualified (For personnel and / or heavy equipment drops, the assistant DZSTL must be a qualified and current Jumpmaster.)
- Two medical personnel /w Front Line Ambulance (FLA) minimum for personnel drops and heavy equipment (Not needed for CDS drops. Check local rules and regulations on the subject).
- 2 wind measuring devices (one located at the control center with the DZSTL, the second wind measuring device will be located with the assistant DZSTL at the highest location on the drop zone).

Partial control group:

- The assistant DZSTL does not have to be DZSTL or Jumpmaster qualified.
- One medical person /w Front Line Ambulance (FLA) minimum for personnel drops and heavy equipment (Not needed for CDS drops. Check local rules and regulations on the subject).
- 1 wind measuring device (located at the control center with the DZSTL).

The following is an example a drop zone support team/control group:

- DZSTL. The senior ranking of the DZST qualified individuals.
- Assistant DZSTL.
- Medical personnel /w Front Line Ambulance (FLA) minimum for personnel drops and heavy equipment (Not needed for CDS drops. Check local rules and regulations on the subject).
- Malfunction officer /w camera. Must be a qualified and current rigger IAW AR 59-4.
- Parachute recovery detail /w recovery kit.
- Vehicles /w drivers as required.
- Road guards as required.
- Military Police if required to control traffic or provide crowd control.
- Boat detail for PE drops only

NOTE: The boat detail is required for personnel drops if a water obstacle is within 1000 meters of any edge of the drop zone, 40ft wide or wider at its widest point AND is four feet deep or deeper at its deepest point. If the water is 4 feet deep or deeper, but not over 40 feet wide, a boat detail is not required. However, **approved life preservers are still required for all jumpers**. The DZSTL may declare any body of water an obstacle based on jumper safety.

The DZSTL must:

- Determine if a follow-on assessment of the DZ has been conducted to confirm the current status.
- Ensure the OIC/NCOIC is fully briefed on the plan. Ensure all boat detail personnel have been trained and have all necessary equipment available to conduct the mission.
- Read all applicable regulations, FMs, and SOPs. Ensure copies are present throughout mission.

WATER OBSTACLE COVERAGE:

The boat detail must: have a minimum of 2 boats in place 1hr prior to TOT, establish two-way communication with the DZSTL 1hr prior to TOT, and maintain communication throughout the jump operation.

The boats will be in the water with engines running 10 minutes prior to TOT (a No-Drop situation exists if both boats are not in the water). The entire obstacle must be accessible to the boat detail. If it is not, an additional boat detail is required to ensure 100% access. Each water obstacle may require a different type of coverage.

The following is an example composition of a boat detail.

- OIC/NCOIC (qualified as a boat operator) and assistant boat operator. Personnel assigned duties as safety boat operators must be trained and licensed to operate the issued boat motors.
- Qualified boat operators - 1 primary and 1 assistant for each boat.
- Recovery personnel - 2 for each boat (one may be lifeguard qualified and combat lifesaver certified). All boat detail personnel should be strong swimmers.
- Each recovery boat team may need the following equipment:
- Boat (Zodiac RB-10 or solid-bodied boat of comparable size) with operable outboard motor.
- Enough fuel/oil to complete the mission.
- Life vest/floatation device for each boat detail member and 1 additional floatation devices for each jumper on the first pass. (not needed when the jumpers are wearing B5's or B7's.
- Life ring with attached rope—1.
- FM radio with spare battery—1.
- Hand held radio with spare battery—1
- Shepherd's crook—1.
- Grappling hook—1.
- Long backboard to facilitate CPR—1.
- Aid bag with resuscitation equipment—1.
- Rope, 120 feet long—1.
- Sling ropes with end of line bowline and snap link per boat—4.
- Paddles—4.

Night Operations:

- Operational night vision devices with spare batteries—2.
- Spot light—1.

NOTE: Units may supplement these requirements. When making a training parachute jump DZ risk assessment, the commander should consider the proximity of the water obstacle to the DZ, the depth of the water obstacle, and the width of the water obstacle. Additionally, the following factors may enter into the water obstacle risk assessment: the condition of the water obstacle bottom, the current of a free-flowing water obstacle, water temperature, the number of obstacles, the equipment available to reduce the risk level, jumper experience levels, jump time (day or night and percent of illumination), and whether or not the selected DZ is critical to mission success.

DZSTL Duties

- Conducts pre-mission coordination.
- Ensures drop zone is opened through range control.
- Has the drop zone fully operational one hour prior to TOT to include support in place and DZ marking correctly displayed.
- Establishes communication with Departure Airfield Control Officer (DACO) no later than one hour prior to TOT.
- Conducts ground or aerial reconnaissance of the drop zone at least one hour prior to the drop for obstacles or safety hazards.
- Conducts 10 minute window.
- Operates all visual acquisition aids.
- Ensures no-drop signals are relayed to the drop aircraft.
- Controls all ground and air medical evacuations.
- Ensures drop zone is closed through range control when accountability of personnel and equipment is completed.
- Submits post mission reports to appropriate agency.

Airborne Operation Flash Report (example)

The Flash Report is a locally generated form used to inform the chain of command of all incidents that occur during the operation. All items must be completed. Use the word "NONE" or N/A for items not applicable. Reports are to be called in by your **units within one hour following the scheduled airborne operation**. All units are required submit a Flash Report through their respective chain of command and **furnish copy to Range Division as soon as possible**.

Malfunctions	Entanglements
a. Type of malfunction	Low or high entanglement
b. Was reserve activated	Was reserve activated
c. Individual's landing status	Individual's landing status

---

1. Unit Designation__________________ 2. Air letter line NO. __________________

3. Type of Aircraft / # __________ 4. Date/Time of drop _______________________

5. Total Troops/Type chutes jumped____________ 6. Drop Zone ______________

7. Winds at Drop Altitude _______ 8. Winds at Surface _____ Drop Alt______

9. Total Number of Containers/Platforms Dropped: a. HEAVY DROP _________

b. LAPES___________ c. CDS _______________ d. OTHER ________________

10. Number of Troops Evacuated From the Drop Zone: FLA _____ HELO ______

11. Remarks(ABORT, REFUSALS, JUMPERS RETURNED TO AIRFIELD, UNUSUAL INCIDENTS)

12. Name, Rank AND Duty Title of Individual Submitting Report

13. Time Report Submitted ____

14. Report Received By ____

***NOTE –** Unit SOP may require additional post-mission reports; the Flash Report is the only one universally required.

MONITORING SURFACE WINDS

Surface wind reading are taken from the control center location and from the highest field elevation on the drop zone when the DZ length is 2100 meters or longer, 20 seconds or more of exit time, or is a multiple aircraft operation. In the event of the surface winds exceeding the allowable limits, the DZSTL will immediately broadcast by radio "no drop, no drop, no drop" or execute the pre-coordinated no drop signal.

The 10 Minute Window: Not later than 12 minutes prior to the first TOT, a continuous monitoring of the surface winds will commence. If, at any time, the wind exceeds the maximum allowable surface wind conditions, then a no-drop signal will be relayed to the drop aircraft. The surface wind must then remain at or below maximum surface wind conditions for 10 minutes before the drop operation can proceed. This procedure will continue until the wind remains at allowable conditions for 10 minutes or the mission is canceled.

> Example: TOT scheduled for 0900. Continuous monitoring of surface winds will begin at 0848. At 0855 a gust of wind exceeds allowable conditions. The new TOT is 0905. Continuous monitoring of surface winds begins 12 minutes prior to TOT to allow a buffer of 2 minutes to relay a no-drop signal to the aircraft.

Max Surface Winds	
Type Of Load	(Knots)
Personnel (land)	13
Personnel (water)	17
Equipment without ground disconnects	13
Equipment with ground disconnects	17
CDS using G-12 parachutes	13
CDS or door bundles using G-13 or G-14 parachutes	20
Simulated airborne training bundles	25
High-velocity CDS/high altitude airdrop resupply system	No Restrictions
Free Drop	No Restrictions

ANEMOMETERS

The 3 US Army Natick Soldier Center approved wind measuring devices:

- The AN/PMQ 3A is omni-directional.
- The DIC/DIC-3 is omni-directional.
- The Turbo Meter (must be held within 20 degrees of wind line with the wind entering the rear of the meter to ensure accurate readings.)

AN/PMQ-3A

DIC/DIC-3

Turbo Meter

VIRS TRANSMISSION

Instructions transmitted to the aircraft must be concise. Example: "Steer right", "On course", etc.

"STEER LEFT/RIGHT" will be given to align the aircraft on desired inbound heading.
"ON COURSE" will be given when the aircraft is on course.
"STAND-BY" will be given to the aircraft at approximately 8 - 10 seconds to release or as briefed.
"EXECUTE" will be transmitted three times minimum when the aircraft reaches the predetermined RP on the ground

This example pertains to a non-tactical scenario after all information pertaining to the drop has been coordinated for with the aircrew such as drop heading, drop altitude, etc.

GTA Transmission	Pilot Transmission
	A1L16 this is Raven 11 – over
Raven 11 this is A1L16 – over	
	L16 this is Raven 11, CCP inbound – over
Raven 11 this is L16, State Number, Type and Intentions - over	
	L16 this is Raven 11, I am a single UH-60 with paradrop, inbound to your location - over
Raven 11 this is L16, Heading _ _ _ degrees, Distance _ _ kilometers, Drop heading _ _ _ degrees, signal on call, I can accept your aircraft at my location with_ _ jumpers per pass. Be advised all no fly areas are in effect. Continue approach for visual identification.– over	
	L16 this is Raven 11, Roger – over
Raven 11 this is L16, I am at your ____ o'clock ____ meters. Signal out, can you identify? – over	
	L16 this is Raven 11, I identify orange VS-17 panel – over
Raven 11 this is L16, Visual contact. Enter (Right / Left / Up / Cross / Down Wind), and report base – over	

	L16 this is Raven 11, on base – over
Raven 11 this is L16, Roger – over	
ONCE AIRCRAFT IS IN POSTIONED ON BASE	
Raven 11 this is L16, turn drop heading _ _ _ degrees – over	
	L16 this is Raven 11, turning drop heading _ _ _ - over
Steer Left/Right; on course	
	Steering Left/Right; on coarse
8 to 10 seconds out; with one jumper, stand by	
	Standing by
With one jumper, execute, execute, execute – over	
Raven 11 this is L16, I observe one jumper clear and away. State intentions. Report when clear of my control zone. Be advised all no fly areas are in effect – over	
	A1L16 this is Raven 11, intention classified. Clear of your control zone – over
Raven 11 this is A1L16, out	

***NOTE**: If the drop aircraft is going to land on or near the drop zone (typically within 1000m), the DZSTL will advise the pilot when all jumpers are on the ground and are clear of the landing area prior to giving clearance to land.

DROP ZONE SURVEY

AIRBORNE UNIT ASSUMES RESPONSIBILITY FOR PERSONNEL INJURY AND EQUIPMENT DAMAGE ON DZ

DROP ZONE SURVEY

1A. DZ NAME: William King DZ
1B. ZAR INDEX NO.:
2A. COUNTRY: US
2B. STATE: GA

3. MAP SERIES/SHEET NUMBER/ EDITION/ DATE OF MAP: V745S FT BENNIMIM MIM 003 20130301

4. SURVEY APPROVAL/DISAPPROVAL DATA

4A1. DATE SURVEYED: 20150527
4A2. TYPED NAME AND GRADE OF SURVEYOR: Jacob A. Sprenger, E-7
4A3. PHONE NUMBER *(DSN)*: 835-1111
4A4. UNIT: HHC / 1-507 PIR

4B. DROP ZONE APPROVAL/DISAPPROVAL
A = APPROVED
D = DISAPPROVED

FOR	CDS/CRL/CRS	PER	HE	MFF	SATB	CRRC	HSLLADS	HVCDS
DAY	A	A	D	D	A	D	A	D
NIGHT	A	A	D	D	A	D	A	D

4C. DATE APPROVED FOR GROUND OPERATIONS: 20150717
NAME, GRADE AND SERVICE OF APPROVAL AUTHORITY: David G. Fivecoat, O-6, US Army
PHONE NUMBER *(DSN)*: (C)706-544-6911
UNIT AND LOCATION: HQ, ARTB, Ft. Benning, GA 31905
SIGNATURE:

4D. DATE SAFETY OF FLIGHT REVIEW APPROVED: 20150725
NAME AND GRADE OF REVIEWING OFFICER: Matthew P. Bradley, O-5, USAFR
PHONE NUMBER *(DSN)*: 625-5345
UNIT AND LOCATION: 94 OSS/OSK, Dobbins ARB, GA 30069
SIGNATURE:

4E. DATE OF MAJCOM APPROVAL: 20150730
NAME AND GRADE OF APPROVING AUTHORITY: James R. Devere, O-6, USAFR
PHONE NUMBER *(DSN)*: 625-5110
UNIT AND LOCATION: 94 OG/CC, Dobbins ARB, GA 30069
SIGNATURE:

5. COORDINATING ACTIVITIES

A. DZ CONTROLLING AGENCY OR UNIT: Lawson Army Airfield, Ft. Benning, GA
B. MEMORANDUM OF UNDERSTANDING/LAND USE: YES ☐ NO ☒ ATTACHED ☐
C. PHONE NUMBER *(DSN)*: 835-3524
D. RANGE CONTROL: Range Control VHF-FM 38.60 / Doughboy Advisory VHF-AM 138.325 / UHF-AM 227.400
E. PHONE NUMBER *(DSN)*: 835-6291

6. DZ DIMENSIONS *(YDS/MTRS) (FOR CIRCULAR DZ, ENTER RADIUS ONLY)*

A. LENGTH: 3,079 YDS / 2,816 MTRS
B. WIDTH: 898 YDS / 821 MTRS
C. RADIUS: N/A

POINT OF IMPACT DISTANCES FROM DZ LEADING EDGE
D. CDS PI: 350 YDS / 320 MTRS
E. PE PI: 350 YDS / 320 MTRS
F. HE PI: N/A

7. DZ AXIS DATA *(OPTIONAL FOR CIRCULAR DZ)*

A. MAGNETIC: 328.9°
B. GRID *(MGRS)*: 323.5°
C. TRUE: 324.7°
D. SOURCE/DATE OF VARIATION DATA: GPS / 20150527

8. GROUND POINT ELEVATION

A. CDS PI: 236'
B. HE PI: N/A
C. PE PI: 236'
D. HIGHEST: 236'

9. DZ COORDINATES

A. SPHEROID: WGS84
B. DATUM: WGS84
C. GRID ZONE: 16S
D. EASTING: 6
E. NORTHING: 35

F. GPS DERIVED COORDINATES: YES ☒ NO ☐
G. POINT OF ORIGIN: 16S FA 90346 77781 - Int of Centerline Rwy 33 & Txy Kilo: PEPI 55 MTRS @ 302°M

H. POINT	MGRS COORDINATES	WGS84 LATITUDE *(D-M.MM)*	WGS84 LONGITUDE *(D-M.MM)*
DZ CENTERPOINT	16S FA 89656 78678	N 32° 19.735'	W 084° 59.104'
CDS PI	16S FA 90300 77802	N 32° 19.254'	W 084° 58.704'
PE PI	16S FA 90300 77802	N 32° 19.254'	W 084° 58.704'
HE PI	N/A	N/A	N/A

I. DZ CORNERS MGRS COORDINATES

LEFT LEADING EDGE: 16S FA 90159 77301 / N 32° 18.985' W 084° 58.800'
RIGHT LEADING EDGE: 16S FA 90820 77787 / N 32° 19.241' W 084° 58.373'
LEFT TRAILING EDGE: 16S FA 88490 79568 / N 32° 20.228' W 084° 59.836'
RIGHT TRAILING EDGE: 16S FA 89151 80055 / N 32° 20.485' W 084° 59.409'

AF IMT 3823, 20021001, V2 PREVIOUS EDITIONS ARE OBSOLETE.

DZ NAME

King DZ

10. DZ DIAGRAM

SEE ATTACHED DIAGRAM(S)

11. REMARKS

1. User accepts responsibility for damage to equipment and injury to personnel resulting from airdrop operations.
2. Administration / Coordination / Scheduling Instructions:
   a. Users must adhere to Unit SOP for DZ Operations
   b. Coordinate with Airfield Operations, Lawson AAF Tower, Fort Benning G-3 Operations, Fort Benning Range Control, Department of Public Works, Flint Energy prior to any operations; usage of King DZ Ryder DZ affects multiple ranges and Fort Benning operations.
   c. Contact Lawson AAF Base Operations for SR-38 and SR-39 deconfliction.
3. Obstacles/Hazards on the DZ:
   a. Traffic must be halted along the following routes where they intersect the perimeter roads of Lawson AAF no later than 10 minutes prior to TOT and throughout Airborne operations: Sunshine Rd, Sightseeing Road, Dixie Road, Bradshaw Rd, Indianhead Rd. (See attached imagery for traffic stop locations).
   b. 40' AGL/ 300' MSL Power lines – closest are located 499 mtrs @ 095.4° Mag from PEPI. Power lines border the outer edge of the airfield perimeter road to the north. Power lines are located on and along the southeast corner of the DZ. The power lines around the DZ cannot be turned off. Power lines on the DZ will be turned off with appropriate coordination.
   c. A drainage ditch/creek (depth variable depending upon seasonal conditions) is located inside of a 10'-20' deep ravine which parallels the right edge of the DZ and turns south to run along the lead edge of the DZ to the Chattahoochee River. The creek is surrounded by heavy foliage in places with trees up to 50' in height. (See attached imagery)
   d. Two drainage ditches, approximately 15'-20' deep (water depth varies depending upon seasonal conditions) are located near the left trailing edge of the DZ, east of the Chattahoochee River. Both ditches are bordered by heavy foliage. (See attached imagery)
   e. Trees up to 60' AGL/ 300' MSL in height border the left leading edge of the DZ for approximately 1000 mtrs.
   f. Trees up to 60' AGL/ 300' MSL in height border the right leading edge of the DZ for approximately 1500 mtrs.
   g. Hazards associated with an active airfield are present including parking aprons, taxiways, towers, navigational equipment, wind socks, runway lights, taxiway lights distance running markers, informational markers, etc.
      1) 2' Tall airfield lighting is located along all runway and taxiway boundaries.
      2) 10' Instrument pole located @ 16S FA 89995 78142, 200 mtrs from PEPI @ 304.4° Mag.
      3) 10' Instrument pole located @ 16S FA 90106 78223, 240 mtrs from PEPI @ 335° Mag.
      4) 50' AGL/ 290' MSL Ground Glideslope Antenna @ 16S FA 89941 78124, 470 mtrs from PEPI @ 309.4° Mag.
      5) 20' AGL/ 260' MSL WX Instrumentation located @ 16S FA 89897 78125, 500 mtrs from PEPI @ 305.4° Mag.
      6) Cement Abutments facing SE and NW located @ 16S FA 89546 78210, 850 mtrs from PEPI @ 298.4° Mag.
      7) 20' AGL/ 257' MSL Observation tower located @ 16S FA 89775 78122, 600 mtrs from PEPI @ 299.4° Mag.
      8) Precision Approach Radar located @ 16S FA 89243 79010, 1.58 km from PEPI @ 321.4° Mag.
      9) VHF Omnidirectional Range located @ 16S FA 88887 79033, 1.9 km from PEPI @ 314.4° Mag.
      10) North Windsock and Weather Station located @ 16S FA 88601 79510, 2.4 km from PEPI @ 319.4° Mag.
      11) 20' AGL/ 257' MSL WX Instrumentation located @ 16S FA 88645 79799, 2.6 km from PEPI @ 324.4° Mag.
      12) Power Junction Box located @ 16S FA 88732 79492, 2.3 km from PEPI @ 320° Mag.
      13) Power Junction Box located @ 16S FA 88604 79782, 2.4 km from PEPI @ 323.4° Mag.
      14) Transformer located @ 16S FA 89133 78961, 1.6 km from PEPI @ 318.4° Mag.
      15) Transformer located @ 16S FA 88763 79513, 2.3 km from PEPI @ 321° Mag.
      16) 20' AGL/ 256' MSL Observation Tower located @ 16S FA 88657 79635, 2.4 km from PEPI @ 321° Mag.
      17) Haz Cargo Ramp, surrounded by 6 x 50' AGL/ 280' MSL light poles, each 80 mtrs from ramp centerpoint located @ 16S FA 90158 78643, 800 mtrs from PEPI @ 353.4° Mag.
      18) 10' Bldg, 20 mtrs x 7 mtrs located at 16S FA 89126 79934, 2.4 km from PEPI @ 345.4° Mag.
      19) 8' Chain link fence topped with barbed wire surrounds the airfield perimeter and travels throughout the lead 1000 mtrs of King DZ in varying directions. (See attached imagery)
4. Obstacles/Hazards around the DZ:
   a. Chattahoochee River (depth variable depending upon seasonal conditions) is located less than 20 mtrs from left leading edge of King DZ and is variable in distance from the left edge of King DZ.
   b. 89' AGL/ 321' MSL ATC tower is located @ 16S FA 88883 80088, 2.6km from PEPI @ 332.4° Mag.
   c. Numerous power lines, buildings, hills, roads and towers are within 1,000 mtrs of the DZ to the north, northeast and east.
5. Antennas, Towers of Aerial Cables within 10NM radius of the DZ Centerpoint:
   a. North: 21x 446'-1,119' MSL / 3.4-9.2NM
   b. South: 8x 564'-840' MSL / 4.3-9.2NM
   c. East: 4x / 490'-785' MSL / 6.8-9.3NM
   d. West: 6x / 554'-786' MSL / 4-9.8NM
6. Additional Information & Airspace:
   a. V241, V321, J40, J73, SR038 are located within a 10 NM radius of the DZ Centerpoint.
   b. R-3002G (Surface – 14,000' MSL) is located over the southeast end of the DZ.
   c. R-3002A/B/C (Surface-4,000' MSL) is located 1 NM east of the DZ.

NOTES: Named after Pvt William N. "Red" King, 1st official US enlisted soldier to parachute out of an airplane.

12. PHOTOGRAPH AVAILABLE

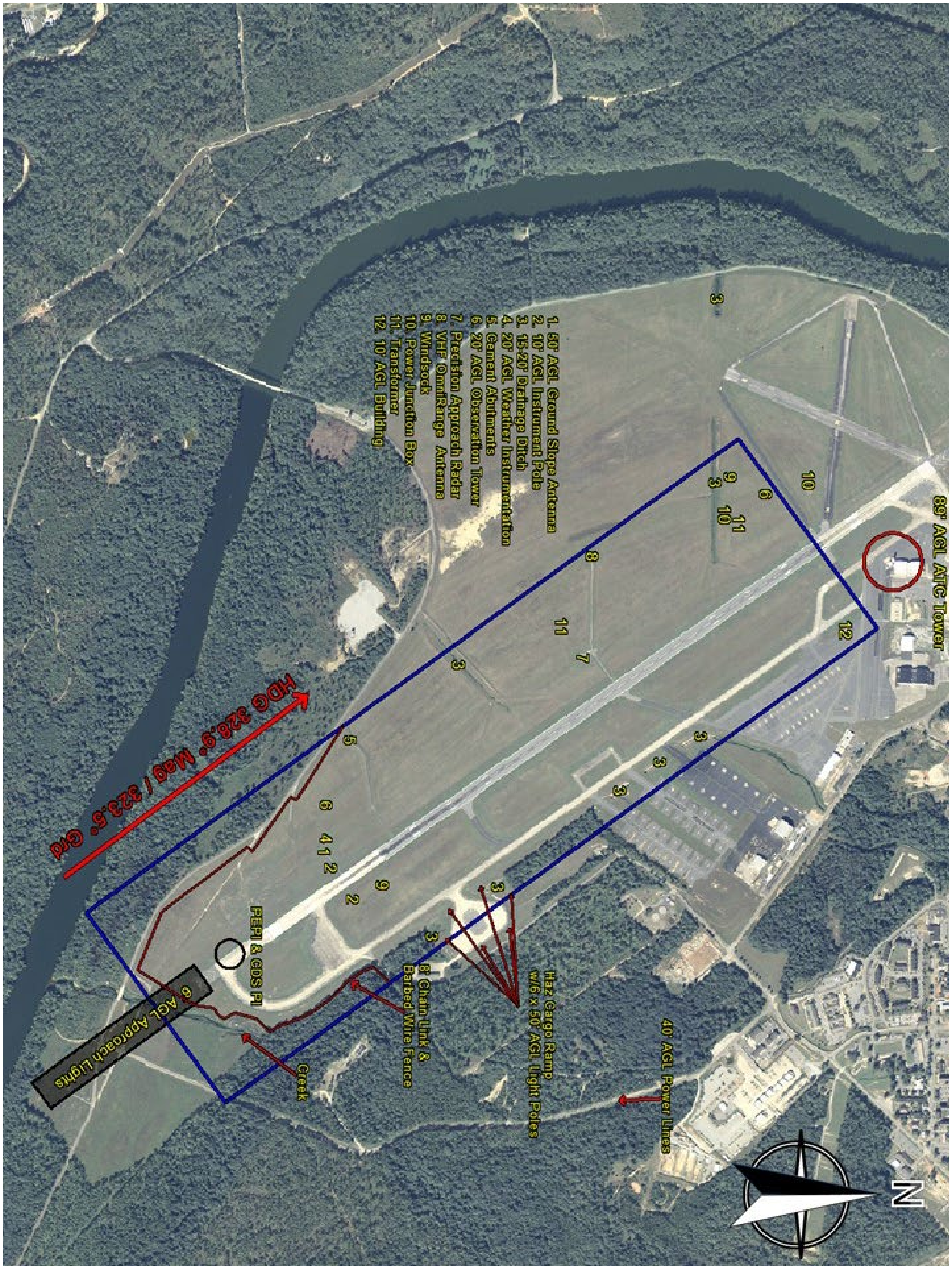
YES ☒ NO ☐

LOW LEVEL ROUTES

☐ NONE AVAILABLE

☐ ROUTE NAME/DESIGNATOR

AF IMT 3823, 20021001, V2 *(REVERSE)*


89' AGL ATC Tower
1. 50' AGL Ground Slope Antenna
2. 10' AGL Instrument Pole
3. 15-20' Drainage Ditch
4. 20' AGL Weather Instrumentation
5. Cement Abutments
6. 20' AGL Observation Tower
7. Precision Approach Radar
8. VHF OmniRange Antenna
9. Windsock
10. Power Junction Box
11. Transformer
12. 10' AGL Building
HDG 328.9° Mag / 323.5° Grd
PEPI & CDS PI
8' Chain Link & Barbed Wire Fence
Haz Cargo Ramp w/6 x 50' AGL Light Poles
40' AGL Power Lines
Creek
6' AGL Approach Lights
N

DROP ZONE SURVEYING FIELD GUIDE

DZ Surveying

Field Guide

Disclaimer: This guide is intended to be used as a supplement to AFI 13-217, not to be used in lieu of AFI 13-217. All material in this guide is based off of AFI 13-217 and the Survey and Assault Zone Assessment Student Guide.

1

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES

Dates of issue for original and changes pages are:

Original	0	18 Mar 08
Change	1	28 Mar 08

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 30 CONSISTING OF THE FOLLOWING:

Page No.	Change No.	Description of Change(s) / Revision(s)
15	1	NOAA Mag Var Calc hyperlink

INTRODUCTION

The *DZ Surveying Field Guide* compliments, enhances, and clarifies Drop Zone (DZ) criteria contained in AFI 13-217, *Drop Zone and Landing Zone Operations*. In recent years, there has been a sharp increase in DZ surveys submitted to Air Mobility Command (AMC) Regional Tactics Offices and/or HQ AMC/A3DT for inclusion on the Zone Availability Report (ZAR) that contain significant safety errors. This guide is to be used in conjunction with AFI 13-217 to ensure "quality products" are being produced by all parties involved in the DZ survey process. Another goal of this guide is to standardize the data contained on surveys being submitted to AMC.

If you're reading this, you've been tasked to either create a new DZ from scratch or have lucked out and just have to resurvey an old one. A prerequisite for any survey is that the individual conducting it must be proficient using a map, compass, Global Positioning System (GPS), and a bit of trigonometry. During your first survey, you will become knowledgeable of DZ criteria. Attendance at the Survey and Assault Zone Assessment Course on (Pope ARB) is highly encouraged, but not required to perform a DZ survey. Paragraph 2.23.1 in AFI 13-217 spells out who is authorized to perform a DZ survey.

There are two different ways to approach a DZ survey – with a specifically designed mission/operation in mind or to create a training DZ on real estate your unit owns and/or may have access rights to. If the former is your goal, you will need to perform coordination with flying personnel assigned to a unit that operates the type of aircraft you expect to use. This is necessary to gain relevant information you'll plug into AFI 13-217's DZ dimension tables. If making a generic one, your job is to make it as big as possible to ensure the greatest flexibility in potential operations.

Here are some issues to take into account when generating a DZ survey.

1. The DZ survey submission process begins with the surveyor. The surveyor is responsible for completing the AF IMT 3823 (DZ Survey Form) and for initiating the approval process.

2. DZ surveys may be accomplished by the unit whose equipment and/or personnel are being airdropped or the using unit may request another unit to perform the ground portion of the DZ survey.

3. If the originating unit is the only unit that will use the DZ and it will not be used by Air Force assets in support of non-Air Force units, the survey can be maintained at the unit level and the original kept on file by the Chief of Tactics. These so called “Local DZ's” are not required to be submitted to AMC for inclusion on the ZAR.

4. According to AMC OPORD 17-76, any DZ survey that is going to be used for a Joint Airdrop/Air Transportability Training (JA/ATT) mission, must be submitted to AMC for inclusion on the Worldwide ZAR and cannot be used until it is on the web site.

5. A DZ survey must be submitted to AMC anytime Air Force assets are used to perform air drop missions in support of non-Air Force units.

6. A DZ survey may be submitted to AMC if a unit wishes to “advertise” the existence of a DZ.

Should you run into any difficulty during the survey process, please don’t hesitate to call a AMC Regional Tactics Office or the ZAR Program Manager; if you have any recommendations, questions, or criticisms of this guide, contact Mr. William Wertley, 62 OSS/OSK. See Attachment 2 for a complete list of AMC contacts.

The four steps involved in properly completing and submitting a DZ survey are ***Information Gathering***, ***Preparation***, ***Site Visit***, and ***Survey Production***. The following section will describe the requirements for completing each step of the survey process.

I. INFORMATION GATHERING

Obtain as much information as possible about the site prior to the visit.

1. Identify the location/site of the DZ.
   a. If you have never performed a survey previously and are tasked to create one on a brand new DZ, you are strongly encouraged to contact a Special Tactics Squadron (STS) for assistance.
   b. If you are resurveying an existing DZ that is about to expire, check the ZAR for a current survey to be used as reference only. Do not assume the survey is correct as the conditions under which it was created may no longer exist.
   c. If the DZ you are surveying has expired and you cannot locate an archived copy of the survey, contact the ZAR Program Manager to see if they have an archived

copy of the DZ survey; contacting the closest regional tactics office may also be helpful.

2. Coordinate all events that require support. If necessary, contact requesting agency or tasking authority:
   - Type aircraft involved
   - Type of operation(s) planned
   - Availability of airlift, naval, and ground support to the DZ Availability of maps, charts, aerial photos, and equipment Proposed inbound and departure courses
   - Factors affecting Air Traffic Control (ATC) in the area
   - Local sources of data or support in the site area
   - Military training area/range access via the appropriate range control facility

3. Determine the time frame and the total ground time required to conduct the survey. Total ground time may be limited by the modes of travel in the area and the location of the site from arrival location, billets, or port of entry.

4. Coordinate date and time of arrival and departure.

5. Determine the personnel and equipment required to conduct the survey are available and in working condition. The minimum equipment list includes:
   - Maps and charts (small detail) 1:24,000, 1:25,000, 1:50,000
   - Imagery of the DZ area (military sources or commercial)
   - Regulations/Manuals (ex. AFI 13-217, this booklet)
   - Measuring tape/wheel or laser range finder
   - Compass (with +/- 0.5 degree accuracy)
   - Military Grid Plotter (GTA 5-2-12 or other military protractor)
   - GPS (go for the most accurate you can afford)
   - Calculator (must have trigonometric functions)
   - Camera (digital preferred with expanded memory)
   - Survey forms and worksheets
   - Laptop computer (with IMT Viewer, as well as AutoCAD and/or Portable Flight
   - Planning System [PFPS] preferred)
   - Sketch pad with pens and pencils
   - Cellular telephone with pertinent numbers preloaded

6. Coordinate any special permission required to access the site area (i.e. range control communications procedures, passwords, passports, keys, passes, etc.).

II. PREPARATION

1. Familiarize yourself with information of the area and the criteria for the type of DZ you are building (circular or rectangular shape, minimum length/width).

   Hint: *If you've not already determined exactly where the DZ will be located, use charts, maps, and/or imagery of the general area to narrow down the location. Also recommend using FalconView and/or Google Earth if current maps or charts cannot be located.*

2. Plot a draft DZ on your map that at least meets your minimum required size; that said, it is always better to go larger if conditions permit to ensure the widest range of options for DZ usage. This will serve as the starting point for your survey. Do not limit yourself to open areas designated by "white space" on the map as it may not accurately reflect what's there. Using recent imagery will minimize major changes later on. Take the following into account:

   a) As points are selected, determine MGRS coordinates for each to aid with identification in the field (make sure you know which datum you're using).

   b) Decide whether the DZ will be a circular or rectangular. Circular DZs provide the most flexibility in mission planning while rectangular ones minimize confusion.

      Note: *DO NOT put both Circular and Rectangular Surveys on the same form. Separate them into two different surveys.*

   c) Use the desired approach axis to orient the DZ if it will be a rectangle. If no route dictates the axis, take into account possible airspace boundary issues such as international borders and special use airspace. To determine if these are a factor for you, contact the military airspace manager closest to the DZ for assistance.

      Note: *If a rectangular DZ can be accessed from multiple directions, break it into two different surveys*.

   d) Determine the length and width that meet your minimum requirements.

   e) Select a DZ center point. This is the absolute center with regards to both width and length. It is determined by taking the midpoint between opposite ends of the DZ (LLE-RTL or RLE-LTE).

   f) Assign one or more PIs as needed. Consider using just one Point of Impact (PI) at 550 yards for all three types of drops if DZ size isn't an issue. This PI distance allows any aircraft to drop CDS, personnel, or heavy equipment.

      Note: This technique minimizes confusion by ensuring the Point of Origin (PO) directions in Section 9.G. take the Drop Zone Controller (DZC) to the correct point and the crew uses the correct PI for their calculations.

   Note: *Minimum distances for PI placement can be found in Table 2.2 of AFI 13-217.*

g) Determine a Point of Origin. The PO is a readily identifiable ground reference point used by the DZ party to find the primary PI on the DZ.

1) Confirm the PO is very obvious and permanent. Road intersections, ponds, and other precise locations work best. Make sure you include a brief description of the PO along with distance and heading from the PO to the Primary PI.

2) On Water DZs within sight of a land mass, pick the closest definable point for the PO, but take bearings to several identifiable points if available for the DZC's use in determining the PI's location by triangulation. This information will be placed in Block 11. The various points should also be visible on the Block 10 diagram.

4. Develop a site visit plan incorporating the best sequence for obtaining the data you need. No technique is wrong if it allows you to accurately assess the utility of the DZ and lets you leave with all of the information required to finish the survey. The amount of time you set aside for conducting the site visit will vary based on weather, time of day, time of year, area security, on-hand equipment, terrain, type, and size of drop zone.

4. Perform one last operations check of your equipment. Make sure you have extra batteries, authorized frequencies, etc. before you leave to perform the survey. Reconfirm your GPS is using the same datum as the map the DZC will use while controlling air drop operations.

a) Contact the DZC to confirm the datum plane desired if no tactical chart is available. If no preference is stated, WGS-84 is the default datum.

Note: *Most of North America has only been surveyed in North American Datum 1927 (NAD-27).*

III. SITE VISIT

1. Using the site visit plan, begin from an established point and canvas the DZ making note of any significant physical obstructions and terrain features of the DZ environment. Add these features to the enlarged copy of the Draft DZ. Build a legend if unusual or nonstandard items are used. Be sure to include:

a) All prominent obstacles (poles, towers, trees, etc.).
b) All permanent manmade structures/surfaces (roads, runways, buildings, etc.).
c) Significant terrain features (lakes, rivers, gullies, cliffs, etc.).

2. As each relevant point of the DZ is identified, validate Military Grid Reference System (MGRS) and Lat/Long coordinates. Double-check that the GPS is set to the correct datum plane.

a) Evaluate the point of origin for ease of identification. If you can't find it, the DZC probably won't be able to either.
b) Make note of the GPS elevation for each point as a backup to the map elevation.

3. Should you find that the draft DZ is not feasible, you have to recalculate and confirm the coordinates of the center point and the PIs. New directions from the PO to the PI will be needed as well.

IV. SURVEY PRODUCTION

Once you have collected all the data necessary to create the DZ and have identified any hazards which may exist, you may begin filling out the AF IMT 3823, Drop Zone Survey Form.

> **Hint:** *You may want to take a blank DZ survey form with you when you're out in the field. This will aid you collect all the data necessary to complete the survey form upon your return to home station.*

Below is a detailed description of what data/information is required to be entered into each block on the AF IMT 3823 (20021001, V2), and how the data is to be verified throughout the process. **All blocks require an entry. Type "N/A" if data is not applicable for that block.**

AF FORM 3823
IMT Version Block by Block

Block 1A. DZ NAME

- Selected by unit who is having the survey completed. One of the more popular ideas in naming DZ's is to honor unit members that lost their lives while in uniform, typically while conducting combat operations; living personnel are not typically honored in this fashion.
- Reference the worldwide ZAR (https://afkm.wpafb.af.mil/zar) to ensure the DZ name you are choosing has not been used elsewhere.
  - Ensure the name is not offensive in English or other languages.
  - If it's a *Circular* and/or *Water* DZ, include "Circular" and/or "Water" to the name.

  Examples: Lakeside Water DZ, Lakeside Circular DZ, Lakeside Circular Water DZ.
- If the DZ can be accessed from multiple directions and you wish to use the same name in the naming convention, include the word "Reverse" or the closest cardinal direction the DZ can be accessed from in the name.

  Examples: Killroy - Killroy Reverse, Killroy South – Killroy North, etc.
- You may also use two entirely different names for each direction the DZ can be accessed.

Block 1B. ZAR INDEX NO.

- Leave this blank unless this is a recertification.
  - If a new DZ, the Regional Tactics Office that performs the safety-of-flight review will get a ZAR Index Number from the ZAR Program Manager.
- If the survey is for local use only, mark this block "N/A".

Block 2A. COUNTRY

- Enter the name of the country in which the DZ is located.
- Use the two-letter country code as found in Attachment 1.

Block 2B. STATE

- Enter the name of the state, province, or territory in which the DZ is located.
- Use the two-letter abbreviation code as found in Attachment 2.

Block 3. MAP SERIES/SHEET NUMBER/EDITION/DATE OF MAP

- These can be found on paper charts (series, sheet number, and edition with the map information are on the bottom left) and in the print preview function in PFPS.
- Use Jan 1st (xxxx0101) to complete the 8-digit date (YYYYMMDD) if the exact date cannot be determined.

SECTION 4: SURVEY APPROVAL/DISAPPROVAL DATA

Blocks 4A1 through 4E are to be signed and dated by those individuals responsible for completing the survey and ensuring the DZ is compliant with all applicable directives. Each person signing the survey is to validate the data themselves. This will ensure the previous signatory has done their job in the review process. By the time the survey reaches the Operations Group Commander (OG/CC) for MAJCOM approval, the DZ should be free of any significant errors that could affect safety-of-flight and/or ground operations.

The intent of AFI 13-217 is to have **four separate individuals** sign the survey form. The person that performed the survey cannot sign-off on either the ground operations approval and/or the safety-of-flight review. Each approval block must have a different signature. If this requirement cannot be met for a unique reason, contact the closest regional tactics office or the ZAR Program Manager for assistance.

Block 4A1. DATE SURVEYED

- Enter the date on which the survey was completed. If the survey took more than one day to complete, use the last day's date.

Block 4A2. TYPED NAME AND GRADE OF SURVEYOR

The surveyor is the person responsible for physically examining the DZ area for hazards and obstacles as well as calculating the DZ dimensions (i.e. length, width, or radius), and PI placement. This individual is also responsible for ensuring all equipment needed to accomplish the DZ survey is available and in operating condition. If more than one person was involved in the survey process, use the team leader's information.

- Enter the surveyor's Full Name, Rank (civilian or military designation), and Branch of Service. The surveyor will sign above their typed name.

  Example: John Q. Doe, TSgt, USAF

Block 4A3. PHONE NUMBER (DSN)

- Provide the surveyor's primary contact number. For overseas phone numbers include the country code along with the DSN number.

- This number must be verified by the ground operations approval authority.
- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

  Example: (C) (123) 555-9876

Block 4A4. UNIT AND LOCATION

- Enter the full Office Symbol, Unit, and Installation of the surveyor. Include the state and/or country where the installation is located.

  Example: 22 STS, McChord AFB, WA

Block 4B. DROP ZONE APPROVAL/DISAPPROVAL

Enter approval or disapproval symbol for each drop category by using the letter "A" for approved and the letter "D" for disapproved. If the DZ is to be placed in the ZAR, consider including approval for types of drops beyond your requirements but may meet other airdrop requirements for the area surveyed. Minimum DZ dimensions are located in AFI 13-217, Table 2.1.

- CDS/CRL/CRS – Container Delivery System/Container Ramp Load/Container Release System
- PER – Static Line Personnel
- HE – Heavy Equipment
- MFF – Military Free Fall (includes HAHO and/or HALO)

  If DZ will be used for HALO (but not HAHO), place an "A" in the block, and note this exception in Block 11 (Remarks).
- SATB – Standard Airdrop Training Bundle
- CRRC – Combat Rubber Raiding Craft
- HSLLADS – High-Speed Low-Level Aerial Delivery System
- HVCDS – High-Velocity Container Delivery System

Block 4C. DATE APPROVED FOR GROUND OPERATIONS
NAME, GRADE, AND SERVICE OF APPROVAL AUTHORITY

The purpose of the ground operations approval is to ensure the DZ survey form is complete, accurate, and the DZ meets the criteria for planned ground operations. This person will also ensure all DZ ground support requirements, hazards and/or obstacles have been accurately annotated in the Remarks section. This task is normally performed by the surveyor's commander or their designated representative.

- Use the Full Name, Rank (civilian or military designation), and Branch of Service of the individual who performed the Ground Operations Review.

  Example: James J. Doe, GS-9, DAFC

  Note: *While not required by AFI 13-217, consider having the survey reviewed by a knowledgeable Range Control representative, as applicable, prior to submittal to the ground operations approval authority. The Range Control representative does not sign the form.*

PHONE NUMBER (DSN)

- Provide the ground operations approval authority's primary contact number. For overseas phone numbers, include the country code along with the DSN number.
- This number must be verified by the safety of flight reviewer.
- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

  Example: (C) (123) 555-9876

UNIT AND LOCATION

- Enter the full Office Symbol, Unit, and Installation of the Reviewing Officer. Include the state and/or country where the installation is located.

  Example: 321 STS, RAF Mildenhall, UK

Block 4D. DATE SAFETY OF FLIGHT REVIEW APPROVED
NAME, GRADE, AND SERVICE OF REVIEWING OFFICER

The safety-of-flight review can be accomplished by an AMC Regional Tactics Office, the Chief of Tactics, or as assigned by the OG/CC or equivalent. The purpose of the safety-of flight review is to ensure that an aircraft can safely ingress and egress the DZ from a flyers perspective.

A safety-of-flight review includes an in-depth chart study of the terrain features along the route of flight from the Initial Point (IP) to a distance of approximately 4 nautical miles (NM) past the DZ trailing edge. If no IP exists, a good rule of thumb is to check for relevant obstructions out to 20 NM from the DZ along the DZ axis. When working with circular DZs, use a 20 NM circle centered on the DZ center point. A safety-of-flight reviewer's signature gives authority for the aircraft to conduct operations over the DZ.

- Use the Full Name, Rank (civilian or military designation), and Branch of Service of the person who performed the safety-of-flight review.

  Example: William J. Doe, Capt, USAF

PHONE NUMBER (DSN)

- Provide the safety of flight reviewer's primary contact number. For overseas phone numbers, include the country code along with the DSN number.
- This number must be verified by the MAJCOM Approval Authority.
- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

  Example: (C) (123) 555-9876

UNIT AND LOCATION

- Enter the full Office Symbol, Unit, and Installation of the Reviewing Officer. Include the state and/or country where the installation is located.

  Example: 62 OSS/OSK, McChord AFB, WA

Block 4E. DATE OF MAJCOM APPROVAL
NAME, GRADE, AND SERVICE OF APPROVING AUTHORITY:

AMC delegated the task of MAJCOM Approval Authority for DZs to the local OG/CC or their equivalent. If the OG/CC is deployed, this task may be delegated to another individual who is of equal status. A letter should be on file with the Chief of Tactics designating this individual as the DZ Approval Authority.

> **NOTE:** *By the time the completed DZ survey reaches the OG/CC or equivalent for signature, the survey should be* ***free of any errors*** *which would prevent it from being posted on the ZAR after MAJCOM review and approval.*

The MAJCOM Approval Authority is to verify the authorization of the Surveyor and Ground Operations Reviewer, confirm safety-of-flight review was accomplished, and validate the DZ is safe for air and ground operations. Once this block is signed, the DZ is ready for use. The signed document is returned to Group Tactics for delivery to HQ AMC/A5QM for inclusion on the ZAR web site.

- Enter the Full Name, Rank (civilian or military designation), and Branch of Service of the individual who is the MAJCOM Approval Authority.

Example: John E. Doe, Col, USAF

Designated Reviewer(s):

a. A letter should be kept on file with the local Chief of Tactics identifying individuals within the squadron who are authorized to conduct safety-of- flight reviews, and MAJCOM approvals (only if the OG is not available).

> **NOTE:** *The OG should specify a "designated representative" to approve DZs on their behalf during extended periods of absence (i.e. AEF deployments, personal leave, PME, etc.)*

b. Good choices for consideration of performing MAJCOM approval include Deputy OG/CCs and airdrop qualified squadron commanders.

c. To reduce frequency of updates, the letter may identify individuals by qualifications/duty titles/office versus names.

d. In addition to the Chief, Group Tactics, the safety-of-flight reviewer list should include other Group Tactics rated officers, Weapons & Tactics Managers, WIC graduates, and squadron tactics flight commanders.

PHONE NUMBER (DSN):
- Enter the MAJCOM Approval Authority's primary contact number. For overseas phone numbers, include the country code along with the DSN number.
- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

Example: (C) (123) 555-9876

UNIT AND LOCATION:
- Enter the full Office Symbol, Unit, and Installation of the MAJCOM Approval Authority. Include the state and/or country where the installation is located.

Example: 62 OG/CC, McChord AFB, WA

SECTION 5: COORDINATING ACTIVITIES

Block 5A. DZ CONTROLLING AGENCY OR UNIT
- Refers to the agency the user needs to contact in order to schedule use of the DZ.
- Use Full Name and/or Office Symbol of the controlling agency.
- Any special instructions regarding this agency should be included in Block 11.

Block 5B. MEMORANDUM OF UNDERSTANDING AND USE
- If the DZ is not located on real estate owned by the requesting unit, it may be necessary to coordinate a Land Use Agreement (LUA) or a Memorandum of Understanding (MOU) with the property owner.
- Do not assume other DoD units will automatically agree to use of their lands. Work with the local military legal office and contracting agency to resolve this requirement.
- Check the block that applies and attach a copy of memorandum or list its location in Block 11.

Block 5C. PHONE NUMBER (DSN)
- Provide the contact number for the DZ scheduling function equivalent. If overseas, include DSN country code.
- This number must be called by the ground operations reviewer to ensure it is correct.
- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

Example: (C) (123) 555-9876

Block 5D. RANGE CONTROL
- Refers to the agency the user should contact during use of the DZ.
- Use the unit's Full Name and/or Office Symbol.
- Any special instructions regarding this agency should be included in Block 11.

Block 5E. PHONE NUMBER (DSN)
- Provide the contact number for the range control agency or its equivalent. If overseas, include DSN country code.
- This number must be called by the ground operations reviewer to ensure it is correct.

- If a DSN number is not available, type "(C)" for commercial prior to the phone number.

  Example: (C) (123) 555-9876

SECTION 6: DZ DIMENSIONS (Yards & Meters) ENTER RADIUS FOR CIRCULAR DZs ONLY.

DZ Admin in PFPS is very capable of providing accurate calculations for your survey. If you have it and are proficient in its use, by all means use it. The following techniques are primarily for use when you don't have it or want to validate the information PFPS is providing.

While AFI 13-217 states Block 6 dimensions can be listed in either meters or yards, put both as stated by the title to this section. For circular DZs, mark all blocks except 6.C. with N/A.

Block 6A. LENGTH: Before listing the length of the DZ, you need to confirm the DZ is actually a rectangle by measuring and comparing the DZ's diagonal distances.

1) Determine the differences between the eastings and northings of the opposite corners (Left Leading Edge vs. Right Trailing Edge, and Right Leading Edge vs. Left Trailing Edge) by subtracting the higher values from the lower ones.

2) Square the differences for each diagonal and then add them together.

3) Determine the square root of the sum from step 2. This number is the diagonal length in meters.

4) Compare the two numbers for the diagonal lengths and consider them to be identical if the difference between them is less than 15 meters.

Here's how to determine the DZ's length.

1) Choose a side of the DZ – left or right.

2) Determine the differences between the eastings and northings of the ends (Left Leading Edge vs. Left Trailing Edge, or Right Leading Edge vs. Right Trailing Edge) by subtracting the higher values from the lower ones.

3) Square the differences and then add them together. *(Example: 400 meters of easting difference and 300 meters of northing difference – (400 x 400) + (300 x 300) = 16,000 + 9,000 = 25,000.)*

4) Determine the square root of the sum from step 3. *(Example: The square root of 25,000 is 500.)* This number is DZ length in meters.

5) Convert meters to yards by multiplying by 1.0936 or use a conversion tool such as http://www.onlineconversion.com/length_common.htm

Block 6B. WIDTH

Here's how to determine the DZ's width.

1) Choose an end of the DZ – leading or trailing.
2) Determine the differences between the eastings and northings of the ends (Left Leading Edge vs. Right Leading Edge, or Left Trailing Edge vs. Right Trailing Edge) by subtracting the higher values from the lower ones.
3) Square the differences and then add them together.
4) Determine the square root of the sum from step 3. This number is DZ width in meters.
5) Convert meters to yards.

Block 6C. RADIUS

- Enter the DZ radius in yards and meters for a circular DZ. Radius is the distance between the DZ center point and the outer edge of the circle.

Blocks 6D –6F. POINT OF IMPACT DISTANCES FROM DZ LEADING EDGE

- Enter the distance from the leading edge of the DZ to each point of impact in yards and meters. PIs may vary in distance due to day/night requirements and/or types of drops the survey is being approved for.
- Consider using just one PI at 550 yards (allows any aircraft to drop CDS, PER, or HE) for all three types of drops if DZ size isn't an issue.

> **NOTE:** *This technique minimizes confusion by ensuring the Point of Origin directions in Section 9.G. take the DZC to the correct point and the crew uses the correct PI for their calculations.*

SECTION 7: DZ AXIS DATA (OPTIONAL FOR CIRCULAR DZ)

List any applicable DZ axis restrictions in remarks to aid in selection of a run-in heading for circular DZs.

Block 7A. MAGNETIC

- Magnetic declination can be determined at the magnetic declination web site -- http://www.ngdc.noaa.gov/geomagmodels/struts/calcDeclination. Add or subtract this number as appropriate.

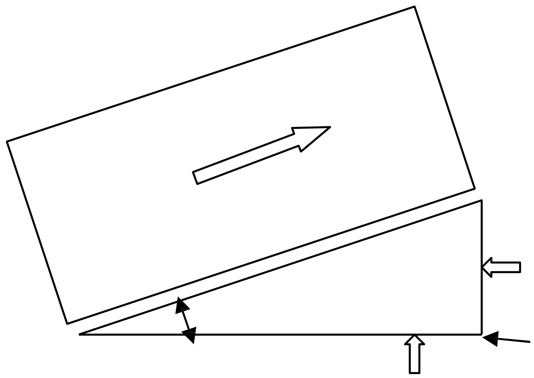
Block 7B. GRID (MGRS)

PFPS is pretty good at calculating the correct true and magnetic DZ axes, but not so well at the grid one. A simple and moderately accurate way to measure the grid axis is to plot the DZ on your map and then measure along its side with a protractor. For the motivated few that want to get it perfect, below are the steps on how to calculate the grid axis correctly:

1) Look at the DZ sketch north up on your map and make an estimate of the anticipated result. The grid axis will be within 2 degrees of the true axis you measured during your survey.

2) Draw a right triangle (one with a 90° angle) on the bottom of DZ with two of its corners being the leading and trailing edge. The following drawing is an approximate example of what it would look like for a DZ with a run-in heading of about 070°.

Angle of Interest



Adjacent

Opposite

90° Right Angle

3) Use the formula: GRID = T [O / A], where:
"GRID" = the grid axis being calculating and is typically within about two degrees of the true axis.
"T" = stands for the inverse "tangent" – that's already more than you want to know.
"O" = refers to the length in meters of the line opposite the angle you want to find.
"A" = refers to the length in meters of the line adjacent to the angle you want to find.

The O and the A are determined by using the following table:

Anticipated Axis	Opposite *	Adjacent *
000.1 ° to 090 °	RTE northing – RLE northing	RTE easting – RLE easting
090.1 ° to 180 °	RTE easting – RLE easting	RLE northing – RTE northing
180.1 ° to 270 °	LLE easting – LTE easting	LLE northing – LTE northing
270.1 ° to 360 °	LTE northing – LLE northing	LLE easting – LTE easting
* Note: If the first number is in a different grid square, put a "1" in front of it to make the math work.		

4) Using your calculator, divide O by A and hit the "equals button". Then hit the "INV" button followed by the "TAN" button. With the resulting number, to get the grid axis:

Anticipated Axis	Action
000.1 ° to 090 °	Subtract from 090 °
090.1 ° to 180 °	Subtract from 180 °
180.1 ° to 270 °	Add to 180 °
270.1 ° to 360 °	Add to 270 °

Show grid axis in tenths of a degree as this number will not change.

Block 7C. TRUE

- The true axis can be found by adding or subtracting the grid convergence angle from the grid axis as applicable.
- On a chart with a magnetic declination diagram, this value is typically expressed in degrees and minutes. Divide the minutes by 60 to get the number you need to use the convergence angle. *(Example: Chart shows a grid convergence of 0°42". Dividing 42 by 60 results in a 0.7 grid convergence).*

Block 7D. SOURCE/DATE OF VARIATION DATA

- Add the source of the variation data (NOAA, GPS, etc.) and the date here unless it's a circular DZ.
- The IMT form will highlight the input in red as an error but will print and save anyway.
- You should use the current year if you obtained the information from a GPS since it extrapolates the current declination from its database.

SECTION 8: GROUND ELEVATION

For blocks **8A** (CDS PI), **8B** (HE PI), **8C** (PE PI), and **8D** (Highest), enter the elevation in feet above mean sea level (MSL) for each point of impact as well as the highest point on the DZ.

- Elevation readings on virtually all GPS units are inherently less accurate than a map of the location, so crosscheck your GPS elevations with the elevations listed on the map.
- Be aware of the map's units of measure as well as the contour intervals. If the point falls right on a line, use that number; if it falls anywhere in between two lines, use half of the interval.
- As the intervals are often in meters, use the proper conversion to show elevation in feet.

Block 8D. HIGHEST

- Refers to the highest point within the DZ boundaries. Use the map/chart to narrow down the area most likely to provide the highest elevation.

SECTION 9:

DZ COORDINATES Block 9A.

SPHEROID

- Enter the spheroid used in computing coordinates for the DZ. Use either the ellipsoid listed in the map legend of the topographical chart, or the GPS ellipsoid (use WGS-84 to the maximum extent possible).

  Note: *Most of North America has only been surveyed in the Clarke 1866 spheroid.*

Block 9B. DATUM

- Enter the datum used in computing coordinates for the DZ.
- Enter the horizontal datum listed in the map legend of the topographical chart, or enter the GPS datum (use WGS-84 to the maximum extent possible).

Note: *Most of North America has only been surveyed in North American Datum 1927 (NAD-27).*

Block 9C. GRID ZONE:

Enter the grid zone designation listed in the map legend of the topographical chart, or use your GPS.

Block 9D. EASTING:

Enter the easting 100,000 meter square UTM identifier from the topographical chart or your GPS. On the chart, the number is the superscripted one to the left of the first easting 1,000 meter grid square and at every 10,000 meter position. It is always a single digit number.

Block 9E. NORTHING:

Enter the northing 100,000 meter square UTM identifier from the topographical chart or your GPS. On the chart, the number is the superscripted one to the left of the first northing 1,000 meter grid square and at every 10,000 meter position. It is always a two digit number, both of which may be zeroes.

Block 9F. GPS DERIVED COORDINATES:

"Yes" is checked if the surveyor used a GPS to assist in determining the coordinates.

Block 9G. POINT OF ORIGIN:

Ensure you use 10 digit grid coordinates derived from the same spheroid reference as listed in Block 9.A. as these coordinates are primarily used by the DZC and his team in finding the PI. Again, use WGS-84 if no map exists. Include a short verbal description of an easily recognized point on or near the DZ (i.e., road intersection, benchmark, pond, etc.).

Include a distance and azimuth from this point to the nearest PI. Continue the Point of Origin comments in the Block 11 if necessary.

Block 9H. POINT:

Despite the improper notation on the AF IMT 3823, all latitude/longitude coordinate sets for Block 9.H. entries will be in DD-MM.MMM format. Additionally, some aircrews like DD-MM.SS.S formatting – there's enough space to place both in this block. Enter the ten-digit MGRS coordinates in local datum and spheroid and the WGS-84 latitude/longitude coordinates to the nearest one-hundredth minute for each indicated point.

- MGRS COORDINATES: Ensure the reference matches those listed in Block 9.A. as these coordinates are primarily used by the DZC team.
- WGS84 LATITUDE (D-M.MMM): Used by aircrew so convert to WGS-84 if necessary.

- WGS84 LONGITUDE (D-M.MMM): Used by aircrew so convert to WGS-84 if necessary.

Block 9I. DZ CORNERS MGRS COORDINATES:
Use 10 digit grid coordinates based upon the Block 9.A. spheroid reference followed by WGS-84 latitude/longitude coordinates to the nearest one-thousandth minute for each corner.

SECTION 10. DZ DIAGRAM:

If the space on the form is large enough to hold your diagram, the best way to proceed is print the diagram, glue it into the space provided, and then scan the document. Ensure the diagram fits within the block. If the diagram is so detailed or oriented in such a way that it justifies a separate page, type "SEE ATTACHED DIAGRAM" in the middle of the block. Consider sending the diagram in a separate file.

Clean up the sketch (put it into AutoCAD, PowerPoint, or whatever means available). It should be legible and include the following:

- All obstacles or prominent features located within the DZ boundaries
- An arrow indicating magnetic north to assist in sketch orientation
- A legend to show only nonstandard items
- A bar scale or the phrase "Not to Scale"

SECTION 11: REMARKS

The remarks should be divided up into "General", "For the Aircrew", and "For the User" comments. "General" covers items both aircrew and users will want to know. Aircrews are mainly concerned with safety-of-flight, restricted area access procedures, etc. Users need to know terrain and obstacle details, range scheduling issues, range access, DZC/DZSO procedures, etc. Also include any statements concerning safety in the DZ area (i.e., hazards, towers, etc.). Mention all charted or observed bodies of water and power lines within 1,000 meters of the DZ boundaries in the user section.

SECTION 12:

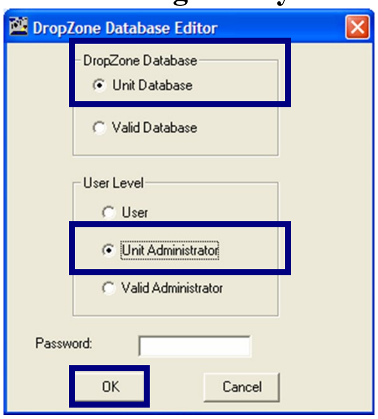
PHOTOGRAPH AVAILABLE (Yes / No)
Indicate in the appropriate section whether photographs of the DZ and approaches are available. Individual completing the safety-of-flight review should know this information and will mark accordingly. If actual photographs exist, they should be forwarded with the 3823. Although readily available commercial satellite imagery counts toward meeting this block's requirements, they do not need to be forwarded.

LOW-LEVEL ROUTES:
Indicate in the appropriate section whether a low-level route is associated with the DZ. Individual completing the safety-of-flight review should know this information and will mark accordingly. To confirm the presence of routes, contact the nearest/appropriate DoD flying unit that performs low-level flights, and perform a review of the AP/1B.

VERIFYING SURVEY DATA USING PFPS

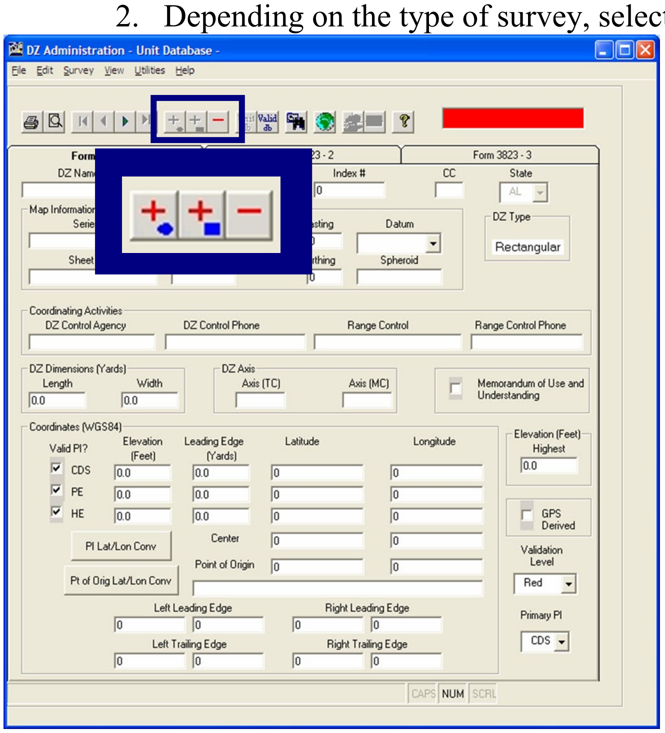
Before submitting a DZ survey to AMC for inclusion on the Worldwide ZAR, it is strongly recommended that you verify all data on the survey by using PFPS. Currently, ***36%*** of the surveys submitted to AMC for inclusion on the ZAR contain ***SIGNIFICANT SAFETY OF FLIGHT ERRORS!*** The purpose of this section is to catch errors before the survey is submitted up the chain that will delay its processing.

I. Entering Survey Data



1. Begin by opening the DZ Database Editor which can be found clicking on Start – All Programs – PFPS Administration – DZ Admin. After the log on screen appears, select Unit Database – Unit Administrator – click on OK. No password is required to access the unit side of DZ Admin.

2. Depending on the type of survey, select either the Add Circular Survey or the Add Rectangular Survey icon.



3. There are three tabs labeled Form 3823-1, Form 3823-2, and Form 3823-3. Only the data on Tab 1 is required by PFPS to calculate the DZ boundaries, PIs, and Coordinates. This data is taken off of the completed DZ survey form. Entering the data on Tabs 2 and 3 is optional.

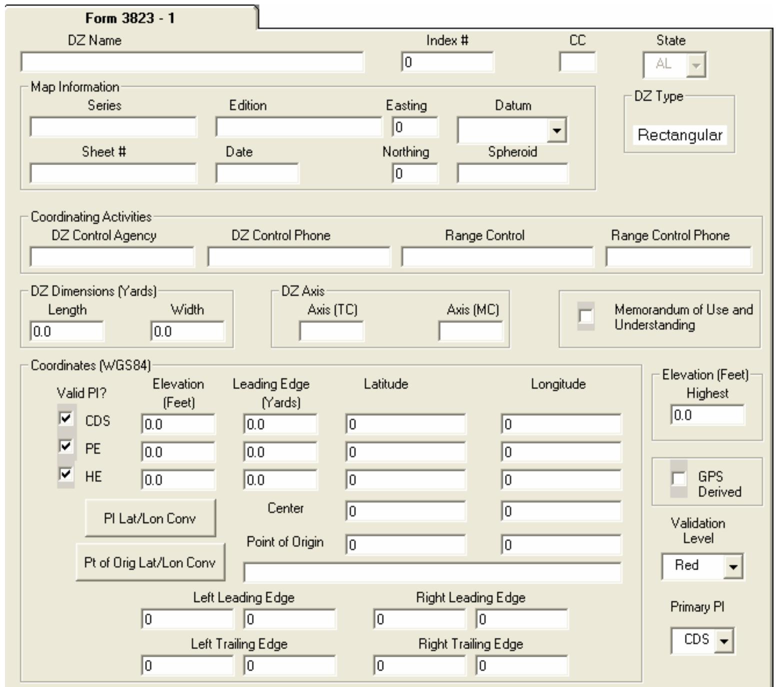


Figure1. Rectangular

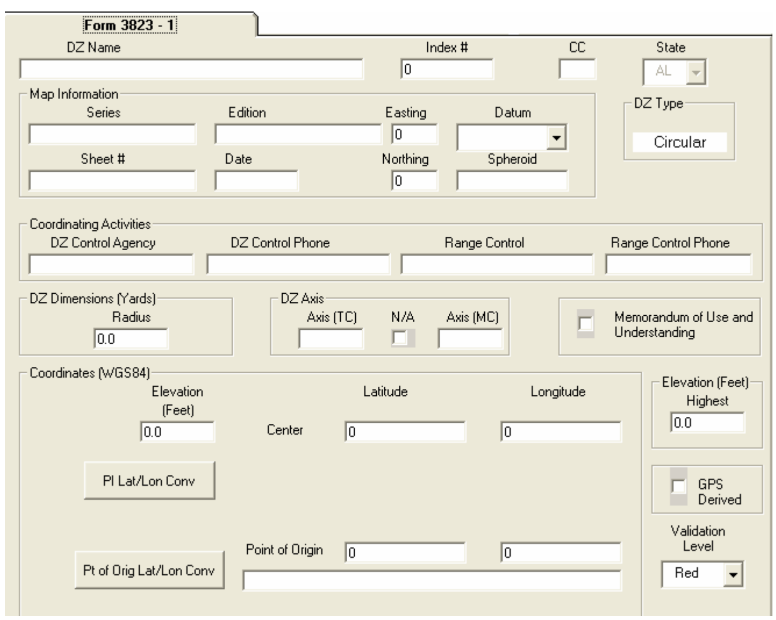
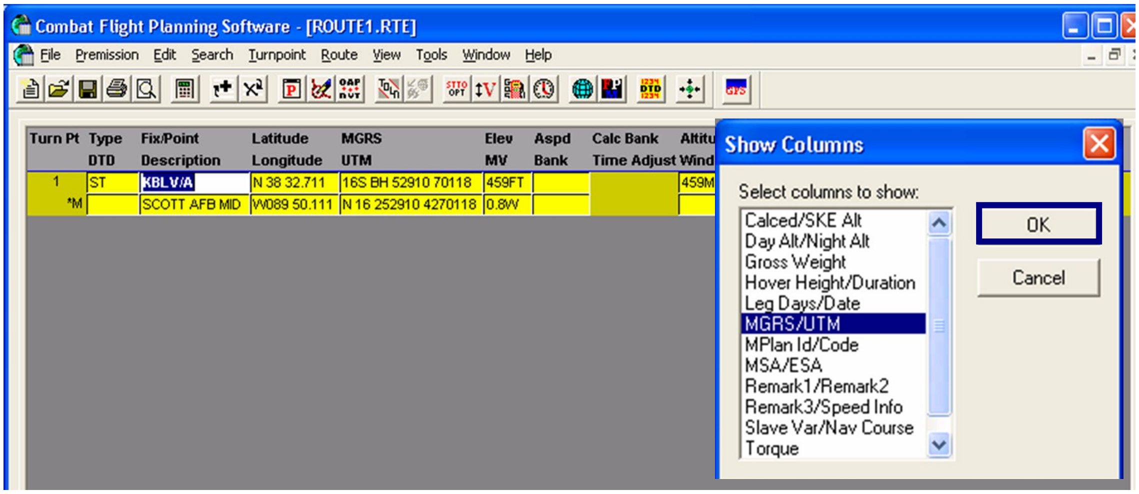


Figure 2. Circular

4. After completing Tab 1, open FalconView by clicking on the Connect/Refresh FalconView Icon 

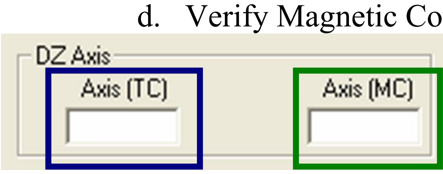
II. Verifying Survey Data



1. After FalconView opens, open up CFPS by clicking on Start – All Programs – PFPS – CFPS.

2. In CFPS, you manually plot the DZ using the MGRS coordinates taken from the actual survey.
   a. NOTE: If the MGRS Coordinates column is not visible when you open CFPS, click on View – Show Columns…, select MGRS/UTM, and click on OK.

3. **Plotting Rectangular DZs**
   a. In CFPS, enter the DZ Boundary MGRS Coordinates in this order. Left Leading Edge, Left Trailing Edge, Right Trailing Edge, Right Leading Edge and Left Leading Edge (to close the box).
   b. Enter the MGRS Coordinates for the PIs beginning with the PI closest to the leading edge and work your way out. (i.e. 275 yards, 350 yards, 550 yards, DZ Centerpoint, etc.).
   c. If the DZ Boundaries, PIs, and DZ Centerpoint match what PFPS calculated, GREAT! If not, time to troubleshoot and make the appropriate adjustments.
   d. Verify Magnetic Course Heading (MAGVAR)



1) If the Magnetic Course Heading on Tab 1 of DZ Admin is different from what is on the survey, enter the True Course Heading off the survey into the Axis (TC) block on Tab 1. Tab out of the box and you will get an accurate Magnetic Course.

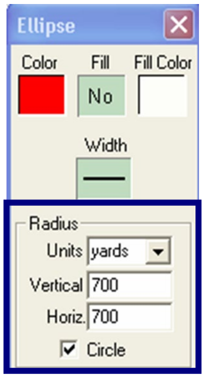
=

- Note: PFPS will always have the most current MAGVAR data. This data is updated by DAFIF.

4. **Plotting Circular DZs**

   a. In CFPS, enter the DZ Centerpoint / PI MGRS Coordinates.

   b. Using the Ellipse Tool  in the Drawing Editor , "draw" a Circle which is close in size to what DZ Admin has created, starting from the DZ Centerpoint.



   c. Next click on the Properties Icon  and change the Units to yards, ensure the Circle box is checked, and then enter the DZ Radius from the survey.

   d. If the PI / DZ Centerpoint Coordinates and the ellipse you drew match what PFPS calculated, GREAT! If not, time to troubleshoot and make the appropriate adjustments.

III. DZ Survey Submission Process

1. For all non-Air Force DZ submissions, the DZ surveys **must be** routed through one of the four designated AMC Regional Tactics Offices (RTOs) listed in Attachment 1.
2. Air Force units may submit surveys through one of the four designated AMC RTOs or utilize an airdrop qualified Air National Guard or Air Force Reserve units Tactic Office.
3. When submitting a survey, please allow enough time for the RTO to perform a thorough review. **Use the following timeline for guidance:**

   a. **6 Months Out**:
   - LZs: Contact a STS Unit to come out and survey the LZ *(Due to the workload of STS Units, the sooner they are contacted, the better.)*
   - DZs: Begin making arrangements to have the DZ surveyed.

   b. **4 Months Out**:
   - By this point the survey should have been sent to a RTO for the Safety of Flight Review. Please refer to AFI 13-217 for guidance.

   c. **2 Months Out**:
   - Safety of Flight Review should have been accomplished and the survey sent to either HQ/AMC A3DT or back to the originating unit for final approval. The requesting unit will then send the *original copy* of the survey to HQ AMC A3DT for inclusion on the ZAR.

   d. NOTE:
   - **DZs can be approved at the Wing Level by the OG or equivalent**.

- **LZs must be sent to the MAJCOM for final approval**.

e. **1 Month Out**:
   - The survey should have been received by the ZAR Program Manager at HQ AMC for review and inclusion in the ZAR.

f. Surveys not received 30 days prior to scheduled use will not be considered for "priority inclusion" in the ZAR regardless of scheduled events.

g. The 30 day period is essential to ensure the survey contains no errors. If errors are found, there is enough time to contact the appropriate individuals to have the errors corrected before date of intended use.

h. If a survey is needed by a specific date, please annotate this somewhere in the survey packet submitted to AMC.

4. For additional information on the ZAR Submission Process, please refer to the "FAQ" and/or the "Survey Process Made Simple" documents located on the ZAR web site at https://afkm.wpafb.af.mil/ZAR

Attachment 1: AMC Regional Tactics Offices

62 OSS Tactics, McChord AFB, WA

62 OSS/OSK
Attn: Weapons & Tactics Managers
1172 Levitow Boulevard, Room 134
McChord AFB, Washington 98438

DSN: 382-4021 / 1347
COM: (253) 982-4021 / 1347
Fax: -2177

E-mail: 62OSS.OSK@mcchord.af.mil

- Please address DZ and LZ Surveys to the attention of Mr. Curt Tinley and/or Mr. William Wertley

317 OSS Tactics, Dyess AFB, TX

317 OSS/OSK
198 Second Avenue Room 212
Dyess AFB, Texas 79607-1865

DSN: 461-2792 / 2796
COM: (325) 696-2792 / 2796

E-mail: 317OSS/OSKGroupTactics@dyess.af.mil

437 OSS Tactics, Charleston AFB, SC

437 OSS/OSK
203 South Davis Drive
Charleston AFB, South Carolina 29404

DSN: 673-5637 / 5540 / 5494
COM: (843) 963-5637 / 5540 / 5494

E-mail: 437OSS.Tactics@Charleston.af.mil

- Please address DZ and LZ Surveys to the attention of Mr. Bobby Orr.

463 OSS Tactics, Little Rock AFB, AR

463 OSS/OSK
380 CMSgt. Williams Drive
Little Rock AFB, Arkansas 72099-4976

DSN 731-7013 / 3719 / 3987
Fax: 731-3984

E-mail: 463OSS.Tactics@littlerock.af.mil

Attachment 2: HQ AMC & ZAR Points of Contact

HQ AMC / Combat Tactics (A3DT), Scott AFB, IL

HQ AMC/A3DT
402 Scott Drive, Unit 3A1
Scott AFB, Illinois 62225-5302

DSN: 779-3148 COM: (618) 229-3148
E-mail: AMC.A3KT@scott.af.mil

Chief of Tactics: Major Shawn Goodlett DSN: 779-0448
E-mail: Richard.Goodlett@scott.af.mil

DZ/LZ POC: Major Jimmy Fuller DSN: 779-0459
E-mail: Jimmy.Fuller@scott.af.mil

JA/ATT POC: Captain Jason Pavelschak DSN: 779-0463

E-mail: Jason.Pavelschak@scott.af.mil

720 STG Liaison Officer: Captain Roger Jennrich

HQ AMC/A3A
402 Scott Drive
Scott AFB, Illinois 62225-5302

DSN: 779-3726
COM: (618) 229-3726

E-mail: Roger.Jennrich@scott.af.mil

HQ AMC / Mission Planning (A5QM), Scott AFB, IL

ZAR Program Manager: Mr. Paul Fusek

HQ AMC/A5QM
402 Scott Drive, Unit 3L3
Scott AFB, Illinois 62225-5302

DSN: 779-4807
COM: (618) 229-4807

E-mail: paul.fusek.ctr@scott.af.mil

Attachment 3: NGA Referenced Country and State Abbreviations

Table 1: Country Codes

Code	Country Name
AF	Afghanistan
AL	Albania
AG	Algeria
AQ	American Samoa
AN	Andorra
AO	Angola
AV	Anguilla
AY	Antarctica
AC	Antigua & Barbuda
AR	Argentina
AM	Armenia
AA	Aruba
AT	Ashmore & Cartier Island
AS	Australia
AU	Austria
AJ	Azerbaijan
BF	Bahamas
BA	Bahrain
FQ	Baker Island
BG	Bangladesh
BB	Barbados
BS	Bassas
BO	Belarus
BE	Belgium
BH	Belize
BN	Benin
BD	Bermuda
BT	Bhutan
BL	Bolivia
BK	Bosnia & Herzegovina
BC	Botswana
BV	Bouvet Island
BR	Brazil
IO	British Indian Ocean Territory
VI	British Virgin Islands
BX	Brunei
BU	Bulgaria
UV	Burkina
BM	Burma
BY	Burundi
CB	Cambodia (Formerly Kampuchea)
CM	Cameroon

Code	Country Name
CA	Canada
CV	Cape Verde
CJ	Cayman Islands
CT	Central Africa
CD	Chad
CI	Chile
CH	China
KT	Christmas Island
IP	Clipperton Island
CK	Cocos (Keeling) Island
CO	Colombia
CN	Comoros
CF	Congo
CW	Cook Islands
CR	Coral Sea Islands
CS	Costa Rica
HR	Croatia
CU	Cuba
CY	Cyprus
EZ	Czech Republic
DA	Denmark
DJ	Djibouti
DO	Dominica
DR	Dominican Republic
TT	East Timor
EC	Ecuador
EG	Egypt
ES	El Salvador
EK	Equatorial Guinea
ER	Eritrea
EN	Estonia
ET	Ethiopia
EU	Europa Island
FK	Falkland Island (Islas Malvinas)
FO	Faroe Islands
FM	Federated States of Micronesia
FJ	Fiji
FI	Finland
FR	France
FP	French Polynesia
FS	French Southern & Antarctic Islands
GB	Gabon

Code	Country Name
GA	Gambia
GZ	Gaza Strip
CG	Georgia
GM	Germany
GH	Ghana
GI	Gibraltar
GO	Glorioso Islands
GR	Greece
GL	Greenland
GJ	Grenada
GP	Guadeloupe
GQ	Guam
GT	Guatemala
GK	Guernsey
GV	Guinea
PU	Guinea-Bissau
GY	Guyana
HA	Haiti
HM	Heard Island & McDonald Island
HO	Honduras
HK	Hong Kong
HQ	Howland Island
HU	Hungry
IC	Iceland
IN	India
ID	Indonesia
IR	Iran
IZ	Iraq
IY	Iraq-Saudi Arabia Neutral Zone
EI	Ireland
IS	Israel
IT	Italy
IV	Ivory Coast
JM	Jamaica
JN	Jan Mayen
JA	Japan
DQ	Jarvis Island
JE	Jersey
JQ	Johnson Atoll
JO	Jordan
JU	Juan De Nova Island
KZ	Kazakhstan
KE	Kenya
KQ	Kingman Reef
KR	Kiribati

Code	Country Name
KN	Korea, Dem. Peoples Rep. of (North)
KS	Korea, Republic of (South)
KU	Kuwait
KG	Kyrgyzstan
LA	Laos
LG	Latvia
LE	Lebanon
LT	Lesotho
LI	Liberia
LY	Libya
LS	Liechtenstein
LH	Lithuania
LU	Luxembourg
MC	Macau
MK	Macedonia
MA	Madagascar
MI	Malawi
MY	Malaysia
MV	Maldives
ML	Mali
MT	Malta
IM	Man, Isle of
RM	Marshall Islands, Republic of
MB	Martinique
MR	Mauritania
MP	Mauritius
MF	Mayotte
MX	Mexico
MQ	Midway Islands
MD	Moldova
MN	Monaco
MG	Mongolia
MW	Montenegro
MH	Montserrat
MO	Morocco
MZ	Mozambique
WA	Namibia
NR	Nauru
BQ	Navassa Island
NP	Nepal
NL	Netherlands
NT	Netherlands Antilles
NC	New Caledonia
NZ	New Zealand
NU	Nicaragua

Code	Country Name
NG	Niger
NI	Nigeria
NE	Niue
NF	Norfolk Island
CQ	Northern Mariana Islands
NO	Norway
MU	Oman
PK	Pakistan
LQ	Palmyra Atoll
PM	Panama
PP	Papua New Guinea
PF	Paracel Islands
PA	Paraguay
PE	Peru
RP	Philippines
PC	Pitcairn Island
PL	Poland
PO	Portugal
RQ	Puerto Rico
QA	Qatar
PS	Republic of Palau
RE	Reunion
RO	Romania
RS	Russia
RW	Rwanda
SM	San Marino
TP	Sao Tome & Principe
SA	Saudi Arabia
SG	Senegal
SR	Serbia
SE	Seychelles
SL	Sierra Leone
SN	Singapore
LO	Slovakia Republic
SI	Slovenia
BP	Solomon Island
SO	Somalia
SF	South Africa
SP	Spain
PG	Spratly Islands
CE	Sri Lanka
SH	St. Helena
SB	St. Pierre & Miquelon
SC	St. Christopher & Nevis

Code	Country Name
ST	St. Lucia
VC	St. Vincent & Grenadines
SU	Sudan
NS	Suriname
SV	Svalbard
WZ	Swaziland
SW	Sweden
SZ	Switzerland
SY	Syria
TW	Taiwan
TI	Tajikistan
TZ	Tanzania, United Republic of
TH	Thailand
TO	Togo
TL	Tokelau
TN	Tonga
TD	Trinidad & Tobago
TE	Tromelin Island
TS	Tunisia
TU	Turkey
TX	Turkmenistan
TK	Turks & Caicos Islands
TV	Tuvalu
UG	Uganda
UP	Ukraine
AE	United Arab Emirates
UK	United Kingdom
US	United States
UY	Uruguay
UZ	Uzbekistan
NH	Vanuatu
VT	Vatican City
VE	Venezuela
VM	Vietnam
VQ	Virgin Islands
WQ	Wake Island
WF	Wallis & Futuna
WE	West Bank
WI	Western Sahara
WS	Western Samoa
YM	Yemen
CG	Zaire
ZA	Zambia
ZI	Zimbabwe

Table 2: Unites States of America

Code	State Name
AL	Alabama
AK	Alaska
AZ	Arizona
AR	Arkansas
CA	California
CO	Colorado
CT	Connecticut
DE	Delaware
DC	District of Columbia*
FL	Florida
GA	Georgia
HI	Hawaii
ID	Idaho
IL	Illinois
IN	Indiana
IA	Iowa
KS	Kansas
KY	Kentucky
LA	Louisiana
ME	Maine
MD	Maryland
MA	Massachusetts
MS	Mississippi
MO	Missouri
MT	Montana
NV	Nevada
NH	New Hampshire
NJ	New Jersey
NM	New Mexico
NY	New York
NC	North Carolina
ND	North Dakota
OH	Ohio
OK	Oklahoma
OR	Oregon
PA	Pennsylvania
RI	Rhode Island
SC	South Carolina
SD	South Dakota
TN	Tennessee
TX	Texas
UT	Utah
VT	Vermont
VA	Virginia
WA	Washington
WV	West Virginia
WI	Wisconsin
WY	Wyoming

Table 3: Canada

AB	Alberta
BC	British Colombia
MB	Manitoba
NB	New Brunswick
NL	Newfoundland & Labrador
NS	Nova Scotia
NT	Northwest Territories
NU	Nunavut
ON	Ontario
PE	Prince Edward Island
QC	Quebec
SK	Saskatchewan
YT	Yukon Territory

Attachment 4: Abbreviations & Acronyms

ACC	Air Component Commander
AGL	Above Ground Level
AMC	Air Mobility Command
ATC	Air Traffic Control
CDS	Container Delivery System
CRRC	Combat Rubber Raiding Craft
CRL	Container Ramp Load
CRS	Container Release System
DRAS	Dual Row Airdrop System
DZ	Drop Zone
DZC	Drop Zone Controller
DZSO	Drop Zone Safety Officer
FOM	Figure of Merit
GPS	Global Positioning System
HAHO	High Altitude High Opening
HALO	High Altitude Low Opening
HE	Heavy Equipment
HSLLADS	High Speed Low Level Aerial Delivery System
HVCDS	High Velocity CDS
IP	Initial Point
LLE	Left Leading Edge
LTE	Left Trailing Edge
LUA	Land Use Agreement
MFF	Military Free Fall
MGRS	Military Grid Reference System
MOU	Memorandum of Understanding
MSL	Mean Sea Level
PER	Personnel
PI	Point of Impact
POO	Point of Origin
RLE	Right Leading Edge
RTE	Right Trailing Edge
SATB	Simulated Airborne Training Bundle
ZAR	Zone Availability Report

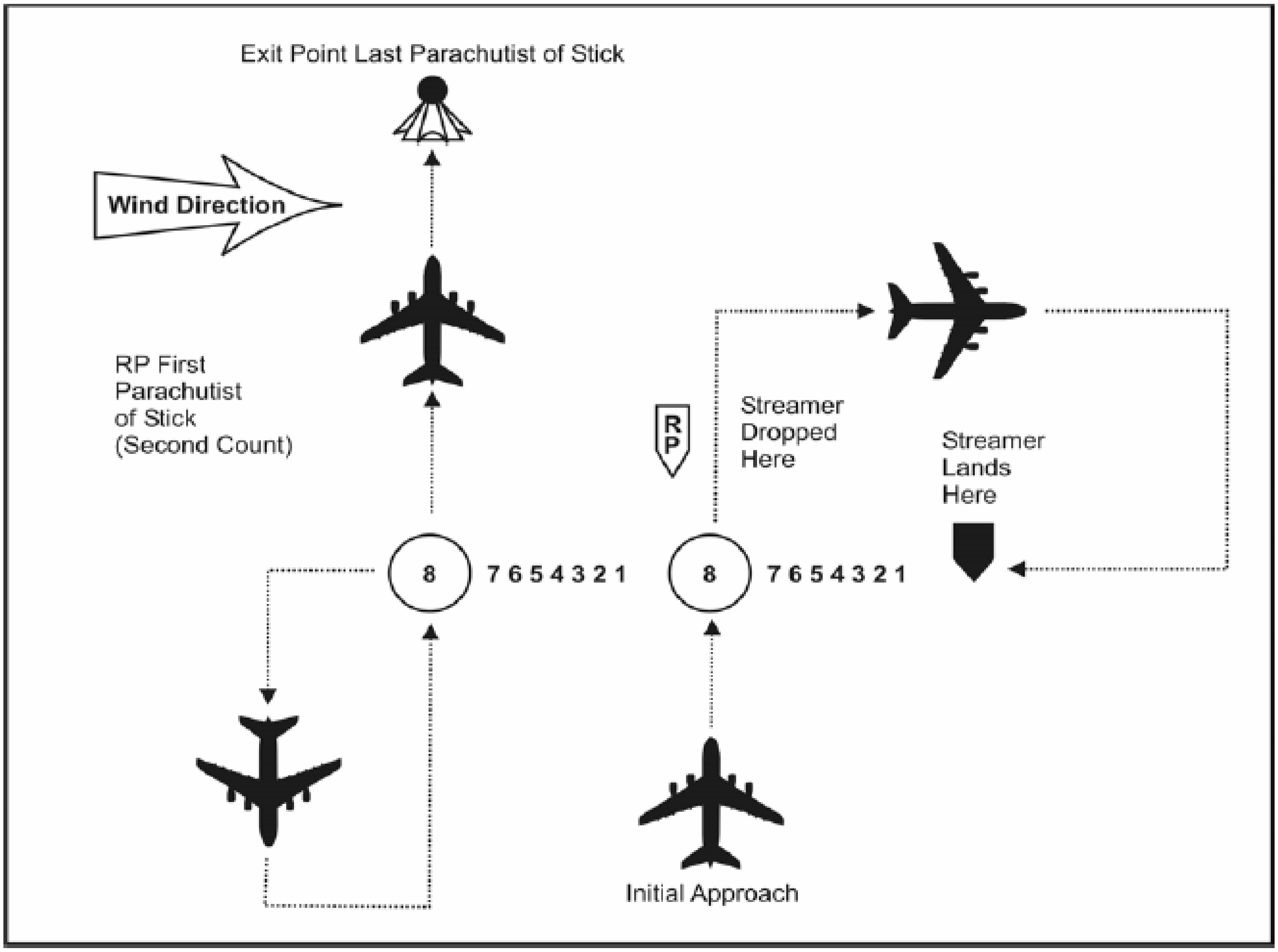
DROP ZONE SURVEY APPROVAL

Duration of DROP ZONE SURVEY Approval

The AF Form 3823 can be approved for two different types of survey; a **Tactical Assessment** or a **Drop Zone Survey**. Each of the two types is approved for different durations.

> **Tactical Assessment:** The tactical assessment is approved at the level of the first O-6 in the chain of command. It is valid for **24 hours from the date that it is approved** or **until the mission for which is was accomplished is completed**. It is **ONLY** approved for use by the unit accomplishing the tactical assessment and only for the singular mission for which it was accomplished.
>
> **Drop Zone Survey:** A drop zone survey is approved at the Air Force Major Command (MAJCOM) level and will be signed by at least an O-6. Is it valid for **5 years from the date of MAJCOM approval**. Unless explicitly stated on the survey itself or any addenda or attachments, any unit may use it for the types of airdrop approved on the survey.

WIND STREAMER VECTOR COUNT



WSVC Method

The JM uses the WSVC method to determine the RP from the air. Normally, the JM executes this method, which does not require markings on the DZ. The WSVC method should not be used for tactical employment, since the aircraft is required to make multiple passes over the DZ. The steps for the WSVC method are as follows:

> **Streamer drop**: On the first aircraft pass over the desired PI, the JM drops a streamer from the aircraft. The aircraft then turns to allow the JM to keep the streamer in sight. The pilot adjusts his route so that the flight path is over the streamer on the ground and the desired impact point (DIP) (in a straight line).
> **Count:** As the aircraft passes over the streamer, the JM begins a count, stopping the count directly over the impact point. He immediately begins a new count. When that count equals the first count, the aircraft is over the RP for the first parachutist.

Aircraft flight adjustment: The pilot then maneuvers the aircraft to fly along the axis of the DZ and over the RP. The pilot may make slight adjustments based on how the parachutists land on the DZ.

*__NOTE__: If aircraft must be shut down for a long period, the JM throws another wind drift indicator at the last RP to make sure the RP is still valid.

DROP ZONE HOMEWORK -- FEET MSL

1. What is the drop altitude in feet MSL for a UH-60 dropping door bundles during the day if the highest point on the drop zone is 113 feet above sea level?

2. What is the drop altitude in feet MSL for a UH-1 dropping door bundles at night if the highest point on the drop zone is 75 meters above sea level?

3. What is the drop altitude in feet MSL for a CH-47 dropping jumpers at night if the highest point on the drop zone is 303 feet above sea level?

4. What is the minimum drop altitude in feet MSL for a CH-47 dropping jumpers at night if the highest point on the drop zone is 118 feet above sea level?

5. What is the minimum drop altitude in feet MSL for a C130 dropping door bundles using the T-10 cargo parachute at night if the highest point on the drop zone is 287 feet above sea level?

6. What is the minimum drop altitude in feet MSL for a C130 dropping door bundles using the G14 parachute at night if the highest point on the drop zone is 96 feet above sea level?

7. What is the minimum drop altitude in feet MSL for a C17 dropping door bundles using the T-10 cargo parachute at night if the highest point on the drop zone is 135 meters above sea level?

8. What is the minimum drop altitude in feet MSL for a C17 dropping door bundles using the G14 parachute at night if the highest point on the drop zone is 134 feet above sea level?

9. What is the drop altitude in feet MSL for a C130 dropping door bundles using the T-10 cargo parachute at night if the highest point on the drop zone is 88 meters above sea level?

10. What is the minimum drop altitude in feet MSL for a C130 dropping CDS using the G14 parachute at night if the highest point on the drop zone is 231 feet above sea level?

11. What is the minimum drop altitude in feet MSL for a C17 dropping CDS using the G14 parachute at night if the highest point on the drop zone is 18 feet above sea level?

12. What is the drop altitude in feet MSL for a C130 dropping CDS using the G14 parachute at night if the highest point on the drop zone is 118 feet above sea level?

13. What is the minimum drop altitude in feet MSL for a C130 dropping heavy equipment using the G12E parachute at night if the highest point on the drop zone is 167 feet above sea level?

14. What is the minimum drop altitude in feet MSL for a C17 dropping heavy equipment using the 5000 lbs parachute release system at night if the highest point on the drop zone is 34 meters above sea level?

15. What is the drop altitude in feet MSL for a C130 dropping heavy equipment using the G12E parachute at night if the highest point on the drop zone is 332 feet above sea level?

16. What is the drop altitude in feet MSL for a C130 dropping jumpers conducting tactical training at night if the highest point on the drop zone is 67 feet above sea level?

17. What is the drop altitude in feet MSL for a C130 dropping jumpers at night if the highest point on the drop zone is 173 meters above sea level?

18. What is the drop altitude in feet MSL for a C130 dropping SATB-Ps from 500 feet AGL if the highest point on the drop zone is 678 feet above sea level?

19. What is the drop altitude in feet MSL for a C130 dropping basic airborne students at night if the highest point on the drop zone is 156 feet above sea level?

20. What is the drop altitude in feet MSL for a C17 dropping jumpers and heavy equipment at night if the highest point on the drop zone is 101 feet above sea level?

21. What is the drop altitude in feet MSL for a C17 dropping jumpers and CDS at night if the highest point on the drop zone is 322 feet above sea level?

22. What is the drop altitude in feet MSL for a C130 dropping CDS and heavy equipment at night if the highest point on the drop zone is 543 feet above sea level?

23. What is the drop altitude in feet MSL for a C17 dropping door bundles and CDS at night if the highest point on the drop zone is 124 feet above sea level?

24. What is the drop altitude in feet MSL for a C130 dropping door bundles and heavy equipment using the 5000 lbs release system at night if the highest point on the drop zone is 71 meters above sea level?

25. What is the drop altitude in feet MSL for a C130 dropping jumpers and door bundles at night if the highest point on the drop zone is 513 feet above sea level?

DROP ZONE HOMEWORK ANSWERS – FEET MSL

1. 450 FEET MSL
2. 750 FEET MSL
3. 1850 FEET MSL
4. 1400 FEET MSL
5. 700 FEET MSL
6. 400 FEET MSL
7. 750 FEET MSL
8. 450 FEET MSL
9. 1300 FEET MSL
10. 650 FEET MSL
11. 350 FEET MSL
12. 750 FEET MSL
13. 750 FEET MSL
14. 1150 FEET MSL
15. 1450 FEET MSL
16. 1100 FEET MSL
17. 1600 FEET MSL
18. 1200 FEET MSL
19. 1450 FEET MSL
20. 1250 FEET MSL
21. 1350 FEET MSL
22. 1650 FEET MSL
23. 1150 FEET MSL
24. 1350 FEET MSL
25. 1550 FEET MSL

DROP ZONE HOMEWORK -- CARP DROP ZONE SIZES

1. What size CARP drop zone is required for 3 C-130Js? Each is dropping 64 jumpers and 2 door bundles each mass exit at night using GPS.

2. What size CARP drop zone is required for 1 C-130H? The aircraft is dropping 5 CDS bundles on a single roller system.

3. What size CARP drop zone is required for 2 C-130Js? Each is dropping 5 heavy equipment platforms each at night.

4. What size CARP drop zone is required for 2 C-130Js? Each i dropping 7 CDS bundles on a double roller system each flying staggered trail using SKE.

5. What size CARP drop zone is required for 2 C-130Hs? Each is dropping 3 heavy equipment platforms each using SKE.

6. What size CARP drop zone is required for 3 C-130Js? Each is dropping 76 jumpers and 1 door bundle, mass exit at night from 1700 feet AGL flying NIT right using SKE and GPS.

7. What size CARP drop zone is required for 3 C-130Js? Each is dropping 3 heavy equipment platforms each at night from 1300 feet AGL using GPS.

8. What size CARP drop zone is required for 3 C-130Hs? Each is dropping 4 heavy equipment platforms each at night from 1850 feet AGL flying NIT using SKE.

9. What size CARP drop zone is required for 1 C-130J? The aircraft is dropping 24 jumpers and 3 door bundles at night from 1400 feet AGL using GPS.

10. What size CARP drop zone is required for 2 C-130Js? Each is dropping 53 jumpers and 3 door bundles each mass exit at night from 1800 feet AGL flying staggered trail using SKE and GPS.

11. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 5 heavy equipment platforms and the second aircraft is dropping 64 jumpers and 2 door bundles mass exit at night using GPS.

12. What size CARP drop zone is required for 2 C-130Hs? The lead aircraft is dropping 5 CDS bundles on a single roller system and the second aircraft is dropping 15 jumpers and 2 door bundles at night flying NIT.

13. What size CARP drop zone is required for 2 C-130Hs? The lead aircraft is dropping 2 heavy equipment platforms and the second aircraft is dropping 4 CDS bundles on a single roller system at night flying staggered trail.

14. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 1 heavy equipment platforms and the second aircraft is dropping 72 jumpers and 2 door bundles mass exit flying NIT using SKE using GPS.

15. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 6 CDS bundles on a single roller system and the second aircraft is dropping 57 jumpers and 3 door bundles mass exit at night flying NIT using SKE.

16. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 3 heavy equipment platforms and the second aircraft is dropping 4 CDS bundles on a single roller system flying staggered trail.

17. What size CARP drop zone is required for 2 C-130Hs if the lead aircraft is dropping 3 heavy equipment platforms and the second aircraft is dropping 49 jumpers and 2 door bundles mass exit at night using SKE from 1300 feet AGL?

18. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 17 CDS bundles on a double roller system and the second aircraft is dropping 14 jumpers and 2 door bundles at night from 1650 feet AGL flying NIT using SKE and GPS.

19. What size CARP drop zone is required for 2 C-130Hs? The lead aircraft is dropping 2 heavy equipment platforms and the second aircraft is dropping 3 CDS bundles on a single roller system at night from 1300 feet AGL flying staggered trail using SKE.

20. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 3 heavy equipment platforms and the second aircraft is dropping 54 jumpers and 2 door bundles mass exit at night from 1800 feet AGL flying NIT using SKE.

21. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 5 heavy equipment, the second aircraft is dropping 6 CDS bundles on a single roller system and the third aircraft is dropping 64 jumpers and 2 door bundles mass exit at night using GPS.

22. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 3 heavy equipment, the second aircraft is dropping 9 CDS bundles on a double roller system and the third aircraft is dropping 54 jumpers and 2 door bundles mass exit at night flying NIT.

23. What size CARP drop zone is required for 3 C-130Hs? The first aircraft is dropping 2 heavy equipment, the second aircraft is dropping 4 CDS bundles on a single roller system and the third aircraft is dropping 46 jumpers and 3 door bundles mass exit at night flying NIT.

24. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 4 heavy equipment, the second aircraft is dropping 10 CDS bundles on a double roller system and the third aircraft is dropping 76 jumpers and 2 door bundles mass exit using SKE and GPS.

25. What size CARP drop zone is required for 3 C-130Hs? The first aircraft is dropping 5 heavy equipment, the second aircraft is dropping 2 CDS bundles on a single roller system and the third aircraft is dropping 78 jumpers and 2 door bundles mass exit using SKE from 1000 feet AGL.

26. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 1 heavy equipment, the second aircraft is dropping 6 CDS bundles on a double roller system and the third aircraft is dropping 57 jumpers and 1 door bundles mass exit at night flying NIT using GPS from 1300 feet AGL.

27. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 5 heavy equipment, the second aircraft is dropping 2 CDS bundles on a single roller system and the third aircraft is dropping 28 jumpers and 2door bundles at night from 1750 feet AGL flying NIT using SKE.

28. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 3 heavy equipment, the second aircraft is dropping 8 CDS bundles on a double roller system and the third aircraft is dropping 32 jumpers and 3 door bundles mass exit at night from 1000 feet AGL flying NIT using SKE.

29. What size CARP drop zone is required for 3 C-130Js? The first aircraft is dropping 2 heavy equipment, the second aircraft is dropping 4 CDS bundles on a single roller system and the third aircraft is dropping 43 jumpers and 2 door bundles mass exit at night from 1250 feet AGL flying NIT using SKE and GPS.

30. What size CARP drop zone is required for 3 C-130Hs? The first aircraft is dropping 3 heavy equipment, the second aircraft is dropping 3 CDS bundles on a single roller system and the third aircraft is dropping 62 jumpers and 1 door bundle mass exit at night from1600 feet AGL flying NIT using SKE.

31. What size CARP drop zone is required for 1 C-17? The aircraft is dropping 100 jumpers and 2 door bundles each mass exit at night.

32. What size CARP drop zone is required for 2 C-17s? The aircraft are dropping 5 CDS bundles on a single roller system each at night using GPS.

33. What size CARP drop zone is required for 2 C-17s dropping 6 heavy equipment platforms each at night flying staggered trail?

34. What size CARP drop zone is required for 3 C-17s? Each is dropping 4 CDS bundles on a single roller system at night from 1600 feet AGL flying NIT using SKE and GPS.

35. What size CARP drop zone is required for 2 C-17s? They are dropping 5 heavy equipment platforms on a dual row delivery system each at night from 1800 feet AGL flying NIT using SKE.

36. What size CARP drop zone is required for 3 C-17s? They are dropping 84 jumpers and 1 door bundles each mass exit at night from 1250 feet AGL on surveyed PI using GPS.

37. What size CARP drop zone is required for 3 C-17s? They are dropping 18 CDS bundles on a single roller system each at night from 1000 feet AGL flying NIT using SKE.

38. What size CARP drop zone is required for 3 C-17s? They are dropping 3 heavy equipment platforms each at night from 1300 feet AGL flying NIT using GPS.

39. What size CARP drop zone is required for 2 C-17s? They are dropping 28 jumpers and 3 door bundles each at night from 1000 feet AGL on off-set PIs using GPS.

40. What size CARP drop zone is required for 2 C-17s? They are dropping 33 jumpers and 3 door bundles each mass exit at night from 1500 feet AGL on the center PI.

41. What size CARP drop zone is required for 2 C-17s separated by 20 minutes? The lead aircraft is dropping 7 heavy equipment platforms from 1200 feet AGL and the second aircraft is dropping 100 jumpers and 2 door bundles mass exit from planning altitude for a tactical training jump at night with both aircraft using GPS.

42. What size CARP drop zone is required for 2 C-17s separated by 15 minutes? The lead aircraft is dropping 2 CDS bundles on a single roller system from 900 feet AGL and the second aircraft is dropping 52 jumpers and 3 door bundles mass exit at night.

43. What size CARP drop zone is required for 2 C-17s separated by 15 minutes? The lead aircraft is dropping 23 CDS bundles on a double roller system from 1200 feet AGL and the second aircraft is dropping 33 jumpers and 2 door bundles at night with the 2nd aircraft using GPS.

44. What size CARP drop zone is required for 2 C-17s? The lead aircraft is dropping 4 heavy equipment platforms on a dual row delivery system and the second aircraft is dropping 17 CDS bundles on a single roller system using SKE.

45. What size CARP drop zone is required for 2 C-17s separated by 15 minutes? The lead aircraft is dropping 2 heavy equipment platforms from 1500 feet AGL and the second aircraft is dropping 65 jumpers and 3 door bundles mass exit from 1200 feet AGL at night with both aircraft using GPS.

46. What size CARP drop zone is required for 2 C-17s separated by 20 minutes? The lead aircraft is dropping 6 CDS bundles on a single roller system and the second aircraft is dropping 26 jumpers and 2 door bundles mass exit.

47. What size CARP drop zone is required for 2 C-17s? The lead aircraft is dropping 2 heavy equipment platforms on a dual row delivery system and the second aircraft is dropping 2 CDS bundles on a single roller system at night flying NIT using SKE and GPS.

48. What size CARP drop zone is required for 2 C-17s? The lead aircraft is dropping 5 heavy equipment platforms and the trail aircraft is dropping 38 CDS on a double roller system from 1500 feet AGL at night flying staggered trail.

49. What size CARP drop zone is required for 2 C-17s separated by 15 minutes? The first aircraft is dropping 17 CDS bundles on a double roller system from 1000 feet AGL and the second aircraft is dropping 19 jumpers and 2 door bundles mass exit at night from 1250 feet AGL using with the second aircraft using GPS.

50. What size CARP drop zone is required for 2 C-17s separated by 15 minutes? The lead aircraft is dropping 4 heavy equipment platforms on a dual row delivery system from 1500 feet AGL and the second aircraft is dropping 84 jumpers and 2 door bundles mass exit from 1800 feet AGL at night with both aircraft using GPS.

51. What size CARP drop zone is required for a C-130J dropping 4 rows of HVCDS at night using GPS?

52. What size CARP drop zone is required for a C-17 dropping 15 HAARS containers from 3200 feet AGL at night?

53. What size CARP drop zone is required for a C-130J dropping 1 row of HV-LCADS from 5000 feet AGL?

54. What size CARP drop zone is required for 2 C-130Js? The lead aircraft is dropping 3 rows of HVCDS and the trail aircraft is dropping 4 HAARS containers from 4500 feet AGL flying staggered trail at night using GPS.

55. What size CARP drop zone is required for 3 C-17s? The lead aircraft is dropping 12 rows of HVCDS and the remaining two aircraft are dropping 20 HAARS containers each from 5000 feet AGL at night flying NIT using SKE and GPS.

56. What size CARP drop zone is required for a C-17 delivering a JPADS platform from minimum drop altitude?

57. What size CARP drop zone is required for a C-130J dropping 6 rows of HV-LCADS from 2500 feet AGL at night using GPS?

58. What size CARP drop zone is required for a 2 C-130Js dropping 7 HAARS containers each from 6000 feet AGL at night using SKE?

59. What size CARP drop zone is required for 3 C-17s dropping 20 rows of HV-CDS each from 5000 feet AGL at night flying NIT using SKE?

60. What size CARP drop zone is required for a C-130H dropping a JPADS platform from 17,500 feet AGL?

DROP ZONE HOMEWORK ANSWERS -- CARP DROP ZONE SIZES

Q1	W	L
1	600	600
N	100	100
A	0	0
N	0	0
A	0	2475
S	0	0
	700	3175

Q2	W	L
1	400	700
N	0	0
A	0	0
N	0	0
A	0	0
S	0	0
	400	700

Q3	W	L
1	600	1000
N	100	100
A	0	0
N	0	0
A	0	1600
S	0	0
	700	2700

Q4	W	L
1	400	550
N	0	0
A	0	0
N	0	0
A	0	0
S	400	0
	800	550

Q5	W	L
1	600	1000
N	0	0
A	0	0
N	0	0
A	0	800
S	400	0
	1000	1800

Q6	W	L
1	600	600
N	100	100
A	210	210
N	0	0
A	0	2850
S	400	0
	1310	3760

Q7	W	L
1	600	1000
N	100	100
A	60	60
N	0	0
A	0	800
S	0	0
	760	1960

Q8	W	L
1	600	1000
N	100	100
A	210	210
N	0	0
A	0	1200
S	400	0
	1310	2510

Q9	W	L
1	600	600
N	0	100
A	120	120
N	0	0
A	0	1950
S	0	0
	720	2770

Q10	W	L
1	600	600
N	100	100
A	240	240
N	0	0
A	0	2100
S	400	0
	1340	3040

Q11	W	L		W	L
1	600	1000	1	600	600
N	100	100	N	100	100
A	0	0	A	30	30
N	0	0	N	0	0
A	0	1600	A	0	2475
S	0	0	S	0	0
	700	2700		730	3205

Q12	W	L		W	L
1	400	700	1	600	600
N	100	100	N	100	100
A	160	160	A	0	0
N	100	0	N	100	0
A	0	0	A	0	1200
S	0	0	S	0	0
	760	960		800	1900

Q13	W	L		W	L
1	600	1000	1	400	550
N	100	100	N	100	100
A	0	0	A	200	200
N	100	0	N	100	0
A	0	400	A	0	0
S	0	0	S	0	0
	800	1500		800	850

Q14	W	L		W	L
1	600	1000	1	600	600
N	0	0	N	0	0
A	0	0	A	30	30
N	0	0	N	0	0
A	0	0	A	0	2775
S	400	0	S	400	0
	1000	1000		1030	3405

Q15	W	L		W	L
1	400	700	1	600	600
N	100	100	N	100	100
A	160	160	A	0	0
N	0	0	N	0	0
A	0	0	A	0	2250
S	400	0	S	400	0
	1060	960		1100	2950

Q16	W	L		W	L
1	600	1000	1	400	550
N	0	0	N	0	0
A	0	0	A	200	200
N	100	0	N	100	0
A	0	800	A	0	0
S	0	0	S	0	0
	700	1800		700	750

Q17	W	L		W	L
1	600	1000	1	600	600
N	100	100	N	100	100
A	60	60	A	90	90
N	0	0	N	0	0
A	0	800	A	0	1875
S	400	0	S	400	0
	1160	1960		1190	2665

Q18	W	L		W	L
1	400	850	1	600	600
N	100	100	N	100	100
A	400	400	A	180	180
N	0	0	N	0	0
A	0	0	A	0	1125
S	400	0	S	400	0
	1300	1350		1280	2005

Q19	W	L		W	L
1	600	1000	1	400	500
N	100	100	N	100	100
A	60	60	A	280	280
N	0	0	N	0	0
A	0	400	A	0	0
S	400	0	S	400	0
	1160	1560		1180	880

Q20	W	L		W	L
1	600	1000	1	600	600
N	100	100	N	100	100
A	210	210	A	240	240
N	0	0	N	0	0
A	0	800	A	0	2100
S	400	0	S	400	0
	1310	2110		1340	3040

Q21	W	L		W	L		W	L
1	600	1000	1	400	700	1	600	600
N	100	100	N	100	100	N	100	100
A	0	0	A	200	200	A	30	30
N	0	0	N	0	0	N	0	0
A	0	1600	A	0	0	A	0	2475
S	0	0	S	0	0	S	0	0
	700	2700		700	1000		730	3205

Q22	W	L		W	L		W	L
1	600	1000	1	400	700	1	600	600
N	100	100	N	100	100	N	100	100
A	0	0	A	200	200	A	30	30
N	100	0	N	100	0	N	100	0
A	0	800	A	0	0	A	0	2100
S	0	0	S	0	0	S	0	0
	800	1900		800	1000		830	2830

Q23	W	L		W	L		W	L
1	600	1000	1	400	550	1	600	600
N	100	100	N	100	100	N	100	100
A	0	0	A	200	200	A	30	30
N	100	0	N	100	0	N	100	0
A	0	400	A	0	0	A	0	1800
S	0	0	S	0	0	S	0	0
	800	1500		800	850		830	2530

Q24	W	L		W	L		W	L
1	600	1000	1	400	700	1	600	600
N	0	0	N	0	0	N	0	0
A	0	0	A	200	200	A	30	30
N	0	0	N	0	0	N	0	0
A	0	1200	A	0	0	A	0	2925
S	400	0	S	400	0	S	400	0
	1000	2200		1000	900		1030	3555

Q25	W	L		W	L		W	L
1	600	1000	1	400	450	1	600	600
N	0	0	N	0	0	N	0	0
A	0	0	A	160	160	A	0	0
N	0	0	N	0	0	N	0	0
A	0	1600	A	0	0	A	0	3000
S	400	0	S	400	0	S	400	0
	1000	2600		960	610		1000	3600

Q26	W	L		W	L		W	L
1	600	1000	1	400	500	1	600	600
N	100	100	N	100	100	N	100	100
A	60	60	A	280	280	A	90	90
N	100	0	N	100	0	N	100	0
A	0	0	A	0	0	A	0	2175
S	0	0	S	0	0	S	0	0
	860	1160		880	880		890	2965

Q27	W	L		W	L		W	L
1	600	1000	1	400	450	1	600	600
N	100	100	N	100	100	N	100	100
A	180	180	A	440	440	A	210	210
N	0	0	N	0	0	N	0	0
A	0	1600	A	0	0	A	0	2175
S	400	0	S	400	0	S	400	0
	1280	2880		1340	990		1310	3085

Q28	W	L		W	L		W	L
1	600	1000	1	400	550	1	600	600
N	100	100	N	100	100	N	100	100
A	0	0	A	160	160	A	0	0
N	0	0	N	0	0	N	0	0
A	0	800	A	0	0	A	0	1275
S	400	0	S	400	0	S	400	0
	1100	1900		1060	810		1100	1975

Q29	W	L		W	L		W	L
1	600	1000	1	400	550	1	600	600
N	100	100	N	100	100	N	100	100
A	30	30	A	240	240	A	60	60
N	0	0	N	0	0	N	0	0
A	0	400	A	0	0	A	0	1650
S	400	0	S	400	0	S	400	0
	1130	1530		1140	890		1160	2410

Q30	W	L		W	L		W	L
1	600	1000	1	400	500	1	600	600
N	100	100	N	100	100	N	100	100
A	150	150	A	400	400	A	180	180
N	0	0	N	0	0	N	0	0
A	0	800	A	0	0	A	0	2325
S	400	0	S	400	0	S	400	0
	1250	2050		1300	1000		1280	3205

Q31	W	L
1	600	600
N	100	100
A	0	0
N	0	0
A	0	3825
S	0	0
	700	4525

Q32	W	L
1	450	765
N	0	100
A	0	0
N	0	0
A	0	0
S	0	0
	450	865

Q33	W	L
1	600	1000
N	100	100
A	0	0
N	100	0
A	0	2500
S	0	0
	800	3600

Q34	W	L
1	450	765
N	0	100
A	400	400
N	0	0
A	0	0
S	400	0
	1250	1265

Q35	W	L
1	600	1000
N	100	100
A	180	180
N	0	0
A	0	1600
S	400	0
	+400	
	1680	2880

Q36	W	L
1	600	600
N	0	100
A	60	60
N	1200	0
A	0	3150
S	0	0
	1860	3910

Q37	W	L
1	450	1065
N	100	100
A	160	160
N	0	0
A	0	0
S	400	0
	1110	1325

Q38	W	L
1	600	1000
N	0	100
A	60	60
N	100	0
A	0	1000
S	0	0
	760	2160

	W	L
1	600	600
N	0	100
A	0	0
N	450	0
A	0	2250
S	0	0
	1050	2950

Q40	W	L
1	600	600
N	100	100
A	150	150
N	640	0
A	0	1350
S	0	0
	1490	2200

Q41	W	L		W	L
1	600	1000	1	600	600
N	0	100	N	0	100
A	30	30	A	0	0
N	0	0	N	0	0
A	0	3000	A	0	3825
S	0	0	S	0	0
	630	4130		600	4525

Q42	W	L		W	L
1	450	615	1	600	600
N	100	100	N	100	100
A	120	120	A	0	0
N	0	0	N	0	0
A	0	0	A	0	2025
S	0	0	S	0	0
	670	835		700	2725

Q43	W	L		W	L
1	450	915	1	600	600
N	100	100	N	0	100
A	240	240	A	0	0
N	0	0	N	0	0
A	0	0	A	0	2550
S	0	0	S	0	0
	790	1255		600	3250

Q44	W	L		W	L
1	600	1000	1	450	1065
N	0	0	N	0	0
A	0	0	A	240	240
N	0	0	N	0	0
A	0	1200	A	0	0
S	400	0	S	400	0
	1000	2200		1090	1305

Q45	W	L		W	L
1	600	1000	1	600	600
N	0	100	N	0	100
A	120	120	A	60	60
N	0	0	N	0	0
A	0	500	A	0	2550
S	0	0	S	0	0
	720	1720		660	3310

Q46	W	L		W	L
1	450	765	1	600	600
N	0	0	N	0	0
A	0	0	A	0	0
N	0	0	N	0	0
A	0	0	A	0	1050
S	0	0	S	0	0
	450	765		600	1650

Q47	W	L		W	L
1	600	1000	1	450	615
N	0	100	N	0	100
A	0	0	A	240	240
N	0	0	N	0	0
A	0	400	A	0	0
S	400	0	S	400	0
	1000	1500		1090	955

Q48	W	L		W	L
1	600	1000	1	450	1065
N	100	100	N	100	100
A	120	120	A	360	360
N	100	0	N	100	0
A	0	2000	A	0	0
S	0	0	S	0	0
	920	3220		1010	1525

Q49	W	L		W	L
1	450	915	1	600	600
N	100	100	N	0	100
A	160	160	A	60	60
N	0	0	N	0	0
A	0	0	A	0	750
S	0	0	S	0	0
	710	1175		660	1510

Q50	W	L		W	L
1	600	1000	1	600	600
N	0	100	N	0	100
A	90	90	A	240	240
N	0	0	N	0	0
A	0	1200	A	0	3225
S	0	0	S	0	0
	690	2390		840	4165

Q51	W	L
1	580	660
N	0	100
A	0	0
N	0	0
A	0	150
S	0	0
	580	910

Q52	W	L
1	500	1900
N	100	100
A	0	0
N	0	0
A	0	0
S	0	0
	600	2000

Q53	W	L
1	580	660
N	0	0
A	100	400
N	0	0
A	0	0
S	0	0
	680	1060

Q54	W	L		W	L
1	580	660	1	500	1200
N	100	100	N	100	100
A	50	200	A	50	100
N	100	0	N	100	0
A	0	100	A	0	0
S	0	0	S	0	0
	830	1060		750	1400

Q55	W	L		W	L
1	580	660	1	500	1900
N	0	100	N	0	100
A	100	400	A	100	200
N	0	0	N	0	0
A	0	550	A	0	0
S	400	0	S	400	0
	1080	1710		1000	2200

Q56 328 Yard Radius

Q57	W	L
1	580	660
N	0	100
A	0	0
N	0	0
A	0	250
S	0	0
	580	1010

Q58	W	L
1	500	1200
N	100	100
A	150	300
N	0	0
A	0	0
S	400	0
	1150	1600

Q59	W	L
1	580	660
N	100	100
A	100	400
N	0	0
A	0	950
S	400	0
	1180	2110

Q60 765 yard radius

DROP ZONE HOMEWORK -- CIRCULAR/RANDOM APPROACH DROP ZONES

1. What radius mission specific circular CARP drop zone is required for a C-130J dropping 34 jumpers and 1 door bundle mass exit at night from 1500 feet AGL using GPS?

2. What radius mission specific circular CARP drop zone is required for 2 C-130Hs if the first one is dropping 2 HE and the second aircraft is dropping 6 CDS on a single roller system at night flying staggered trail using SKE?

3. What radius mission specific circular CARP drop zone is required for 3 C-17s dropping 101 jumpers and 2 door bundles each mass exit at night on surveyed PI using GPS?

4. What radius mission specific circular CARP drop zone is required for 2 C-17s if the first is dropping 15 rows of HV-CDS and the second aircraft is dropping 5 HE on a dual row delivery system at night using GPS flying NIT?

5. What radius mission specific circular CARP drop zone is required for 1 C-17 dropping 10 HAARS containers from 7500 feet AGL at night using GPS?

6. What radius surveyed circular CARP drop zone is required for 3 C-17s dropping 67 jumpers and 2 door bundles each mass exit at night from 1800 feet AGL using GPS on off-set PIS?

7. What radius surveyed circular CARP drop zone is required for 2 C-130Js if the lead aircraft is dropping 12 CDS on a single roller and the trail aircraft is dropping 3 HE at night?

8. What radius surveyed circular CARP drop zone is required for CARP DROP ZONE SIZE QUESTION NUMBER 29?

9. What radius surveyed circular CARP drop zone is required for CARP DROP ZONE SIZE QUESTION NUMBER 43?

10. What radius surveyed circular CARP drop zone is required for CARP DROP ZONE SIZE QUESTION NUMBER 54?

DROP ZONE HOMEWORK ANSWERS -- CIRCULAR/RANDOM APPROACH DROP ZONES

1. 1127 YR
2. 931 YR
3. 2435 YR
4. 1735 YR
5. 1250 YR
6. 3282 YR
7. 1687 YR
8. 2237 YR
9. 3002 YR
10. 1010 YR

DROP ZONE HOMEWORK -- FORMULAS

D=K x A x V

1. What is the drift that the DZSTL will pace off for a UH-60 dropping door bundles during the day with a MEW of 12 KIAS?

2. What is the drift that the DZSTL will pace off for a UH-1 dropping door bundles at night with a MEW of 4 KIAS?

3. What is the drift that the DZSTL will pace off for a CH-47 dropping jumpers at night with a MEW of 11 KIAS?

4. What is the drift that the DZSTL will pace off for a CH-47 dropping jumpers at night from the minimum drop altitude with a MEW of 12 KIAS?

5. What is the drift that the DZSTL will pace off for a C-130 dropping door bundles with the T-10 cargo parachute at night from the minimum drop altitude with a MEW of 8 KIAS?

6. What is the drift that the DZSTL will pace off for a C-130 dropping door bundles with the G14 parachute at night from the minimum drop altitude with a MEW of 2 KIAS?

7. What is the drift that the DZSTL will pace off for a C-17 dropping door bundles with the T-10 cargo parachute at night from the minimum drop altitude with a MEW of 18 KIAS?

8. What is the drift that the DZSTL will pace off for a C-17 dropping door bundles with the G14 parachute at night from the minimum drop altitude with a MEW of 12 KIAS?

9. What is the drift that the DZSTL will pace off for a C-130 dropping door bundles using the T-10 cargo parachute at night with a MEW of 14 KIAS?

10. What is the drift that the DZSTL will pace off for a C-130 dropping CDS with the G14 parachute at night from the minimum drop altitude with a MEW of 23 KIAS?

11. What is the drift that the DZSTL will pace off for a C-17 dropping CDS with the G14 parachute at night from the minimum drop altitude with a MEW of 13 KIAS?

12. What is the drift that the DZSTL will pace off for a C-130 dropping CDS using the G14 parachute at night with a MEW of 6 KIAS?

13. What is the drift that the DZSTL will pace off for a C-130 dropping heavy equipment with the G12E parachute at night from the minimum drop altitude with a MEW of 3 KIAS?

14. What is the drift that the DZSTL will pace off for a C-17 dropping heavy equipment with the 5000 lbs parachute release system at night from the minimum drop altitude with a MEW of 14 KIAS?

15. What is the drift that the DZSTL will pace off for a C-130 dropping heavy equipment using the G12E parachute at night with a MEW of 11 KIAS?

16. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers conducting combat training at night with a MEW of 15 KIAS?

17. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers at night with a MEW of 9 KIAS?

18. What is the drift that the DZSTL will pace off for a C-130 dropping SATB-Ps from 500 feet AGL with a MEW of 4 KIAS?

19. What is the drift that the DZSTL will pace off for a C-130 dropping basic airborne students at night with a MEW of 23 KIAS?

20. What is the drift that the DZSTL will pace off for a C-17 dropping jumpers and heavy equipment at night with a MEW of 8 KIAS?

21. What is the drift that the DZSTL will pace off for a C-17 dropping jumpers and CDS at night with a MEW of 22 KIAS?

22. What is the drift that the DZSTL will pace off for a C-130 dropping CDS and heavy equipment at night with a MEW of 19 KIAS?

23. What is the drift that the DZSTL will pace off for a C-17 dropping door bundles and CDS at night with a MEW of 13 KIAS?

24. What is the drift that the DZSTL will pace off for a C-130 dropping door bundles and heavy equipment using the 5000 lbs release system at night with a MEW of 17 KIAS?

25. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers and door bundles at night with a MEW of 11 KIAS?

26. What is the drift that the DZSTL will pace off for a UH-60 dropping jumpers and door bundles with a MEW of 9 KIAS?

27. What is the drift that the DZSTL will pace off for a C-130 dropping CDS from 3000 feet AGL with a MEW of 7 KIAS?

28. What is the drift that the DZSTL will pace off for a C-17 dropping jumpers from 2500 feet AGL with a MEW of 11 KIAS?

29. What is the drift that the DZSTL will pace off for a CH-47 dropping bundles from 1800 feet AGL with a MEW of 23 KIAS?

30. What is the drift that the DZSTL will pace off for a C-130 dropping SATB-Ps from 1100 feet AGL with a MEW of 3 KIAS?

31. What is the drift that the DZSTL will pace off for a C-17 dropping CDS and heavy equipment with a MEW of 29 KIAS?

32. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers and heavy equipment with a MEW of 12 KIAS?

33. What is the drift that the DZSTL will pace off for a C-130 dropping CDS with a MEW of 16 KIAS?

34. What is the drift that the DZSTL will pace off for a CH-47 dropping jumpers from 2500 feet AGL with a MEW of 5 KIAS?

35. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers and door bundles from 1250 feet AGL with a MEW of 7 KIAS?

36. What is the drift that the DZSTL will pace off for a UH-60 dropping door bundles from 2100 feet AGL with a MEW of 6 KIAS?

37. What is the drift that the DZSTL will pace off for a C-17 dropping heavy equipment from 800 feet AGL with a MEW of 13 KIAS?

38. What is the drift that the DZSTL will pace off for a C-130 dropping jumpers from 1450 feet AGL with a MEW of 22 KIAS?

39. What is the drift that the DZSTL will pace off for a C-130 dropping CDS from 1300 feet AGL with a MEW of 14 KIAS?

40. What is the drift that the DZSTL will pace off for a C-130 dropping CDS from 1800 feet AGL with a MEW of 9 KIAS?

41. What is the drift that the DZSTL will pace off for a C-17 dropping heavy equipment from 600 feet AGL with a MEW of 4 KIAS?

42. What is the drift that the DZSTL will pace off for a C-17 dropping jumpers and door bundles from 1300 feet AGL with a MEW of 13 KIAS?

43. What is the drift that the DZSTL will pace off for a C-17 dropping jumpers and door bundles from 2300 feet AGL with a MEW of 17 KIAS?

44. What is the drift that the DZSTL will pace off for a C-130 dropping SATB-Ps from 1000 feet AGL a MEW of 6 KIAS?

45. What is the drift that the DZSTL will pace off for a C-17 dropping SATB-Ps and door bundles from 1250 feet AGL with a MEW of 4 KIAS?

46. What is the drift that the DZSTL will pace off for a UH-60 dropping and door bundles from 3000 feet AGL with a MEW of 15 KIAS?

47. What is the drift that the DZSTL will pace off for a C-130 dropping CDS and jumpers from 950 feet AGL with a MEW of 10 KIAS?

48. What is the drift that the DZSTL will pace off for a C-17 dropping CDS and jumpers from 1300 feet AGL with a MEW of 11 KIAS?

49. What is the drift that the DZSTL will pace off for a C-130 dropping door bundles and jumpers from 1850 feet AGL with a MEW of 12 KIAS?

50. What is the drift that the DZSTL will pace off for a C-17 dropping door bundles and jumpers from 3000 feet AGL with a MEW of 17 KIAS?

D=R x T

1. A C-130 is dropping 25 jumpers on a GMRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

2. A C-17 is dropping 28 jumpers on a GMRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

3. A UH-1 is dropping 6 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

4. A UH-60 is dropping 8 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

5. A CH-47 is dropping 27 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

6. A C-130 is dropping 10 door bundles on a GMRS drop zone. What length drop zone is required to get all the door bundles out in one pass?

7. A C-17 is dropping 14 door bundles on a GMRS drop zone. What length drop zone is required to get all the door bundles out in one pass?

8. A UH-1 is dropping 4 door bundles on a VIRS drop zone. What length drop zone is required to get all the door bundles out in one pass?

9. A UH-60 is dropping 5 door bundles on a VIRS drop zone. What length drop zone is required to get all the door bundles out in one pass?

10. A CH-47 is dropping 13 door bundles on a VIRS drop zone. What length drop zone is required to get all the door bundles out in one pass?

11. A C-130 is dropping 30 jumpers and 3 door bundles on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

12. A C-17 is dropping 41 jumpers and 5 door bundles on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

13. A UH-1 is dropping 4 jumpers and 2 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

14. A UH-60 is dropping 3 jumpers and 3 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

15. A CH-47 is dropping 25 jumpers and 2 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

16. A C-130 is dropping 64 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

17. A C-17 is dropping 97 jumpers and 3 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

18. A UH-1 is dropping 5 jumpers and 1 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

19. A UH-60 is dropping 2 jumpers and 2 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

20. A CH-47 is dropping 21 jumpers and 3 door bundles on a VIRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

21. A C-130 flying 135 KIAS is dropping 61 jumpers and 1 door bundle mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundle out in one pass?

22. A C-17 flying 138 KIAS is dropping 91 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass?

23. A UH-1 flying 50 KIAS is dropping 7 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

24. A UH-60 flying 75 KIAS is dropping 6 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

25. A CH-47 flying 80 KIAS is dropping 17 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass?

26. A C-130 is dropping 53 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 160 meters to fit the markings on the drop zone?

27. A C-17 is dropping 83 jumpers and 3 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 185 meters to fit the markings on the drop zone?

28. A UH-1 flying 60 KIAS is dropping 4 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass if the point of impact was moved forward 95 meters to fit the markings on the drop zone?

29. A UH-60 flying 65 KIAS is dropping 3 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass if the point of impact was moved forward 65 meters to fit the markings on the drop zone?

30. A CH-47 flying 85 KIAS is dropping 26 jumpers on a VIRS drop zone. What length drop zone is required to get all the jumpers out in one pass if the point of impact was moved forward 100 meters to fit the markings on the drop zone?

31. A C-130 is dropping 73 jumpers and 1 door bundle mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundle out in one pass if the point of impact was moved forward 135 meters to fit the markings on the drop zone?

32. A C-17 is dropping 94 jumpers and 1 door bundle mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundle out in one pass if the point of impact was moved forward 112 meters to fit the markings on the drop zone?

33. A C-130 is dropping 22 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 120 meters to fit the markings on the drop zone?

34. A C-17 is dropping 98 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 179 meters to fit the markings on the drop zone?

35. A C-130 is dropping 78 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 140 meters to fit the markings on the drop zone?

36. A C-17 flying 135 KIAS is dropping 89 jumpers and 3 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 107 meters to fit the markings on the drop zone?

37. A C-130 flying 135 KIAS is dropping 67 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 315 meters to fit the markings on the drop zone?

38. A C-17 flying 135 KIAS is dropping 45 jumpers and 8 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 212 meters to fit the markings on the drop zone?

39. A C-130 flying 135 KIAS is dropping 72 jumpers and 1door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 155 meters to fit the markings on the drop zone?

40. A C-17 flying 135 KIAS is dropping 88 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 205 meters to fit the markings on the drop zone?

41. A C-130 is dropping 71 jumpers and 5 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 108 meters to fit the markings on the drop zone?

42. A C-17 is dropping 76 jumpers and 4 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 105 meters to fit the markings on the drop zone?

43. A C-130 is dropping 75 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 128 meters to fit the markings on the drop zone?

44. A C-17 is dropping 98 jumpers and 1 door bundle mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundle out in one pass if the point of impact was moved forward 68 meters to fit the markings on the drop zone?

45. A C-130 is dropping 61 jumpers and 3 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 160 meters to fit the markings on the drop zone?

46. A C-17 flying 135 KIAS is dropping 89 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 320 meters to fit the markings on the drop zone?

47. A C-130 flying 135 KIAS is dropping 69 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 95 meters to fit the markings on the drop zone?

48. A C-17 flying 135 KIAS is dropping 96 jumpers and 3 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 179 meters to fit the markings on the drop zone?

49. A C-130 flying 135 KIAS is dropping 45 jumpers and 2 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 193 meters to fit the markings on the drop zone?

50. A C-17 flying 135 KIAS is dropping 92 jumpers and 5 door bundles mass exit on a GMRS drop zone. What length drop zone is required to get all the jumpers and door bundles out in one pass if the point of impact was moved forward 117 meters to fit the markings on the drop zone?

T=D/R

1. A C-130 is dropping 25 jumpers on a GMRS drop zone that is 1100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

2. A C-17 is dropping 28 jumpers on a GMRS drop zone that is 900 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

3. A UH-1 is dropping 6 jumpers on a VIRS drop zone that is 300 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

4. A UH-60 is dropping 8 jumpers on a VIRS drop zone that is 350 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

5. A CH-47 is dropping 27 jumpers on a VIRS drop zone that is 800 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

6. A C-130 is dropping 10 door bundles on a GMRS drop zone that is 850 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

7. A C-17 is dropping 14 door bundles on a GMRS drop zone that is 900 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

8. A UH-1 is dropping 4 door bundles on a VIRS drop zone that is 325 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

9. A UH-60 is dropping 5 door bundles on a VIRS drop zone that is 350 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

10. A CH-47 is dropping 13 door bundles on a VIRS drop zone that is 500 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

11. A C-130 is dropping 30 jumpers and 3 door bundles on a GMRS drop zone that is 950 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

12. A C-17 is dropping 41 jumpers and 5 door bundles on a GMRS drop zone that is 1200 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

13. A UH-1 is dropping 4 jumpers and 2 door bundles on a VIRS drop zone that is 400 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

14. A UH-60 is dropping 3 jumpers and 3 door bundles on a VIRS drop zone that is 450 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

15. A CH-47 is dropping 25 jumpers and 2 door bundles on a VIRS drop zone that is 725 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

16. A C-130 is dropping 64 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

17. A C-17 is dropping 97 jumpers and 3 door bundles mass exit on a GMRS drop zone that is 1300 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

18. A UH-1 is dropping 5 jumpers and 1 door bundles on a VIRS drop zone that is 275 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

19. A UH-60 is dropping 2 jumpers and 2 door bundles on a VIRS drop zone that is 280 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

20. A CH-47 is dropping 21 jumpers and 3 door bundles on a VIRS drop zone that is 530 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

21. A C-130 flying 135 KIAS is dropping 61 jumpers and 1 door bundle mass exit on a GMRS drop zone that is 1165 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

22. A C-17 flying 138 KIAS is dropping 91 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1450 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

23. A UH-1 flying 50 KIAS is dropping 7 jumpers on a VIRS drop zone that is 295 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

24. A UH-60 flying 75 KIAS is dropping 6 jumpers on a VIRS drop zone that is 600 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

25. A CH-47 flying 80 KIAS is dropping 17 jumpers on a VIRS drop zone that is 415 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft?

26. A C-130 is dropping 53 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 890 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 160 meters to fit the markings on the drop zone?

27. A C-17 is dropping 83 jumpers and 3 door bundles mass exit on a GMRS drop zone that is 1700 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 185 meters to fit the markings on the drop zone?

28. A UH-1 flying 60 KIAS is dropping 4 jumpers on a VIRS drop zone that is 1350 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 95 meters to fit the markings on the drop zone?

29. A UH-60 flying 65 KIAS is dropping 3 jumpers on a VIRS drop zone that is 430 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 65 meters to fit the markings on the drop zone?

30. A CH-47 flying 85 KIAS is dropping 26 jumpers on a VIRS drop zone that is 540 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 100 meters to fit the markings on the drop zone?

31. A C-130 is dropping 73 jumpers and 1 door bundle mass exit on a GMRS drop zone that is 1200 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 135 meters to fit the markings on the drop zone?

32. A C-17 is dropping 94 jumpers and 1 door bundle mass exit on a GMRS drop zone that is 1850 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 112 meters to fit the markings on the drop zone?

33. A C-130 is dropping 22 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 700 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and

how many passes will it take to empty the aircraft if the point of impact was moved forward 120 meters to fit the markings on the drop zone?

34. A C-17 is dropping 98 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 179 meters to fit the markings on the drop zone?

35. A C-130 is dropping 78 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 2200 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 140 meters to fit the markings on the drop zone?

36. A C-17 flying 135 KIAS is dropping 89 jumpers and 3 door bundles mass exit on a GMRS drop zone that is 1600 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 107 meters to fit the markings on the drop zone?

37. A C-130 flying 135 KIAS is dropping 67 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1430 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 315 meters to fit the markings on the drop zone?

38. A C-17 flying 135 KIAS is dropping 45 jumpers and 8 door bundles mass exit on a GMRS drop zone that is 1440 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 212 meters to fit the markings on the drop zone?

39. A C-130 flying 135 KIAS is dropping 72 jumpers and 1door bundles mass exit on a GMRS drop zone that is 1100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 155 meters to fit the markings on the drop zone?

40. A C-17 flying 135 KIAS is dropping 88 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1400 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 205 meters to fit the markings on the drop zone?

41. A C-130 is dropping 71 jumpers and 5 door bundles mass exit on a GMRS drop zone that is 1078 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 108 meters to fit the markings on the drop zone?

42. A C-17 is dropping 76 jumpers and 4 door bundles mass exit on a GMRS drop zone that is 2100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and

how many passes will it take to empty the aircraft if the point of impact was moved forward 105 meters to fit the markings on the drop zone?

43. A C-130 is dropping 75 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1650 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 128 meters to fit the markings on the drop zone?

44. A C-17 is dropping 98 jumpers and 1 door bundle mass exit on a GMRS drop zone that is 1200 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 68 meters to fit the markings on the drop zone?

45. A C-130 is dropping 61 jumpers and 3 door bundles mass exit on a GMRS drop zone that is 1100 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 160 meters to fit the markings on the drop zone?

46. A C-17 flying 135 KIAS is dropping 89 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1760 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 320 meters to fit the markings on the drop zone?

47. A C-130 flying 135 KIAS is dropping 69 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1340 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 95 meters to fit the markings on the drop zone?

48. A C-17 flying 135 KIAS is dropping 96 jumpers and 3 door bundles mass exit on a GMRS drop zone that is 1280 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 179 meters to fit the markings on the drop zone?

49. A C-130 flying 135 KIAS is dropping 45 jumpers and 2 door bundles mass exit on a GMRS drop zone that is 1400 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 193 meters to fit the markings on the drop zone?

50. A C-17 flying 135 KIAS is dropping 92 jumpers and 5 door bundles mass exit on a GMRS drop zone that is 1765 meters long. How much time does the aircraft have to exit loads over the drop zone per pass and how many passes will it take to empty the aircraft if the point of impact was moved forward 117 meters to fit the markings on the drop zone?

Drop Zone Homework Answers -- Formulas

	D=K*A*V			D=R*T			T=D/R			
1)	54	Meters of Drift	1)	1,792	Meters Long	1)	13	Seconds	2	Passes
2)	30	Meters of Drift	2)	1,991	Meters Long	2)	10	Seconds	3	Passes
3)	495	Meters of Drift	3)	379	Meters Long	3)	2	Seconds	2	Passes
4)	450	Meters of Drift	4)	450	Meters Long	4)	4	Seconds	2	Passes
5)	48	Meters of Drift	5)	1,394	Meters Long	5)	13	Seconds	2	Passes
6)	9	Meters of Drift	6)	1,791	Meters Long	6)	12	Seconds	2	Passes
7)	81	Meters of Drift	7)	2,586	Meters Long	7)	13	Seconds	3	Passes
8)	54	Meters of Drift	8)	322	Meters Long	8)	9	Seconds	1	Passes
9)	210	Meters of Drift	9)	429	Meters Long	9)	9	Seconds	2	Passes
10)	138	Meters of Drift	10)	1,653	Meters Long	10)	10	Seconds	4	Passes
11)	59	Meters of Drift	11)	2,587	Meters Long	11)	11	Seconds	4	Passes
12)	54	Meters of Drift	12)	3,714	Meters Long	12)	14	Seconds	4	Passes
13)	25	Meters of Drift	13)	450	Meters Long	13)	5	Seconds	2	Passes
14)	210	Meters of Drift	14)	522	Meters Long	14)	6	Seconds	2	Passes
15)	182	Meters of Drift	15)	1,486	Meters Long	15)	11	Seconds	3	Passes
16)	450	Meters of Drift	16)	2,521	Meters Long	16)	13	Seconds	3	Passes
17)	270	Meters of Drift	17)	3,648	Meters Long	17)	16	Seconds	4	Passes
18)	48	Meters of Drift	18)	379	Meters Long	18)	2	Seconds	2	Passes
19)	863	Meters of Drift	19)	379	Meters Long	19)	2	Seconds	2	Passes
20)	264	Meters of Drift	20)	1,440	Meters Long	20)	7	Seconds	4	Passes
21)	660	Meters of Drift	21)	2,335	Meters Long	21)	13	Seconds	3	Passes
22)	314	Meters of Drift	22)	3,649	Meters Long	22)	17	Seconds	3	Passes

23)	195	Meters of Drift	23)	353	Meters Long	23)	3	Seconds	2	Passes
24)	281	Meters of Drift	24)	392	Meters Long	24)	10	Seconds	1	Passes
25)	330	Meters of Drift	25)	853	Meters Long	25)	5	Seconds	3	Passes
26)	405	Meters of Drift	26)	2,349	Meters Long	26)	7	Seconds	4	Passes
27)	315	Meters of Drift	27)	3,369	Meters Long	27)	19	Seconds	3	Passes
28)	825	Meters of Drift	28)	387	Meters Long	28)	34	Seconds	1	Passes
29)	621	Meters of Drift	29)	332	Meters Long	29)	4	Seconds	1	Passes
30)	80	Meters of Drift	30)	1,384	Meters Long	30)	5	Seconds	5	Passes
31)	479	Meters of Drift	31)	2,789	Meters Long	31)	12	Seconds	3	Passes
32)	396	Meters of Drift	32)	3,429	Meters Long	32)	22	Seconds	3	Passes
33)	144	Meters of Drift	33)	1,249	Meters Long	33)	5	Seconds	3	Passes
34)	375	Meters of Drift	34)	3,827	Meters Long	34)	10	Seconds	5	Passes
35)	263	Meters of Drift	35)	3,125	Meters Long	35)	27	Seconds	2	Passes
36)	189	Meters of Drift	36)	3,612	Meters Long	36)	18	Seconds	3	Passes
37)	156	Meters of Drift	37)	3,063	Meters Long	37)	13	Seconds	3	Passes
38)	957	Meters of Drift	38)	2,822	Meters Long	38)	14	Seconds	3	Passes
39)	273	Meters of Drift	39)	2,834	Meters Long	39)	10	Seconds	4	Passes
40)	243	Meters of Drift	40)	3,641	Meters Long	40)	14	Seconds	4	Passes
41)	36	Meters of Drift	41)	3,093	Meters Long	41)	11	Seconds	4	Passes
42)	507	Meters of Drift	42)	3,223	Meters Long	42)	26	Seconds	2	Passes
43)	1173	Meters of Drift	43)	3,047	Meters Long	43)	19	Seconds	3	Passes
44)	144	Meters of Drift	44)	3,517	Meters Long	44)	13	Seconds	4	Passes
45)	120	Meters of Drift	45)	2,615	Meters Long	45)	11	Seconds	3	Passes
46)	675	Meters of Drift	46)	3,825	Meters Long	46)	17	Seconds	3	Passes
47)	285	Meters of Drift	47)	2,912	Meters Long	47)	15	Seconds	3	Passes

48)	429	Meters of Drift	48)	3,891	Meters Long	48)	13	Seconds	4	Passes
49)	666	Meters of Drift	49)	2,184	Meters Long	49)	14	Seconds	2	Passes
50)	1530	Meters of Drift	50)	3,898	Meters Long	50)	20	Seconds	3	Passes

DROP ZONE PRACTICE QUIZ

VERSION A (UPDATED 27 January 2016)

SELECTION FACTORS

1. Where is the control center located on a CARP drop zone when dropping CDS from a C-130J?
   a. 200m to the 6 o'clock of the PI
   b. Off the drop zone
   c. 200y to the 6 o'clock of the PI
   d. 200y to the 12 o'clock of the PI
   e. None of the above

2. What is the primary reference for CARP drop zones?
   a. USASOC Regulation 350-2
   b. FM 3-21.38
   c. AFI 12-317
   d. AFI 13-217
   e. None of the above

3. Who determines the release point on a CARP drop zone?
   a. DZSTL
   b. Ground unit Commander
   c. Air Force Navigator
   d. S-3 AIR
   e. None of the above

4. What is the minimum drop altitude in feet MSL for a C-130H, dropping Door Bundles using T10 cargo parachutes, at night, if the highest point is 149 feet above sea level?
   a. 549ft MSL
   b. 550ft MSL
   c. 450ft MSL
   d. 1150ft MSL
   e. None of the above

5. What is the minimum drop altitude in feet MSL for a C-17, dropping Heavy Equipment, using a G12E Parachutes, on the dual row airdrop system, at night, under AWADS, if the field elevation is 350 meters above sea level?
   a. 1700ft MSL
   b. 2350ft MSL
   c. 2250ft MSL
   d. 2150ft MSL
   e. None of the above

6. Where is the PI located for a C-130J, flying 135 KIAS, dropping CDS, using T10 Cargo parachutes, on a CARP drop zone, from 600 ft AGL, at night, with a MEW of 12 knots?

7. How many and what type lights are required to mark the code letter at night on a CARP drop zone?

8. What radius mission specific circular, night, CARP drop zone is required for a two C-17s, using GPS, if the first is dropping 2 Heavy Equipment platforms and the second is dropping 38 CDS, in double container configuration?

9. What is the airdrop airspeed when dropping AHKIO sleds from a C-17, at night, using T10 Cargo parachutes, in order to conduct Arctic Tactical Training?

10. What radius night, surveyed circular, CARP drop zone is required in order to facilitate two C-17s, if the first is dropping 10 rows of HV-CDS and the second is dropping 4 HAARS, both using GPS, and dropping from 5500ft AGL?

CARP DROP ZONE SIZES

1. What size CARP drop zone is required for three C-17s, dropping 40 Jumpers and 5 Door Bundles, each, at night, mass exit, from 950ft AGL, using GPS and an offset PI?
   a. 1800yds wide/ 2275yds long
   b. 1400yds wide/ 4000yds long
   c. 1300yds wide/ 2350yds long
   d. 600yds wide/ 4275yds long
   e. None of the above

2. What size night CARP drop zone is required for two C-17s, with GPS, using the center PI, the first is dropping 16 CDS in single container configuration, fifteen minutes later the second is dropping 32 Jumpers and 6 Door Bundles, mass exit, from 1300ft AGL?
   a. 600yds wide/ 2125yds long
   b. 730yds wide/ 2155yds long
   c. 730yds wide/ 3565yds long
   d. 690yds wide/ 2215yds long
   e. None of the above

3. What size CARP drop zone is required for two C-130Js, flying echelon left, dropping 4 rows of HV-CDS from 5250ft AGL, at night, using GPS, flying 135 KIAS, using SKE?
   a. 1180yds wide/ 1310yds long
   b. 980yds wide/ 11010yds long
   c. 1080yds wide/ 1310yds long
   d. 880yds wide/ 1110yds long
   e. None of the above

4. What radius CARP drop zone required for a C-130J dropping 1 JPADS from 15,000ft AGL, at night, flying 140 KIAS, using GPS?
   a. 500meters
   b. 500yards
   c. 546yards
   d. Both A and C
   e. None of the above

5. What size CARP drop zone is required to accommodate three C-17s, using GPS at night, flying not in trail, the first is dropping 3 Heavy Equipment platforms the second is dropping 5 CDS on a single roller, 5 minutes later the third is dropping 33 Jumpers and 6 Door Bundles, mass exit?
   a. 700yds wide/ 2100yds long
   b. 750yds wide/ 2125yds long
   c. 850yds wide/ 2155yds long
   d. 700yds wide/ 3580yds long
   e. None of the above

6. What size night CARP drop zone is required for three C-17s, if the first is dropping 3 Heavy Equipment platforms, fifteen minutes later the remaining aircraft are dropping 92 Jumpers and 3 Door Bundles, mass exit, using an offset PI?

7. What size night CARP drop zone is required for three C-130Js, flying staggered trail, if the first is dropping 1 Heavy Equipment platform, the second aircraft is dropping 1 CDS single container, and the third aircraft is dropping 39 Jumpers and 2 Door Bundles, mass exit?

8. What size CARP drop zone is required for three C-130Js, using flying staggered trail, if the first is dropping 4 Heavy Equipment platform, the second aircraft is dropping 12 CDS single container, and the third aircraft is dropping 41 Jumpers and 1 Door Bundles?

9. What size night CARP drop zone is required for three C-130Hs, if the first is dropping 6 Heavy Equipment platform, the second aircraft is dropping 19 CDS double container, and the third aircraft is dropping 61 Jumpers and 2 Door Bundles, mass exit, flying not in trail?

10. What size CARP drop zone is required for three C-17s, if the first is dropping 3 Heavy Equipment platforms, the second aircraft is dropping 20 CDS double container, and the third aircraft is dropping 10 rows of HV-CDS, flying not in trail?

DUTIES AND RESPONSIBILITIES

1. How many medics are required to support a single ship, personnel drop on a 2100 meter drop zone with 19 seconds of green light?
   a. 1
   b. 2
   c. 0
   d. 3
   e. None of the above

2. How long prior to TOT do boats have to be in the water with engines running for three C-17s dropping Heavy Equipment on a 1500 meter drop zone with 15 seconds of green light?
   a. 1 Hour
   b. 15 minutes
   c. 10minutes
   d. 12 minutes
   e. None of the above

3. What are the maximum surface winds allowable when dropping Door Bundles using G14 parachutes?
   a. 17 knots
   b. 13 knots
   c. 20 knots
   d. 25 knots
   e. No restriction

4. The boat detail must at a minimum have communications with whom?
   a. Range Control
   b. DZSTL
   c. DACO
   d. Ground Unit Commander
   e. None of the above

5. How many additional vests are required for each boat for a C-130J, dropping a total of 64 Jumpers, wearing B7's, making three personnel passes if the aircraft is to drop 14 Jumpers on the first pass and 25 on the subsequent passes?
   a. 0
   b. 14
   c. 25
   d. 64
   e. None of the above

6. At a minimum who must the DZSTL have communications with when on the military reservation?

7. At a minimum the drop zone support team will consist of how many members when dropping CDS?

8. For which types of drop zones are communication required with the Aircraft?

9. What is the MEW restriction for a personnel airdrop when training for Airfield Seizure?

10. The Turbo-Meter is different in that it must be held within how many degrees of the wind line in order to obtain an accurate measurement?

VIRS/GMRS

1. What is the minimum drop zone size requirement for a GMRS resupply drop zone in order to fit all markings and the release point on the drop zone?
   a. 275y/275y
   b. 275m/275m
   c. 300m/275m
   d. 475m/475m
   e. None of the above

2. When marking a night time VIRS drop zone how many lights are required to mark the code letter "H"?
   a. 9
   b. 10
   c. 11
   d. 5
   e. None of the above

3. How far forward would you be required to shift the PI in order to fit all markings on the drop zone when dropping Door Bundles from a CH-47 on a drop heading of 174 degrees, at night, with a MEW of 11 @ 261 degrees, and 5 meter trees on the lead edge?
   a. 167m
   b. 166m
   c. 91m
   d. 161m
   e. None of the above

4. How many lights face only opposite the direction of flight when marking a VIRS drop zone using with the code letter “A” when dropping personnel from a C-130J at night using GPS?
   a. 7
   b. 8
   c. 10
   d. 9
   e. None of the above

5. When dropping CDS on a VIRS drop zone from a C-17 at night what publication must be referenced to determine drop zone size requirements and PI location?
   a. AFI 11-231
   b. USASOC Reg. 350-2
   c. FM 3-21.38
   d. AFI 13-217
   e. None of the above

6. What is the forward throw for Heavy Equipment dropped from a C-130H?

7. How far must the PI be shifted on a GMRS drop zone for a C130J dropping 36 Jumpers and 1 door bundle, mass exit, if the MEW is 6 knots, 48 degrees to the left of drop heading and the trees on the lead edge are 8 meters tall, in order to not require a far marker?

8. The authentication light is located where on a GMRS drop zone?

9. What is the distance between the release point and the alignment light on a nighttime GMRS drop zone?

10. How many meters must the DZSTL shift the PI on A GMRS drop zone using the code letter “T”, in order to make all markings visible to the aircrew, at night, for a UH-60L dropping 6 Door Bundles, if the drop zone is 600 meters long the drop heading is 360 degrees and the MEW is 0, trees on the lead edge are 5 meters tall?

FORMULAS

1. A CH-47, flying 90 knots is dropping 27 combat equipped Jumpers, on a 700 meter long drop zone, at night, with a MEW of 14 knots, how much drift will the Jumpers experience?
   a. 630m
   b. 336m
   c. 525m
   d. 420m
   e. None of the above

2. If you have a C-17, flying 135 KIAS, dropping 92 Jumpers and 5 Door Bundles, mass exit, from 1500 ft AGL, on a nighttime GMRS drop zone with a MEW of 17 knots, what length drop zone would be required to exit all Jumpers and equipment in one pass if the PI was shifted 75m left and 117m forward, in order to make all lights visible to the aircraft?
   a. 3781m
   b. 3898m
   c. 3905m
   d. 3698m
   e. None of the above

3. How many seconds of green light are available and how many passes will you have on a 1400 meter GMRS drop zone with a MEW of 3 knots, for a C-17 flying 135 KIAS, dropping 96 Jumpers and 3 Door Bundles from 1800ft AGL, mass exit, with the PI shifted 179 meters forward to not need a far marker
   a. 13 seconds, 4 passes
   b. 14 seconds, 3 passes
   c. 14 seconds, 4 passes
   d. 17 seconds, 3 passes
   e. None of the above

4. A C-17 is dropping 3 HE platforms, with G12E parachutes and 5,000 pound parachute releases and 3 CDS double containers, with G14 parachutes, from minimum drop altitude, on a nighttime GMRS drop zone that is 2100 meters long, with 19 seconds of available green light, if the MEW is 13 knots how much drift will the loads experience?
   a. 195m
   b. 215m
   c. 312m
   d. 108m
   e. None of the above

5. You are setting up for a C-130J, dropping 45 Jumpers and 2 Door Bundles at 135 KIAS, from 1750ft AGL, mass exit at night, on a GMRS drop zone where the MEW is 23 knots, what length drop zone will required to exit all Jumpers and equipment in one pass if the PI has been shifted 34m right and 193m forward in order to fit all the markings on the drop zone?
   a. 1991m
   b. 1983m
   c. 2184m
   d. 1783m
   e. None of the above

6. How much drift will the DZSTL account for when dropping 6 Door Bundles from a CH-47 flying 90 KIAS, at night with a MEW of 12 knots?

7. A C-17 is dropping 18 Door Bundles on a GMRS drop zone that is 800m long, from 1450ft AGL, How many seconds of green light are available and how many passes will be required to exit all equipment if the PI has been shifted forward 113 meters because of a 13 knot MEW?

8. You have a C-17 dropping 5 Door Bundles and 96 Jumpers, mass exit, conducting tactical training on a nighttime GMRS drop zone with a MEW of 17 knots, what length drop zone will be required to exit all Jumpers and Door Bundles in one pass if the PI was shifted 75m left and 117m forward to fit all markings on the drop zone?

9. A single C-17 is dropping 3 Door Bundles and 96 Jumpers, mass exit, from 1800ft AGL, on an 1100m GMRS drop zone with a MEW of 3 knots, the PI has been shifted 179 meters forward and the drop zone is being identified by the code letter "H", how many seconds are available and how many passes will be required to exit all Jumpers and equipment?

10. A CH-47 is dropping 13 Door Bundles and 4 Jumpers from the minimum altitude on a daytime GMRS drop zone that is 525m long, how many seconds of green light will be available and how many passes will it take to exit all Door Bundles and Jumpers if the PI has been shifted forward 164m to allow all markings to be visible to the aircraft?

DROP ZONES PRACTICE QUIZ A ANSWERS

Answers

Selection Factors

1. C
2. D
3. C
4. B
5. D
6. Centerline 250yds from the lead edge
7. 9 White Omni-directional lights
8. 864yds radius
9. 140 KIAS
10. 1085yds radius

CARP Drop Zone Sizes

1. C
2. D
3. A
4. D
5. B
6. 1150yds wide/4225yds long
7. 830yds wide/2230yds long
8. 730yds wide/3705yds long
9. 830yds wide/3100yds long
10. 1510yds wide/ 2570yds long

Duties and Responsibilities

1. B
2. E
3. C
4. B
5. A
6. Range Control
7. 2
8. VIRS and IMC CARP
9. None
10. 20 degrees

GMRS/VIRS

1. C
2. A
3. C
4. D
5. D
6. 500y/458m
7. 179m
8. 15m to the right of the approach light
9. 150m
10. 160m

Formulas

1. A
2. B
3. C
4. A
5. C
6. 90m
7. 10sec/ 5passes
8. 3898m
9. 10sec/ 5 passes
10. 3sec/8passes

DROP ZONE PRACTICE QUIZ

VERSION B (UPDATED 27 January 2016)

SELECTION FACTORS

1. When dropping Door Bundles using T-10 Cargo parachutes, from a C-130J at night, flying with GPS on a drop zone with a field elevation of 191m; what is the drop altitude in feet MSL?
   f. 1627 ft MSL
   g. 927 ft MSL
   h. 950 ft MSL
   i. 1650 ft MSL
   j. None of the above

2. When dropping HV-CDS from a C-17 at night using 26 foot Ring Slot parachutes, from an altitude of 7,000 feet AGL, where is the control center located?
   a. 275m 6 o'clock of the PI
   b. 275y 6 o'clock of the PI
   c. 550 y 6 o'clock of the PI
   d. Off the drop zone
   e. None of the above

3. Who is responsible for advising the Ground Unit Commander on the suitability of the proposed drop zone based on the eight selection factors?
   a. S-3 AIR
   b. Pathfinder/ DZSTL
   c. Jumpmaster
   d. Air Mobility Liaison
   e. None of the above

4. What is the minimum drop altitude in feet MSL for two C-130Hs, flying not in trail, dropping JPADS, at night, if the highest point is 649 feet above sea level?
   a. 4,150 ft MSL
   b. 4,149 ft MSL
   c. 9,649 ft MSL
   d. 9,650 ft MSL
   e. None of the above

5. What is the minimum drop altitude in feet MSL for three C-17s, if the first two are dropping Heavy Equipment, using G-12E Parachutes, on the Dual Row Airdrop System; the third is dropping 40 CDS double row containers, using G-14 parachutes at night, under AWADS, if the field elevation is 3,150 meters above sea level?
   a. 10,882 ft MSL
   b. 10,900 ft MSL
   c. 3,700 ft MSL
   d. 3,650 ft MSL
   e. None of the above

6. When marking a CARP drop zone at night how many and what type lights are needed to mark the drop zone when using the optional lights?

7. What radius surveyed circular, night, CARP drop zone is required for five C-17s, using GPS, if the first two are dropping four Heavy Equipment DRADS platforms using G12E parachutes and 5,000 lb parachute release systems, the third is dropping 40 CDS double containers, using G14 parachutes. Fifteen minutes later, the remaining aircraft are dropping 71 Jumpers and 3 Door Bundles with T-10 Cargo parachutes, mass exit, each, on an offset point of impact?

8. You are establishing a CARP drop zone for resupply by CDS from a C-130J, it will be ineffective due to the size of the surveyed drop zone to use the surveyed PI; however, the necessary drop zone size required will fit within the boundaries of the surveyed drop zone. How far in advance of TOT must you advise the aircrew of your new proposed point of impact?

9. What is the airdrop airspeed for a single C-130H, at night, dropping a Combat Rubber Raiding Craft being chased by eight ODA Operators, off the ramp?

10. What radius surveyed circular, CARP drop zone is required in order to facilitate two C-17s, using GPS, if the first is dropping 8 rows of HV-CDS and the second is dropping 8 HAARS, dropping from 7,200ft AGL?

CARP DROP ZONE SIZES

1. What size night CARP drop zone is required for three C-17s, dropping 60 Jumpers and 3 Door Bundles, each, mass exit, from 1150ft AGL, using an offset PI?
   a. 630yds wide/ 2955yds long
   b. 1330yds wide/ 2955yds long
   c. 1430yds wide/ 3055yds long
   d. 1430yds wide/ 3155yds long
   e. None of the above

2. What size night CARP drop zone is required for two C-17s, with GPS, using the center PI, the first is dropping 12 CDS in single container configuration, from 1,000ft AGL fifteen minutes later the second is dropping 52 Jumpers and 1 Door Bundles, mass exit?
   a. 610yds wide/ 2650yds long
   b. 700yds wide/ 2525yds long
   c. 730yds wide/ 2600yds long
   d. 710yds wide/ 1915yds long
   e. None of the above

3. What size CARP drop zone is required for two C-130Js, flying echelon left, dropping 4 HV-CDS rows from 5250ft AGL, using GPS, flying 135 KIAS, and using SKE?
   a. 1280yds wide/ 1310yds long
   b. 980yds wide/ 11010yds long
   c. 980yds wide/ 1310yds long
   d. 1080yds wide/ 1210yds long
   e. None of the above

4. What radius CARP drop zone required for three C-130Js dropping 3 JPADS, each, at night, flying 140 KIAS, and using GPS?
   a. 500meters
   b. 500yards
   c. 546yards
   d. Both A and C
   e. None of the above

5. What size CARP drop zone is required to accommodate three C-17s, using GPS at night, flying not in trail, the first is dropping 3 Heavy Equipment DRADS platforms the second is dropping 2 CDS on a single roller, 5 minutes later the third is dropping 30 Jumpers and 3 Door Bundles, mass exit?
   a. 700yds wide/ 1800yds long
   b. 790yds wide/ 1900yds long
   c. 800yds wide/ 1975yds long
   d. 690yds wide/ 2100yds long
   e. None of the above

6. What size night CARP drop zone is required for three C-17s, if the first is dropping 4 Heavy Equipment DRADS platforms, fifteen minutes later the remaining aircraft are dropping 81 Jumpers and 4 Door Bundles, mass exit?

7. What size night CARP drop zone is required for three C-130Js, flying staggered trail, if the first is dropping 1 Heavy Equipment platform, the second aircraft is dropping 1 CDS single container, and the third aircraft is dropping 25 Jumpers, mass exit?

8. What size CARP drop zone is required for three C-130Js, flying staggered trail, if the first is dropping 3 Heavy Equipment platforms, the second aircraft is dropping 11 CDS single containers, and the third aircraft is dropping 46 Jumpers and 3 Door Bundles, mass exit?

9. What size night CARP drop zone is required for three C-130Hs, flying not in trail, if the first is dropping 5 Heavy Equipment platforms, the second aircraft is dropping 16 CDS double containers, and the third aircraft is dropping 59 Jumpers and 1 Door Bundles, mass exit?

10. What size CARP drop zone is required for three C-17s, if the first is dropping 4 Heavy Equipment platforms, the second aircraft is dropping 28 CDS double containers, and the third aircraft is dropping 12 HV-CDS rows, flying not in trail?

DUTIES AND RESPONSIBILITIES

1. How many medics are required to support a multi-ship, CDS drop on a 2200 meter drop zone with 20 seconds of green light?
   a. 1
   b. 2
   c. 0
   d. 4
   e. None of the above

2. How long prior to TOT do boats have to be in place for three C-17s dropping Door Bundles on a 1500 meter drop zone with 15 seconds of green light?
   a. 1 Hour
   b. 15 minutes
   c. 10 minutes
   d. 30 minutes
   e. None of the above

3. What are the maximum surface winds allowable when dropping Heavy Equipment using G-12E parachutes and the 5,000 lb parachute release system?
   a. 17 knots
   b. 13 knots
   c. 20 knots
   d. 25 knots
   e. None of the above

4. The boat detail must at a minimum have communications with whom?
   a. Range Control
   b. DZSTL
   c. DACO
   d. Ground Unit Commander
   e. None of the above

5. How many additional life vests are the boat detail required to have for a C-130J, dropping 5 Door Bundles and 42 Jumpers, wearing combat equipment, conducting tactical training?
   a. 0
   b. 47
   c. 42
   d. 44
   e. None of the above

6. Who is responsible for naming the drop zone while conducting a new DZ survey?

7. At a minimum the drop zone support team will consist of how many members when dropping LCLA's?

8. For which types of drop zones are communications not required with the Aircraft?

9. What is the MEW restriction for a personnel airdrop when dropping Heavy Equipment using DRADS configuration?

10. Which Natick approved Anemometer is both digital and Omni-directional?

VIRS/GMRS

1. What is the minimum drop zone size requirement for a GMRS resupply drop zone?
   a. 275y/275y
   b. 275m/275m
   c. 300m/275m
   d. 475m/475m
   e. None of the above

2. When marking a VIRS drop zone with the code letter "H" how many panels are required?
   a. 7
   b. 11
   c. 10
   d. 6
   e. None of the above

3. How far forward would you be required to shift the PI in order to fit all markings on the drop zone when dropping personnel from a C-23 on drop heading of 217 degrees, with a MEW of 7 @ 271 degrees, and 7 meter trees on the lead edge?
   a. 188m
   b. 135m
   c. 23m
   d. 0m
   e. None of the above

4. How many lights face only opposite the direction of flight when marking a VIRS drop zone using with the code letter "E" when dropping personnel from a C-130J at night using GPS?
   a. 7
   b. 8
   c. 10
   d. 9
   e. None of the above

5. When dropping Heavy Equipment on a GMRS drop zone from a C-130H at night what publication must be referenced to determine the PI location?
   a. AFI 12-317
   b. USASOC Reg. 350-2
   c. FM 3-21.38
   d. AFI 13-217
   e. None of the above

6. What is the forward throw for CDS dropped from a C-17?

7. How far must the PI be shifted on a GMRS drop zone for a C-130J dropping 36 Jumpers and 1 Door Bundle, mass exit, if the MEW is 6 knots, 32 degrees to the right of drop heading and the trees on the lead edge are 5 meters tall, in order to not require a far marker?

8. The far marker is located where on a GMRS drop zone?

9. What is the distance between the corner light and the approach light on a nighttime GMRS drop zone?

10. How many meters must the DZSTL shift the PI on A GMRS drop zone with no code letter, in order to make all markings visible to the aircrew, at night, for a UH-60L dropping 6 Door Bundles, if the drop zone is 600 meters long the drop heading is 330 degrees and the MEW is 7 knots at 184 degrees, trees on the lead edge are 11 meters tall?

FORMULAS

1. A CH-47, flying 95 knots is dropping 27 combat equipped Jumpers, from minimum drop altitude, on a 900 meter long drop zone, at night, with a MEW of 12 knots; how much drift will the jumpers experience?
    a. 270m
    b. 450m
    c. 225m
    d. 540m
    e. None of the above

2. If you have a C-130J, flying 140 KIAS, dropping 48 Jumpers and 3 Door Bundles, mass exit, from 1500 ft AGL, on a nighttime GMRS drop zone with a MEW of 17 knots; what length drop zone would be required to exit all jumpers and equipment in one pass if the PI was shifted 75m forward and 117m right, in order to make all lights visible to the aircraft?
    a. 2128m
    b. 2060m
    c. 4131m
    d. 2203m
    e. None of the above

3. How many seconds of green light will be available and how many passes will you have on a 1250 meter GMRS drop zone with a MEW of 8 knots, for a C-17, dropping 96 Jumpers and 3 Door Bundles from 1400 ft AGL, mass exit, with the PI shifted 179 meters forward to not need a far marker
    a. 13 seconds, 4 passes
    b. 14 seconds, 3 passes
    c. 14 seconds, 4 passes
    d. 17 seconds, 3 passes
    e. None of the above

4. A C-17 is dropping 8 rows of HV-CDS, from 6,500ft AGL, on a nighttime GMRS drop zone that is 2100 meters long, with 19 seconds of available green light, and if the MEW is 21 knots; how much drift will the loads experience?
    a. 410m
    b. 205m
    c. 2048m
    d. 1890m
    e. None of the above

5. You are setting up for a C-130J, dropping 41 Jumpers and 7 Door Bundles at 135 KIAS, from 1750ft AGL, and mass exit at night, on a GMRS drop zone where the MEW is 18 knots. What length drop zone will be required to exit all Jumpers and equipment in one pass if the PI has been shifted 34m right and 210m forward in order to fit all the markings on the drop zone?
   a. 2266m
   b. 2476m
   c. 1853m
   d. 2063m
   e. None of the above

6. How much drift will the DZSTL account for when dropping 6 Door Bundles from a CASA-212 flying 110 KIAS, at night with a MEW of 12 knots?

7. A CH-47 is dropping 25 Door Bundles on a GMRS drop zone that is 750m long, from 650ft AGL. How many seconds of green light are available and how many passes will be required to exit all equipment if the PI has been shifted forward 143 meters because of a 13 knot MEW?

8. You have a C-17 dropping 6 Door Bundles and 91 Jumpers, mass exit, conducting tactical training on a nighttime GMRS drop zone with a MEW of 17 knots. What length drop zone will be required to exit all Jumpers and door bundles in one pass if the PI was shifted 75m left and 745m forward to fit all markings on the drop zone?

9. A single C-17 is dropping 3 door bundles and 96 jumpers, mass exit, from 1800ft AGL, on an 1100m GMRS drop zone with a MEW of 3 knots, the PI has been shifted 325 meters forward and the drop zone is being identified by the code letter “H”. How many seconds are available and how many passes will be required to exit all Jumpers and equipment?

10. A CH-47 is dropping 13 Door Bundles and 4 Jumpers from the minimum altitude on a daytime GMRS drop zone that is 615m long. How many seconds of green light will be available and how many passes will it take to exit all Door Bundles and Jumpers; if the PI has been shifted forward 158m in order to place all markings on the drop zone?

DROP ZONES PRACTICE QUIZ B ANSWERS

Selection Factors

1. D
2. D
3. B
4. A
5. E
6. 11 White Omni-directional lights
7. 3293 yard radius
8. 15 minutes prior to TOT
9. 140 KIAS
10. 1149 yards radius

CARP Drop Zone Sizes

1. C
2. A
3. D
4. D
5. B
6. 1340yds wide/ 3850yds long
7. 830yds wide/ 1630yds long
8. 730yds wide/ 2430yds long
9. 830yds wide/ 2980yds long
10. 1510yds wide/ 3070yds long

Duties and Responsibilities

1. C
2. E
3. A
4. B
5. C
6. SURVEYOR
7. 2
8. GMRS and VMC CARP
9. No Restriction
10. DIC-3

GMRS/VIRS

1. B
2. A
3. D
4. C
5. D
6. 725y/ 663m
7. 101m
8. Trail edge or where best seen
9. 50m
10. 294m

Formulas

1. B
2. D
3. A
4. E
5. B
6. 90m
7. 13 sec/ 5 passes
8. 4592m
9. 8 sec/ 7 passes
10. 5 sec/ 7 passes

DROP ZONE PRACTICE QUIZ

VERSION C (UPDATED 26 January 2016)

SELECTION FACTORS

1. Where is the control center located on a CARP drop zone when dropping HV-CDS from a C130J at night?
   a. 200m to the 6 o'clock of the PI
   b. Off the drop zone
   c. 200y to the 6 o'clock of the PI
   d. 200y to the 12 o'clock of the PI
   e. None of the above

2. What is the primary reference for CARP personnel drop zones?
   a. USASOC Regulation 350-2
   b. FM 3-21.38
   c. AFI 12-317
   d. AFI 13-217
   e. None of the above

3. Who locates/marks the point of impact on a CARP drop zone?
   a. DZSTL
   b. Ground unit Commander
   c. Air Force Navigator
   d. S-3 AIR
   e. None of the above

4. What radius surveyed circular night CARP drop zone is required to accomodate 5 C-17s, with GPS? The first two are dropping 4 heavy Equipment platforms each in dual row configuration; the next two will be dropping 72 jumpers and 1 door bundle mass exit each. Two hours later a resupply bird will drop three JPADS from 9,000 feet AGL.
   a. 2966 YR
   b. 3186 YR
   c. 3235 YR
   d. 3162 YR
   e. None of the above

5. What is the minimum drop altitude in feet MSL for a C-17, dropping Heavy Equipment, using a G12E Parachutes, on the dual row airdrop system, at night, under AWADS, if the field elevation is 350 feet above sea level?
   a. 900ft MSL
   b. 1350ft MSL
   c. 1450ft MSL
   d. 1550ft MSL
   e. None of the above

6. On a CARP Drop Zone how far apart are the Flanker Lights?

7. How many and what type lights are required to mark a night CARP drop zone including all optional lights?

8. What radius mission specific circular, CARP drop zone is required for a two C-130Js, using GPS, if the first is dropping 2 Heavy Equipment platforms and the second is dropping 18 CDS, in double container configuration?

9. What is the airdrop airspeed when dropping a pallet of MREs from a C-17, at night, using T10 Cargo parachutes?

10. What radius night, surveyed circular, CARP drop zone is required in order to facilitate two C-130Js? The first is dropping 11 rows of HV-CDS and the second is dropping 7 HAARS, both using GPS, and dropping from 5800ft AGL?

CARP DROP ZONE SIZES

1. What size CARP drop zone is required for three C-17s, dropping 51 Jumpers and 5 Door Bundles, each, at night, mass exit, from 980ft AGL, using GPS and an offset PI?
   a. 600yds wide/ 2725yds long
   b. 1400yds wide/ 2875yds long
   c. 1300yds wide/ 2800yds long
   d. 700yds wide/ 4125yds long
   e. None of the above

2. What size night CARP drop zone is required for two C-17s, with GPS, using the center PI, the first is dropping 18 CDS in single container configuration; the second is dropping 35 Jumpers and 6 Door Bundles, mass exit?
   a. 610yds wide/ 2075yds long
   b. 600yds wide/ 2200yds long
   c. 610yds wide/ 3000yds long
   d. 610yds wide/ 2200yds long
   e. None of the above

3. What size CARP drop zone is required for two C-130Js, flying echelon left, dropping 7 rows of HV-CDS from 6250ft AGL, at night, using GPS, flying 135 KIAS, using SKE?
   a. 1330yds wide/ 1360yds long
   b. 1155yds wide/ 1360yds long
   c. 830yds wide/ 1060yds long
   d. 1230yds wide/ 1660yds long
   e. None of the above

4. What radius CARP drop zone required for a C-130J dropping 1 JPADS from 9,000ft AGL, at night, flying 140 KIAS, using GPS?
   a. 500meters
   b. 500yards
   c. 546yards
   d. Both A and C
   e. None of the above

5. What size CARP drop zone is required to accommodate three C-17s, using GPS at night, flying not in trail, the first is dropping 4 Heavy Equipment platforms the second is dropping 6 CDS on a single roller, 5 minutes later the third is dropping 41 Jumpers and 6 Door Bundles, mass exit?
   a. 750yds wide/ 2600yds long
   b. 600yds wide/ 2425yds long
   c. 700yds wide/ 2300yds long
   d. 700yds wide/ 4150yds long
   e. None of the above

6. What size night CARP drop zone is required for three C-17s, if the first is dropping 3 Heavy Equipment platforms, fifteen minutes later the remaining aircraft are dropping 68 Jumpers and 3 Door Bundles, mass exit?

7. What size night CARP drop zone is required for three C-130Js, flying staggered trail, if the first is dropping 1 Heavy Equipment platforms, the second aircraft is dropping 1 CDS single container, and the third aircraft is dropping 29 Jumpers and 2 Door Bundles, mass exit?

8. What size CARP drop zone is required for three C-130Js, flying staggered trail, if the first is dropping 4 Heavy Equipment platforms, the second aircraft is dropping 11 CDS single container, and the third aircraft is dropping 39 Jumpers and 1 Door Bundles?

9. What size night CARP drop zone is required for three C-130Hs, if the first is dropping 4 Heavy Equipment platforms, the second aircraft is dropping 19 CDS double containers, and the third aircraft is dropping 60 Jumpers and 2 Door Bundles, mass exit, flying not in trail?

10. What size CARP drop zone is required for three C-17s, if the first is dropping 3 Heavy Equipment platforms, the second aircraft is dropping 20 CDS double containers, and the third aircraft is dropping 10 rows of HV-CDS, flying not in trail?

DUTIES AND RESPONSIBILITIES

1. How many medics are required to support a single ship, Heavy Equipment drop on a 2100 meter drop zone with 19 seconds of green light?
   a. 1
   b. 2
   c. 0
   d. 3
   e. None of the above

2. How long prior to TOT do boats have to be in the water with engines running for three C-17s dropping Door Bundles on a 1500 meter drop zone with 15 seconds of green light?
   a. 1 Hour
   b. 15 minutes
   c. 10minutes
   d. 12 minutes
   e. None of the above

3. What are the maximum surface winds allowable when Conducting a personnel water drop?
   a. 17 knots
   b. 13 knots
   c. 20 knots
   d. 25 knots
   e. No restriction

4. The boat detail must at a minimum have communications with whom?
   a. Range Control
   b. DZSTL
   c. DACO
   d. Ground Unit Commander
   e. None of the above

5. You are DZSTL the following mission for a C-130J, dropping a total of 64 Jumpers, wearing B7's, making three personnel passes if the aircraft is to drop 14 Jumpers on the first pass and 25 on the subsequent passes How many anemometers must you have on the drop zone if the drop zone is 2000M long, and there is 18 seconds of green light?
   a. 0
   b. 1
   c. 2
   d. 3
   e. None of the above

6. At a minimum who must the DZSTL have communications with while conducting operations on the military reservation?

7. At a minimum the drop zone support team will consist of how many members when dropping Personnel?

8. For which types of drop zones are communication not required with the Aircraft?

9. What is the MEW restriction for a personnel airdrop when conducting a water drop?

10. As the S-3 Air NCO, you are tasking individuals to conduct two consecutive CARP airdrop missions; the first line is a single ship CDS mission; one hour later your second line will be two C-130Js dropping personnel and door bundles. Your DZSTL is current and fully qualified and you have plenty of current jumpmasters but none are current DZSTLs, is it possible to conduct this mission?

VIRS/GMRS

1. What is the minimum drop zone size requirement for a GMRS resupply drop zone in order to fit all markings and the release point on the drop zone?
   a. 275y/275y
   b. 275m/275m
   c. 300m/275m
   d. 475m/475m
   e. None of the above

2. When marking a night time VIRS drop zone with the code letter "H" how many lights face only opposite the direction of flight?
   a. 9
   b. 10
   c. 11
   d. 5
   e. None of the above

3. How far forward would you be required to shift the PI in order to fit all markings on the drop zone when dropping Door Bundles from a CH-47 on a drop heading of 174 degrees, at night, with a MEW of 11 @ 219 degrees, and 5 meter trees on the lead edge?
   a. 111m
   b. 39m
   c. 60m
   d. 36m
   e. None of the above

4. How many lights face only opposite the direction of flight when marking a GMRS drop zone using with the code letter “A” when dropping personnel from a C-130J at night using GPS?
   a. 9
   b. 8
   c. 12
   d. 4
   e. None of the above

5. When dropping CDS on a VIRS drop zone from a C-17 at night what publication must be referenced to determine drop zone size requirements and PI location?
   a. AFI 12-317
   b. USASOC Reg. 350-2
   c. FM 3-21.38
   d. AIF 13-217
   e. None of the above

6. What is the forward throw for Personnel dropped from a C-130H?

7. How far must the PI be shifted on a GMRS drop zone for a C-130J dropping 18 CDS Double Containers, if the MEW is 6 knots, 49 degrees to the left of drop heading and the trees on the lead edge are 8 meters tall, in order to not require a far marker?

8. The authentication light is located where on a GMRS drop zone?

9. What is the distance between the release point and the alignment light on a nighttime GMRS drop zone?

10. How many meters must the DZSTL shift the PI on a GMRS drop zone using the code letter “T”, in order to make all markings visible to the aircrew, at night, for a C-130J dropping 6 Door Bundles, if the drop zone is 600 meters long the drop heading is 360 degrees and the MEW is 0, trees on the lead edge are 5 meters tall?

FORMULAS

1. A CH-47, flying 90 knots is dropping 27 combat equipped Jumpers, on a 700 meter long drop zone, at night, with a MEW of 14 knots, how much drift will the Jumpers experience?
   a. 630m
   b. 336m
   c. 525m
   d. 420m
   e. None of the above

2. If you have a C-17, flying 135 KIAS, dropping 42 Jumpers and 5 Door Bundles, mass exit, from 1500 ft AGL, on a nighttime GMRS drop zone with a MEW of 17 knots, what length drop zone would be required to exit all Jumpers and equipment in one pass if the PI was shifted 75m left and 117m forward, in order to make all lights visible to the aircraft?
   a. 1976m
   b. 2176m
   c. 2059m
   d. 2134m
   e. None of the above

3. How many seconds of green light are available and how many passes will you have on a 1200 meter GMRS drop zone with a MEW of 3 knots, for a C-17 flying 135 KIAS, dropping 96 Jumpers and 3 Door Bundles from 12500ft AGL, mass exit, with the PI shifted 179 meters forward to not need a far marker
   a. 12 seconds, 4 passes
   b. 11 seconds, 6 passes
   c. 12 seconds, 4 passes
   d. 11 seconds, 5 passes
   e. None of the above

4. A C-17 is dropping 3 HE platforms, with G12E parachutes and 5,000 pound parachute releases and 3 CDS double containers, with G14 parachutes, on a nighttime GMRS drop zone that is 2100 meters long, with 19 seconds of available green light, if the MEW is 13 knots how much drift will the loads experience?
   a. 135m
   b. 225m
   c. 215m
   d. 270m
   e. None of the above

5. You are setting up for a C-130J, dropping 45 Jumpers and 2 Door Bundles at 135 KIAS, from 1750ft AGL, mass exit at night, on a GMRS drop zone where the MEW is 23 knots, what length drop zone will required to exit all Jumpers and equipment in one pass if the PI has been shifted 34m right and 53m forward in order to fit all the markings on the drop zone?
   a. 1984m
   b. 1784m
   c. 2044m
   d. 2018m
   e. None of the above

6. How much drift will the DZSTL account for when dropping 6 Door Bundles from a CH-47 flying 90 KIAS, at night with a MEW of 11 knots?

7. A C-17 is dropping 61 Jumpers and 3 door bundles on a GMRS drop zone that is 900m long, from 1450ft AGL, How many seconds of green light are available and how many passes will be required to exit all equipment if the PI has been shifted forward 113 meters because of a 13 knot MEW?

8. You have a C-17 dropping 24 CDS Double Containers on a nighttime VIRS drop zone with a MEW of 17 knots, what size drop zone will be required?

9. A single C-17 is dropping 3 Door Bundles and 96 Jumpers, mass exit, from 1600ft AGL, on an 1100m GMRS drop zone with a MEW of 3 knots, the PI has been shifted 179 meters forward and the drop zone is being identified by the code letter "H", how many seconds are available and how many passes will be required to exit all Jumpers and equipment?

10. A CH-47 flying 100KIAS is dropping 13 Door Bundles and 4 Jumpers from the minimum altitude on a daytime GMRS drop zone that is 575m long, how many seconds of green light will be available and how many passes will it take to exit all Door Bundles and Jumpers if the PI has been shifted forward 165m to allow all markings to be visible to the aircraft?

Drop Zone Survey

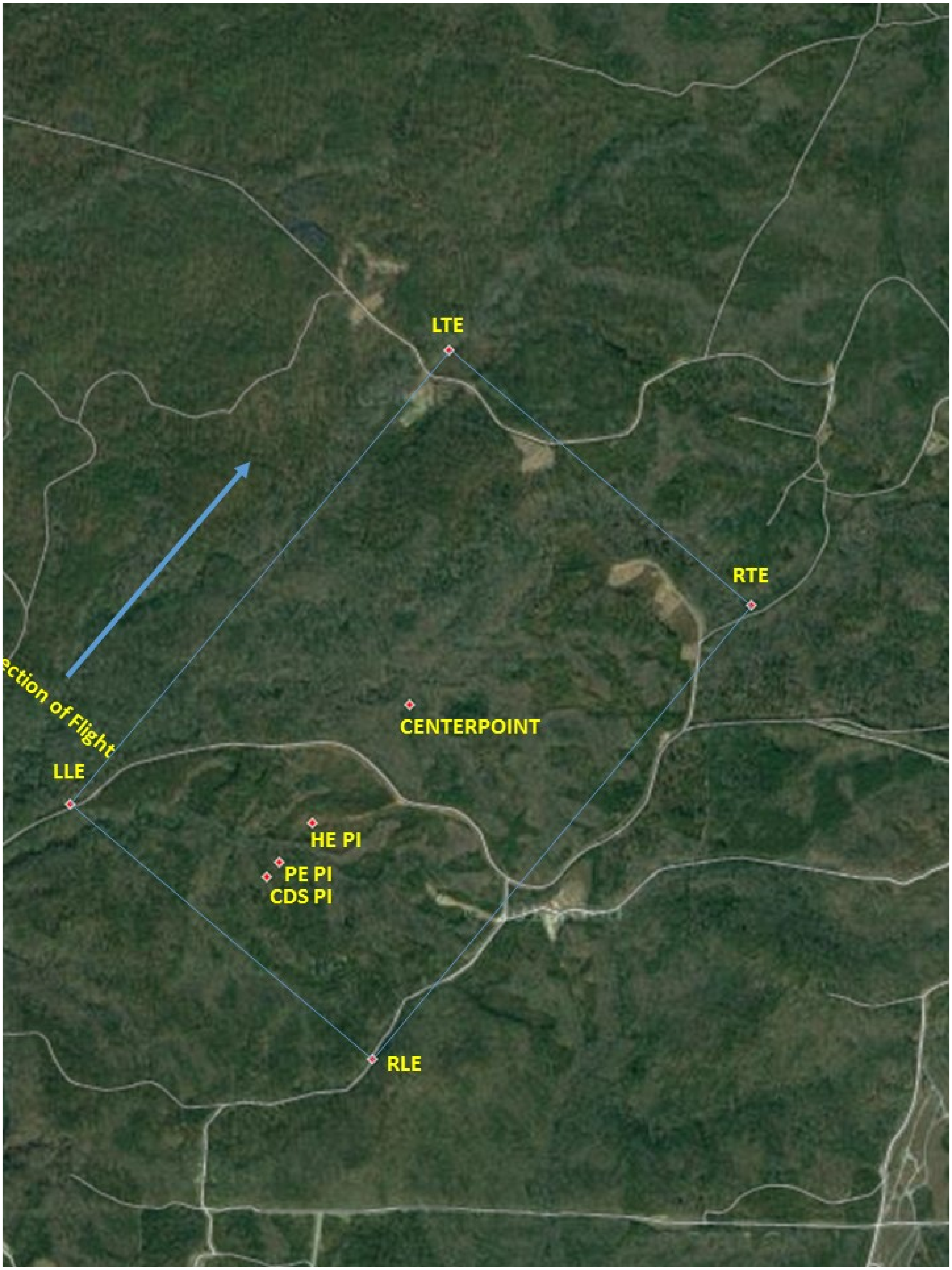
Pathfinder, you have been tasked by your superiors to complete a new survey for Iron Eagle Drop Zone. The existing survey has expired and been removed from the database and you are required to submit a new one for approval and use. The Pathfinder in charge of the survey has been assigned other duties, but left you with a partially completed AF Form 3823. Ensure the remainder of the form is correctly filled out prior to submission. A map and aerial photograph of the drop zone has been included to assist you in the completion of your duties. Your predecessor has left you the following contact information:

Fort Benning Range Control
Land Owner: Lawson Army Airfield, Ft Benning, GA
DSN: 835-3524
COMM: (607) 545-3524
Range Control: Range Control VHF-FM - 38.60 / Doughboy Advisory VHF-AM 138.325/UHF-AM 227.400
DSN: 835-6291
COMM: (706) 545-6291

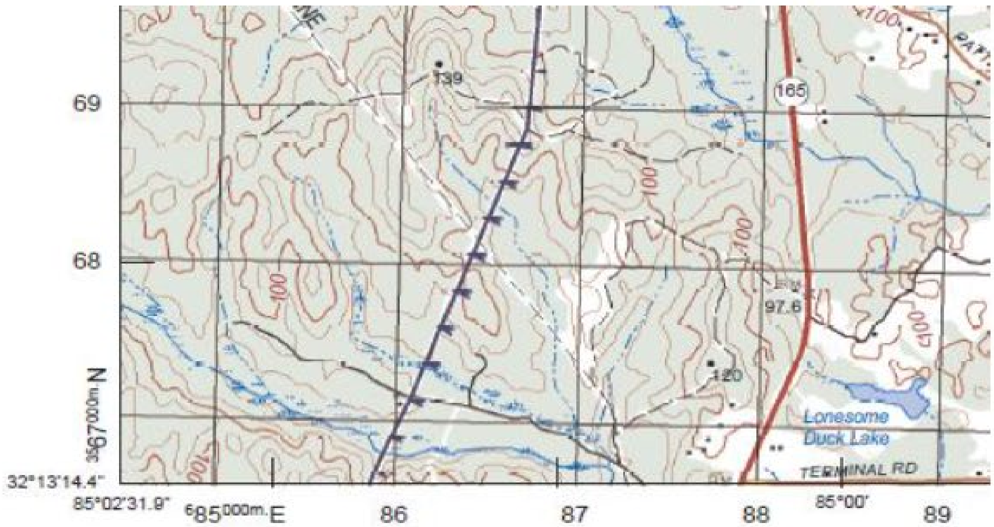
Ground Commander:
COL Douglas Masters, US Air Force
4 ASOG
Wiesbaden, DE
APO, AE 65205
DSN: 537-4683
Comm: (0611) 143 537 4683

Safety of Flight Officer:
LTC Charles Sinclair, USAF
521 OSS/OSK
APO, AE 09094
DSN: 480-2390
COM: (011) 49 6371 47 2390

MAJCOM Approval Authority:
COL Daniel James Jr., USAF
521 AMOG OG/CC
APO, AE 09094
DSN: 480-6692
COM: (011) 49 6371 47 6692


LTE
RTE
ction of Flight
CENTERPOINT
LLE
HE PI
PE PI
CDS PI
RLE

EDITION **003** SERIES **V745S** SHEET **FTBENNIMIM**



SCALE 1:50,000

Meters 1000 500 0 1 2 3 4 5 Kilometers

1 0.5 0 1 2 3 Statute Miles

1 0.5 0 1 2 3 Nautical Miles

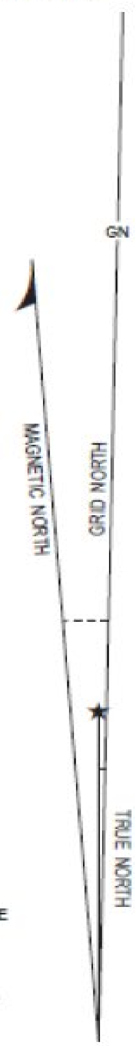
ELEVATIONS IN METERS

CONTOUR INTERVAL 10 METERS

ELLIPSOID. . . . . WORLD GEODETIC SYSTEM 1984
GRID. . . . . 1000 METER UTM ZONE 16
PROJECTION. . . . . TRANSVERSE MERCATOR
VERTICAL DATUM. . . . . MEAN SEA LEVEL
HORIZONTAL DATUM. . . . . WORLD GEODETIC SYSTEM 1984
PRINTED BY. . . . . U.S. ARMY SUSTAINABLE RANGE PROGRAM

SAMPLE 1,000 METER GRID SQUARE	100 METER REFERENCE
x SAMPLE POINT; 90; 89; 07; 08	1. Read large numbers labeling the VERTICAL grid line left of point and estimate tenths (100 meters) from grid line to point. 12 3 2. Read large numbers labeling the HORIZONTAL grid line below point and estimate tenths (100 meters) from grid line to point. 45 6 Example: 073896
100,000 M. SQUARE IDENTIFICATION FB GB / FA GA	WHEN REPORTING ACROSS A 100,000 METER LINE, PREFIX THE 100,000 METER SQUARE IDENTIFICATION IN WHICH THE POINT LIES. Example: GA073896
GRID ZONE DESIGNATION 16S	WHEN REPORTING OUTSIDE THE GRID ZONE DESIGNATION AREA. PREFIX THE GRID ZONE DESIGNATION. Example: 16SGA073896

USERS SHOULD REFER CORRECTIONS, ADDITIONS, AND COMMENTS TO THE INSTALLATION DPTM OFFICE (706) 545-3446; DSN 835-3446.



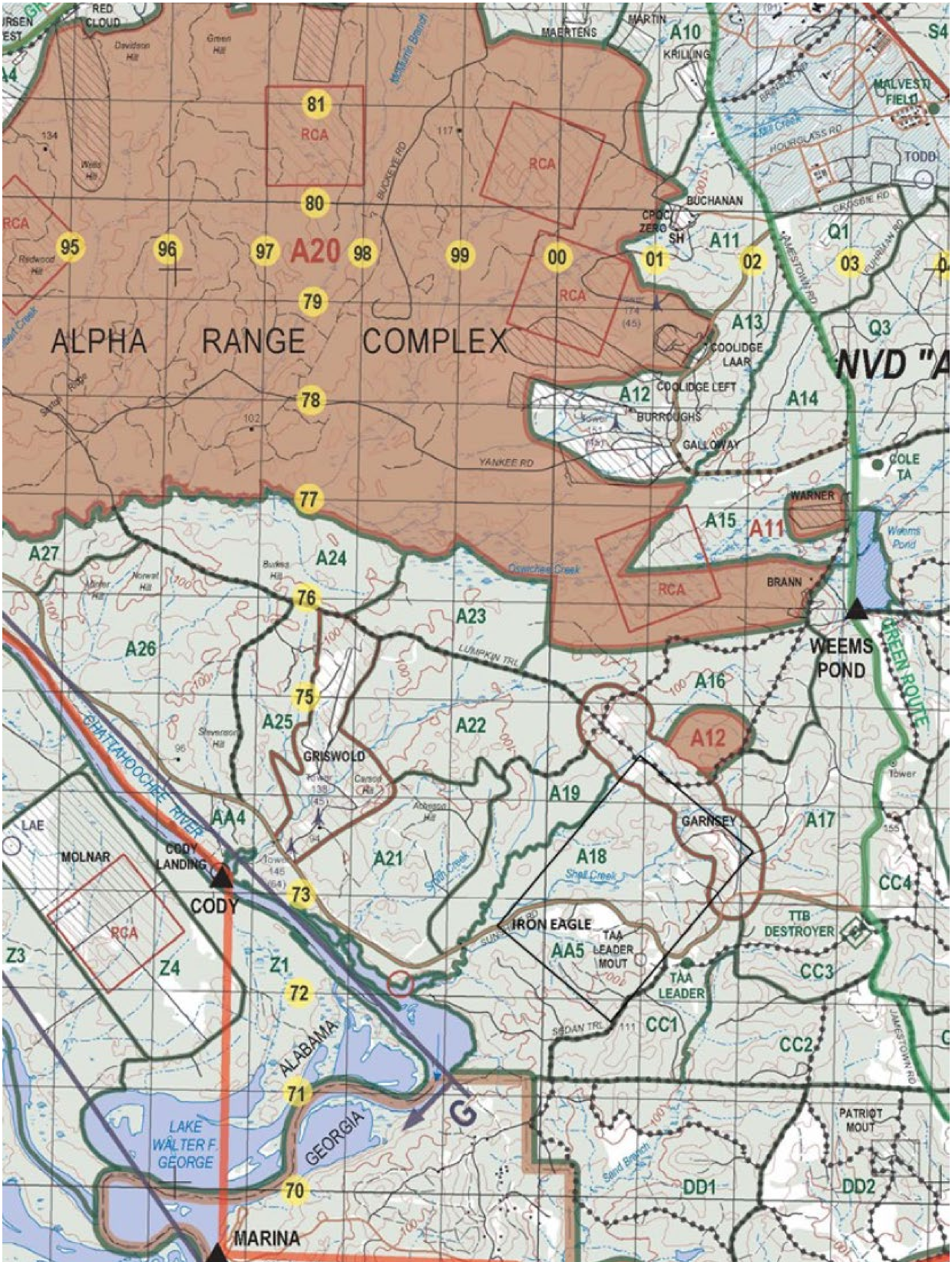
2013
G-M ANGLE
5.4° (96 MILS)

GRID CONVERGENCE
1° 10' (21 MILS)
FOR CENTER OF SHEET

TO CONVERT A MAGNETIC AZIMUTH TO A GRID AZIMUTH SUBTRACT G-M ANGLE

TO CONVERT A GRID AZIMUTH TO A MAGNETIC AZIMUTH ADD G-M ANGLE

Map Data Current as of
03-2013


ALPHA RANGE COMPLEX
A20
RCA
NVD "A
GREEN ROUTE
CHATTAHOOCHEE RIVER
ALABAMA
GEORGIA
LAKE WALTER F. GEORGE
WEEMS POND
CODY LANDING
CODY
MARINA
GRISWOLD
GARNSEY
IRON EAGLE
TAA LEADER MOUT
TAA LEADER
TTB DESTROYER
PATRIOT MOUT
MOLNAR
LAE
BUCHANAN
CPOC ZERO
COOLIDGE LAAR
COOLIDGE LEFT
BURROUGHS
GALLOWAY
WARNER
BRANN
COLE TA
MALVESTI FIELD
TODD
MAERTENS
MARTIN
KRILLING
RED CLOUD
YANKEE RD
LUMPKIN TRL
SEDAN TRL
JAMESTOWN RD
A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A21 A22 A23 A24 A25 A26 A27
AA4 AA5
Q1 Q3 S4
CC1 CC2 CC3 CC4
DD1 DD2
Z1 Z3 Z4
95 96 97 98 99 00 01 02 03
81 80 79 78 77 76 75 73 72 71 70

AIRBORNE UNIT ASSUMES RESPONSIBILITY FOR PERSONNEL INJURY AND EQUIPMENT DAMAGE ON DZ

DROP ZONE SURVEY	1A. DZ NAME	1B. ZAR INDEX NO.	2A. COUNTRY	2B. STATE
	3. MAP SERIES/SHEET NUMBER/ EDITION/ DATE OF MAP			

4. SURVEY APPROVAL/DISAPPROVAL DATA

4A1. DATE SURVEYED	4A2. TYPED NAME AND GRADE OF SURVEYOR	4A3. PHONE NUMBER *(DSN)*	4A4. UNIT

4B. DROP ZONE APPROVAL/DISAPPROVAL A = APPROVED D = DISAPPROVED	FOR	CDS/CRL/CRS	PER	HE	MFF	SATB	CRRC	HSLLADS	HVCDS
	DAY								
	NIGHT								

4C. DATE APPROVED FOR GROUND OPERATIONS	NAME, GRADE AND SERVICE OF APPROVAL AUTHORITY	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		
4D. DATE SAFETY OF FLIGHT REVIEW APPROVED	NAME AND GRADE OF REVIEWING OFFICER	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		
4E. DATE OF MAJCOM APPROVAL	NAME AND GRADE OF APPROVING AUTHORITY	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		

5. COORDINATING ACTIVITIES

A. DZ CONTROLLING AGENCY OR UNIT	B. MEMORANDUM OF UNDERSTANDING/LAND USE YES ☐ NO ☐ ATTACHED ☐	C. PHONE NUMBER *(DSN)*
D. RANGE CONTROL		E. PHONE NUMBER *(DSN)*

6. DZ DIMENSIONS *(YDS/MTRS) (FOR CIRCULAR DZ, ENTER RADIUS ONLY)*

A. LENGTH	B. WIDTH	C. RADIUS

POINT OF IMPACT DISTANCES FROM DZ LEADING EDGE	D. CDS PI	E. PE PI	F. HE PI

7. DZ AXIS DATA *(OPTIONAL FOR CIRCULAR DZ)*

A. MAGNETIC	B. GRID *(MGRS)*	C. TRUE	D. SOURCE/DATE OF VARIATION DATA

8. GROUND POINT ELEVATION	A. CDS PI	B. HE PI	C. PE PI	D. HIGHEST
	259’	229’	256’	331’

9. DZ COORDINATES

A. SPHEROID	B. DATUM	C. GRID ZONE	D. EASTING	E. NORTHING

F. GPS DERIVED COORDINATES YES ☐ NO ☐	G. POINT OF ORIGIN

H. POINT	MGRS COORDINATES	WGS84 LATITUDE *(D-M.MM)*	WGS84 LONGITUDE *(D-M.MM)*
DZ CENTERPOINT		N32°16.632'	W084°52.038'
CDS PI	16S GA 00307 72479	N32°16.270'	W084°52.397'
PE PI	16S GA 00354 72537	N32°16.301'	W084°52.366'
HE PI	16S GA 00480 72692	N32°16.384'	W084°52.284'

I. DZ CORNERS MGRS COORDINATES

LEFT LEADING EDGE 16S FA 99535 72749	RIGHT LEADING EDGE 16S GA 00732 71780
LEFT TRAILING EDGE 16S GA 00982 74536	RIGHT TRAILING EDGE 16S GA 02179 73567

DZ NAME

10. DZ DIAGRAM

11. REMARKS

1.

2. Prior coordination is required before entry into R-3002.
3. Iron Eagle Drop Zone is within Lawson AAF control zone. Aircraft must fly left traffic pattern only. Aircraft must maintain contact with control tower during airdrop operations on VHF-AM 119.050 / UHF-AM 269.525 / UHF-AM 288.275. Drop zone frequencies are UHF-AM 234.500 / VHF-AM 141.800 / VHF-FM 52.90.
4. Lawson AAF is located 7.3NM at 303.4 degrees magnetic. Dekkar Airstrip is located 4.6NM at 275.4 degrees magnetic.
5. Chattahoochee River is located 800m at 237.4 degrees magnetic, Water depth is up to 24ft.
6. Jump Towers 250' AGL are located 8.1NM at 316.4 degrees magnetic.
7. ILS approach to Runway 33 passes within 2.7NM of the left leading edge of the DZ.
8. Shell Creek runs through the center of the DZ. Water depth is 5ft.
9. Boat detail is required for all Personnel airdrops in accordance with USAIC Reg. 350-3 and TC 3-21.220.
10. 70' to 100' high treeline encroaches on all sides of the DZ.
11. Highest obstruction in the 2,249' MSL tower located 4.3NM NE.
12. Observation / control tower (FA 92385 71228), approximately 50' AGL tall, located on Fryar DZ, 467yds southwest of PE PI.
13. TAA Leader MOUT (GA 00995 72404) with buildings approximately 30' AGL tall located 200M inside of the right edge of the DZ.
14. Offset PE PI coordinate are standard 250yds left and right of the surveyed PE PI.

12. PHOTOGRAPH AVAILABLE

YES ☒ NO ☐

LOW LEVEL ROUTES

☐ NONE AVAILABLE

☐ ROUTE NAME/DESIGNATOR

DROP ZONES PRACTICE QUIZ C ANSWERS

Selection Factors

1. B
2. D
3. A
4. C
5. B
6. 500M
7. 11 White Omni-directional lights
8. 762 yds radius
9. 140 KIAS
10. 1149 yds radius

CARP Drop Zone Sizes

1. C
2. B
3. D
4. D
5. A
6. 1340yds wide/3325yds long
7. 830yds wide/1855yds long
8. 730yds wide/3555yds long
9. 830yds wide/3055yds long
10. 1510yds wide/ 2570yds long

Duties and Responsibilities

1. B
2. E
3. A
4. B
5. B
6. Range Control
7. 3
8. GMRS and VMC CARP
9. No RESTRICTIONS
10. YES

GMRS/VIRS

1. C
2. B
3. D
4. C
5. E
6. 229M
7. 455m
8. 15m to the right of the approach light
9. 150m
10. 354m

Formulas

1. A
2. B
3. D
4. C
5. C
6. 83M
7. 8sec/ 8passes
8. 504m wide/ 929m long
9. 10sec/ 5 passes
10. 4sec/7passes

DZ Survey is on the following two pages

AIRBORNE UNIT ASSUMES RESPONSIBILITY FOR PERSONNEL INJURY AND EQUIPMENT DAMAGE ON DZ

DROP ZONE SURVEY	1A. DZ NAME	1B. ZAR INDEX NO.	2A. COUNTRY	2B. STATE
	Iron Eagle DZ		US	GA
	3. MAP SERIES/SHEET NUMBER/ EDITION/ DATE OF MAP: V745S FTBENNIMIM 003 20130301			

4. SURVEY APPROVAL/DISAPPROVAL DATA

4A1. DATE SURVEYED	4A2. TYPED NAME AND GRADE OF SURVEYOR	4A3. PHONE NUMBER *(DSN)*	4A4. UNIT
TODAY'S DATE	YOUR NAME	YOUR NUMBER	YOUR UNIT

4B. DROP ZONE APPROVAL/DISAPPROVAL A = APPROVED D = DISAPPROVED	FOR	CDS/CRL/CRS	PER	HE	MFF	SATB	CRRC	HSLLADS	HVCDS
	DAY	A	A	A	D	A	D	A	A
	NIGHT	A	A	A	D	A	D	A	A

4C. DATE APPROVED FOR GROUND OPERATIONS	NAME, GRADE AND SERVICE OF APPROVAL AUTHORITY: Douglas Masters, O-6, USAF	PHONE NUMBER *(DSN)*: 537-4683	SIGNATURE
	UNIT AND LOCATION: 4 ASOG, Wiesbaden, DE, APO AE 65205		
4D. DATE SAFETY OF FLIGHT REVIEW APPROVED	NAME AND GRADE OF REVIEWING OFFICER: Charles Sinclair, O-5	PHONE NUMBER *(DSN)*: 480-2390	SIGNATURE
	UNIT AND LOCATION: 521 OSS/OSK Ramstein AB, APO, AE 09094		
4E. DATE OF MAJCOM APPROVAL	NAME AND GRADE OF APPROVING AUTHORITY: Daniel James Jr., O-6	PHONE NUMBER *(DSN)*: 480-6692	SIGNATURE
	UNIT AND LOCATION: 521 AMOG OG/CC, Ramstein AB, APO, AE 09094		

5. COORDINATING ACTIVITIES

A. DZ CONTROLLING AGENCY OR UNIT	B. MEMORANDUM OF UNDERSTANDING/LAND USE	C. PHONE NUMBER *(DSN)*
Lawson Army Airfield, Ft Benning, GA	YES ☐ NO ☒ ATTACHED ☐	835-3524
D. RANGE CONTROL		E. PHONE NUMBER *(DSN)*
Range Control VHF-FM - 38.60 / Doughboy Advisory VHF-AM 138.325/UHF-AM 227.400		835-6291

6. DZ DIMENSIONS ***(YDS/MTRS) (FOR CIRCULAR DZ, ENTER RADIUS ONLY)***

A. LENGTH	B. WIDTH	C. RADIUS
2514 YDS / 2299 MTRS	1684 YDS / 1540 MTRS	N/A

POINT OF IMPACT DISTANCES FROM DZ LEADING EDGE	D. CDS PI	E. PE PI	F. HE PI
	275 YDS / 251 MTRS	350 YDS / 321 MTRS	550 YDS / 503 MTRS

7. DZ AXIS DATA ***(OPTIONAL FOR CIRCULAR DZ)***

A. MAGNETIC	B. GRID *(MGRS)*	C. TRUE	D. SOURCE/DATE OF VARIATION DATA
044.4	039	040.1	GPS / TODAY'S DATE

8. GROUND POINT ELEVATION	A. CDS PI	B. HE PI	C. PE PI	D. HIGHEST
	259'	229'	256'	331'

9. DZ COORDINATES

A. SPHEROID	B. DATUM	C. GRID ZONE	D. EASTING	E. NORTHING
WGS84	WGS84	16S	7	35

F. GPS DERIVED COORDINATES	G. POINT OF ORIGIN
YES ☒ NO ☐	ANY POINT (10-DIGIT GRID, DESCRIPTION, DIST/DIR TO A SPECIFIED PI)

H. POINT	MGRS COORDINATES	WGS84 LATITUDE *(D-M.MM)*	WGS84 LONGITUDE *(D-M.MM)*
DZ CENTERPOINT	16S GA 00857 73158	N32°16.632'	W084°52.038'
CDS PI	16S GA 00307 72479	N32°16.270'	W084°52.397'
PE PI	16S GA 00354 72537	N32°16.301'	W084°52.366'
HE PI	16S GA 00480 72692	N32°16.384'	W084°52.284'

I. DZ CORNERS MGRS COORDINATES

LEFT LEADING EDGE	RIGHT LEADING EDGE
16S FA 99535 72749	16S GA 00732 71780
LEFT TRAILING EDGE	RIGHT TRAILING EDGE
16S GA 00982 74536	16S GA 02179 73567

DZ NAME

Iron Eagle DZ

10. DZ DIAGRAM

See Attached Photo

11. REMARKS

1. User accepts responsibility for damage to equipment or injury to personnel resulting from airdrop operations.
2. Prior coordination is required before entry into R-3002.
3. Iron Eagle Drop Zone is within Lawson AAF control zone. Aircraft must fly left traffic pattern only. Aircraft must maintain contact with control tower during airdrop operations on VHF-AM 119.050 / UHF-AM 269.525 / UHF-AM 288.275. Drop zone frequencies are UHF-AM 234.500 / VHF-AM 141.800 / VHF-FM 52.90.
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7. ILS approach to Runway 33 passes within 2.7NM of the left leading edge of the DZ.
8. Shell Creek runs through the center of the DZ. Water depth is 5ft.
9. Boat detail is required for all Personnel airdrops in accordance with USAIC Reg. 350-3 and TC 3-21.220.
10. 70' to 100' high treeline encroaches on all sides of the DZ.
11. Highest obstruction in the 2,249' MSL tower located 4.3NM NE.
12. Observation / control tower (FA 92385 71228), approximately 50' AGL tall, located on Fryar DZ, 467yds southwest of PE PI.
13. TAA Leader MOUT (GA 00995 72404) with buildings approximately 30' AGL tall located 200M inside of the right edge of the DZ.
14. Offset PE PI coordinate are standard 250yds left and right of the surveyed PE PI.

12. PHOTOGRAPH AVAILABLE	LOW LEVEL ROUTES
YES ☒ NO ☐	☐ NONE AVAILABLE ☐ ROUTE NAME/DESIGNATOR

Drop Zones AF 3823 Math Practice

For each scenario solve for the following questions in BOTH meters and yards

A. What is the diagonal length?
B. What is the longitudinal length?
C. What is the lateral width?

1. While preparing an AF3823 for an impending airborne training mission you complete the site survey portion of your drop zone survey. The proposed drop heading will be 025° which is also the long axis of your drop zone. The corner grid coordinates for your drop zone as you found them are LLE 16SFA 98810 76415, RLE 16SFA 99444 76119, LTE 16SFA 99233 77321 and RTE 16SFA 99867 77025?

2. While preparing an AF3823 for an impending airborne training mission you complete the site survey portion of your drop zone survey. The proposed drop heading will be 010° which is also the long axis of your drop zone. The corner grid coordinates for your drop zone as you found them are LLE 16SFA 84840 69715, RLE 16SFA 85923 69524, LTE 16SFA 85083 71094 and RTE 16SFA 86166 70903?

3. While preparing an AF3823 for an impending airborne training mission you complete the site survey portion of your drop zone survey. The proposed drop heading will be 315° which is also the long axis of your drop zone. The corner grid coordinates for your drop zone as you found them are LLE 16SFA 69740 58723, RLE 16SFA 70293 59276, LTE 16SFA 68596 59867 and RTE 16SFA 69149 60420?

4. While preparing an AF3823 for an impending airborne training mission you complete the site survey portion of your drop zone survey. The proposed drop heading will be 351° which is also the long axis of your drop zone. The corner grid coordinates for your drop zone as you found them are LLE 16SFA 48569 25897, RLE 16SFA 49162 25990, LTE 16SFA 48444 26687 and RTE 16SFA 49037 26780?

5. While preparing an AF3823 for an impending airborne training mission you complete the site survey portion of your drop zone survey. The proposed drop heading will be 017° which is also the long axis of your drop zone. The corner grid coordinates for your drop zone as you found them are LLE 16SFA 56642 61942, RLE 16SFA 59279 61136, LTE 16SFA 57987 66341 and RTE 16SFA 60624 65535?

DROP ZONES AF 3823 MATH PRACTICE ANSWERS

1. a) 1220m / 1334y
   b) 999m / 1093y
   c) 699m / 765y

2. a) 1780m / 1947y
   b) 1400m / 1531y
   c) 1099m / 1202y

3. a) 1796m / 1965y
   b) 1617m / 1769y
   c) 782m / 855y

4. a) 999m / 1092y
   b) 799m / 874y
   c) 600m / 656y

5. a) 5362m / 5864y
   b) 4600m / 5030y
   c) 2757m / 3015y

Drop Zones PI Shift Homework

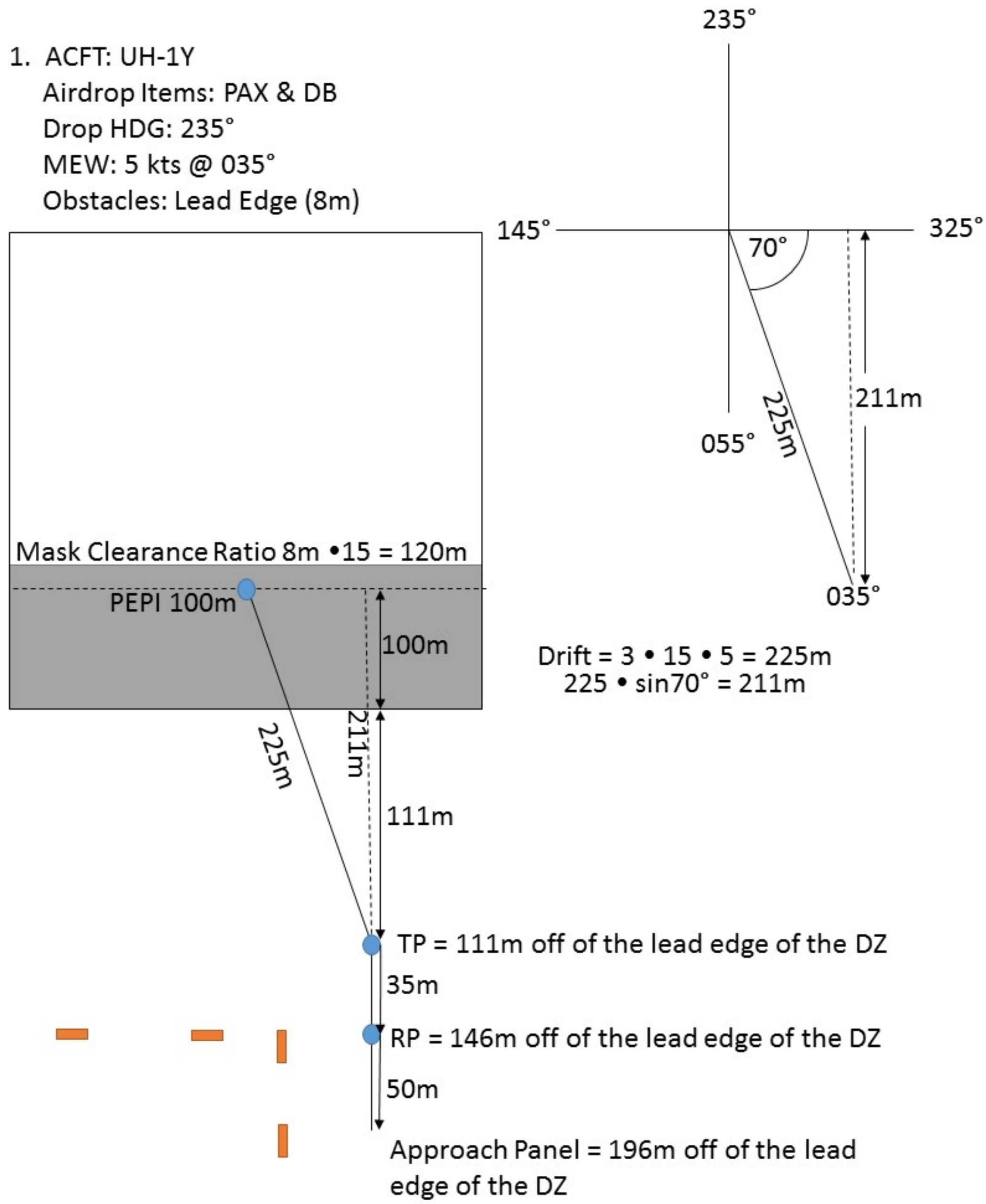
For each problem, answer these three questions:

A. How far do you need to shift the PI to put the approach panel on the DZ?
B. How far from the lead edge does the approach panel need to be to not need a far marker?
C. How far do you need to shift the PI to not need a far marker?

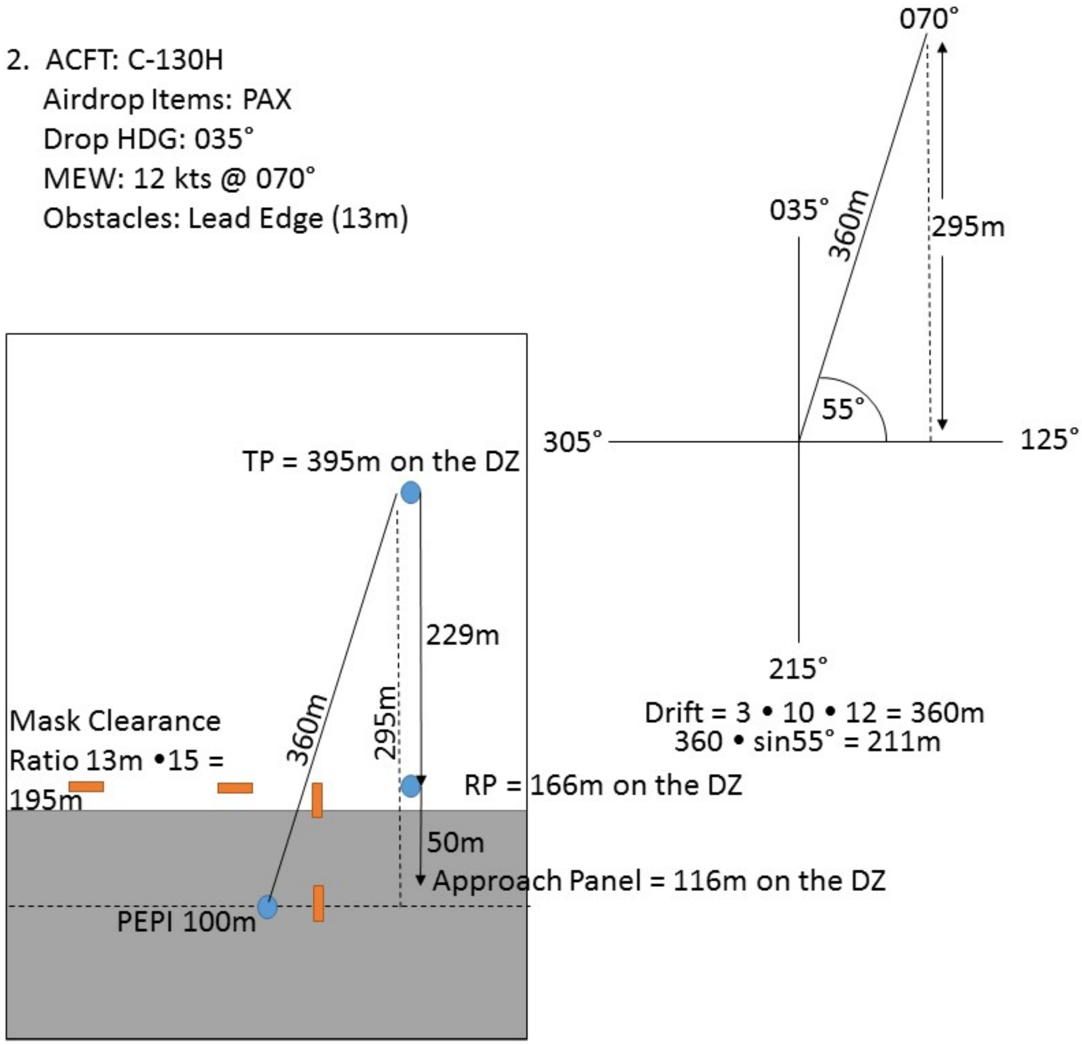
1. A UH-1Y dropping 2 door bundles and 2 jumpers on a GMRS DZ. The drop heading is 235° with a MEW of 5kts @ 035°. Trees n the lead edge are 8m tall.
2. A C-130H dropping 30 jumpers on a GMRS DZ. The drop heading is 035° with a MEW of 12kts @ 070°. Trees on the lead edge are 13m tall.
3. A CH-53E dropping 4 door bundles on a GMRS DZ. The drop heading is 097° with a MEW of 11kts @ 177°. Trees on the lead edge are 5m tall.
4. A UH-60L dropping 6 jumpers on a GMRS DZ. The drop heading is 258° with a MEW of 2kts @ 229°. Trees on the lead edge are 9m tall.
5. A CH-47D dropping 10 door bundles at night on a GMRS DZ. The drop heading is 075° with a MEW of 18kts @ 233°. Trees on the lead edge are 12m tall.
6. A C-17 dropping 8 jumpers from 1400ft AGL on a GMRS DZ. The drop heading is 008° with a MEW of 12kts @ 192°. Trees on the lead edge are 4m tall.
7. A UH-60L dropping 3 door bundles on a GMRS DZ. The drop heading is 145° with a MEW of 3kts @ 025°. Trees on the lead edge are 10m tall.
8. A CH-47E dropping 12 jumpers and 2 door bundles on a GMRS DZ. The drop heading is 065° with a MEW of 18kts @218°. Trees on the lead edge are 8m tall.
9. A CASA-212 flying 100KIAS dropping 4 door bundles at night on a GMRS DZ. The drop heading is 095° with a MEW of 7kts @ 061°. Trees on the trail edge are 14m tall.
10. A CH-47D dropping 12 jumpers at night from minimum drop altitude on a GMRS DZ. The drop heading is 260° with a MEW of 17kts @ 284°. Trees on the lead edge are 6m tall.

DROP ZONES PI SHIFT HOMEWORK ANSWERS

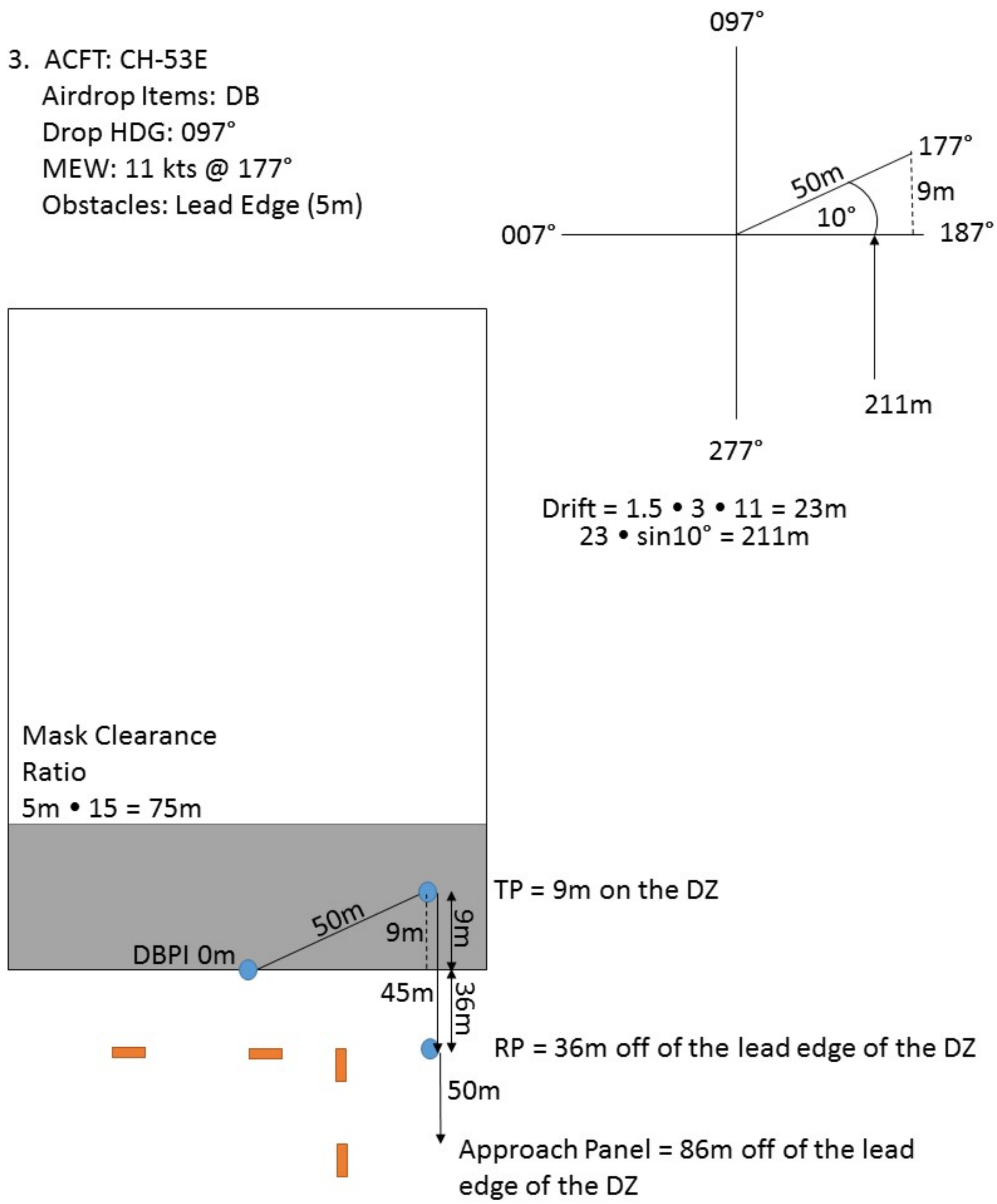
1. a) 196m
   b) 120m
   c) 316m



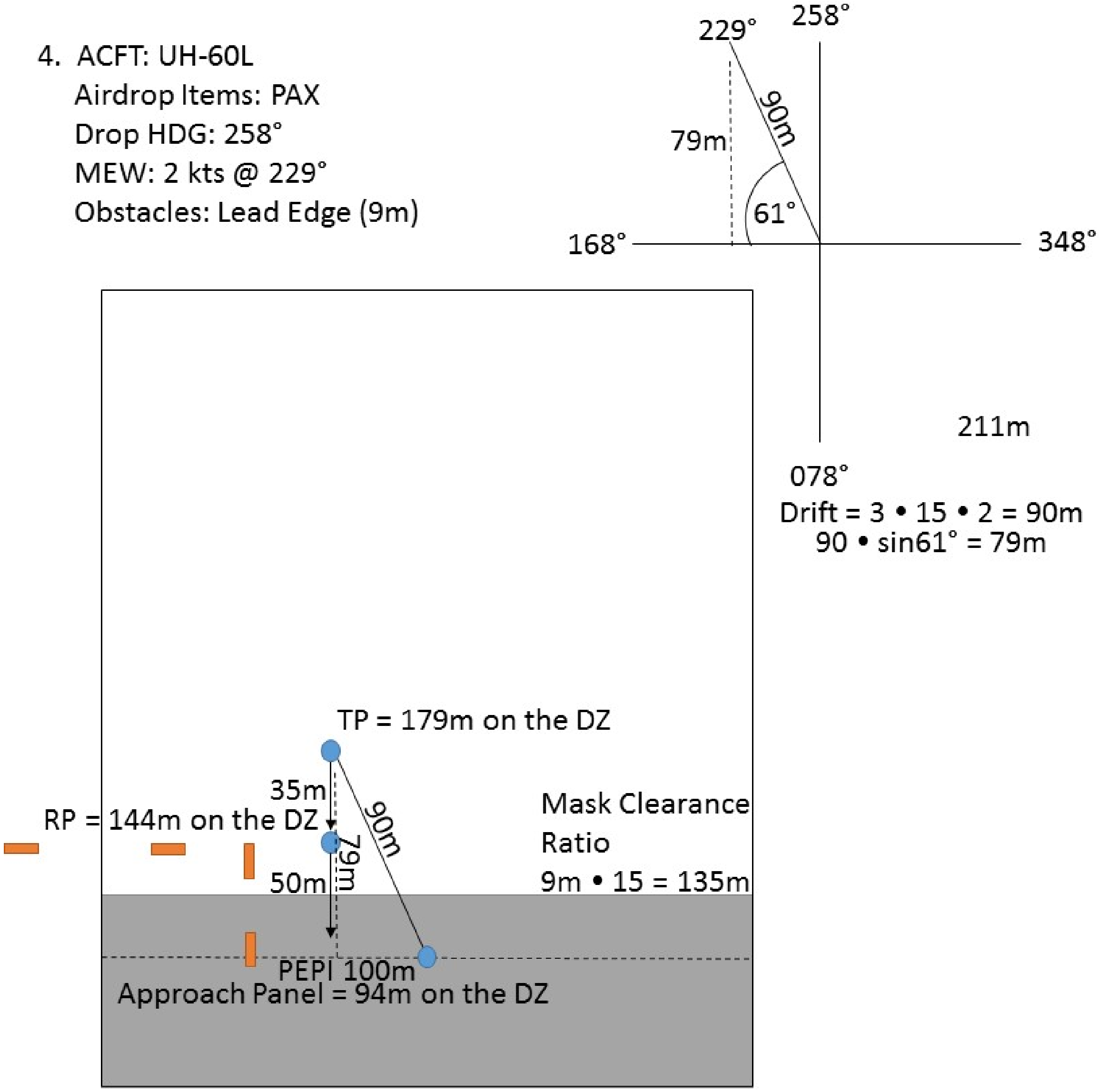
2. a) 0m
   b) 195m
   c) 79m



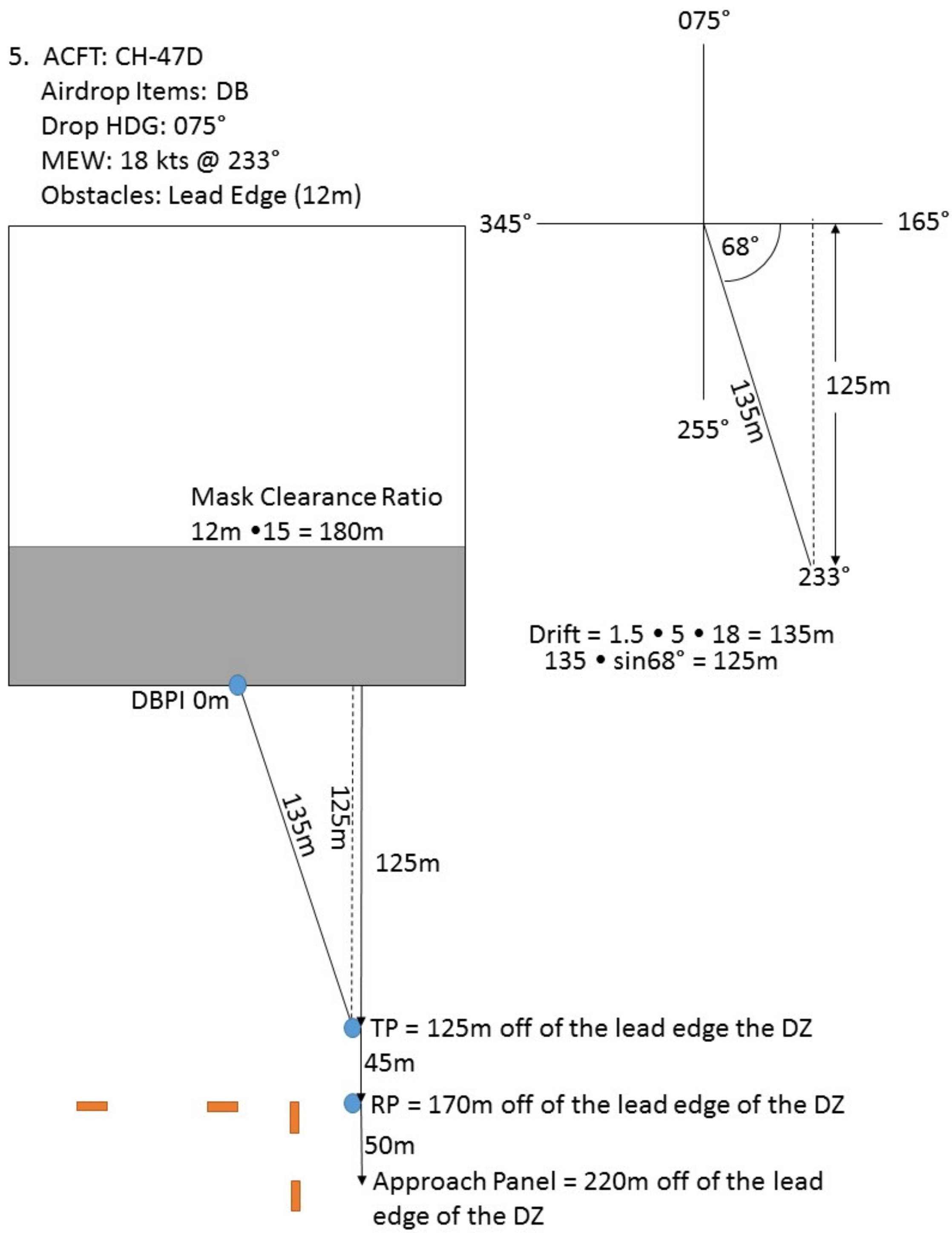
3. a) 86m
   b) 75m
   c) 161m



4. a) 0m
   b) 135m
   c) 41m

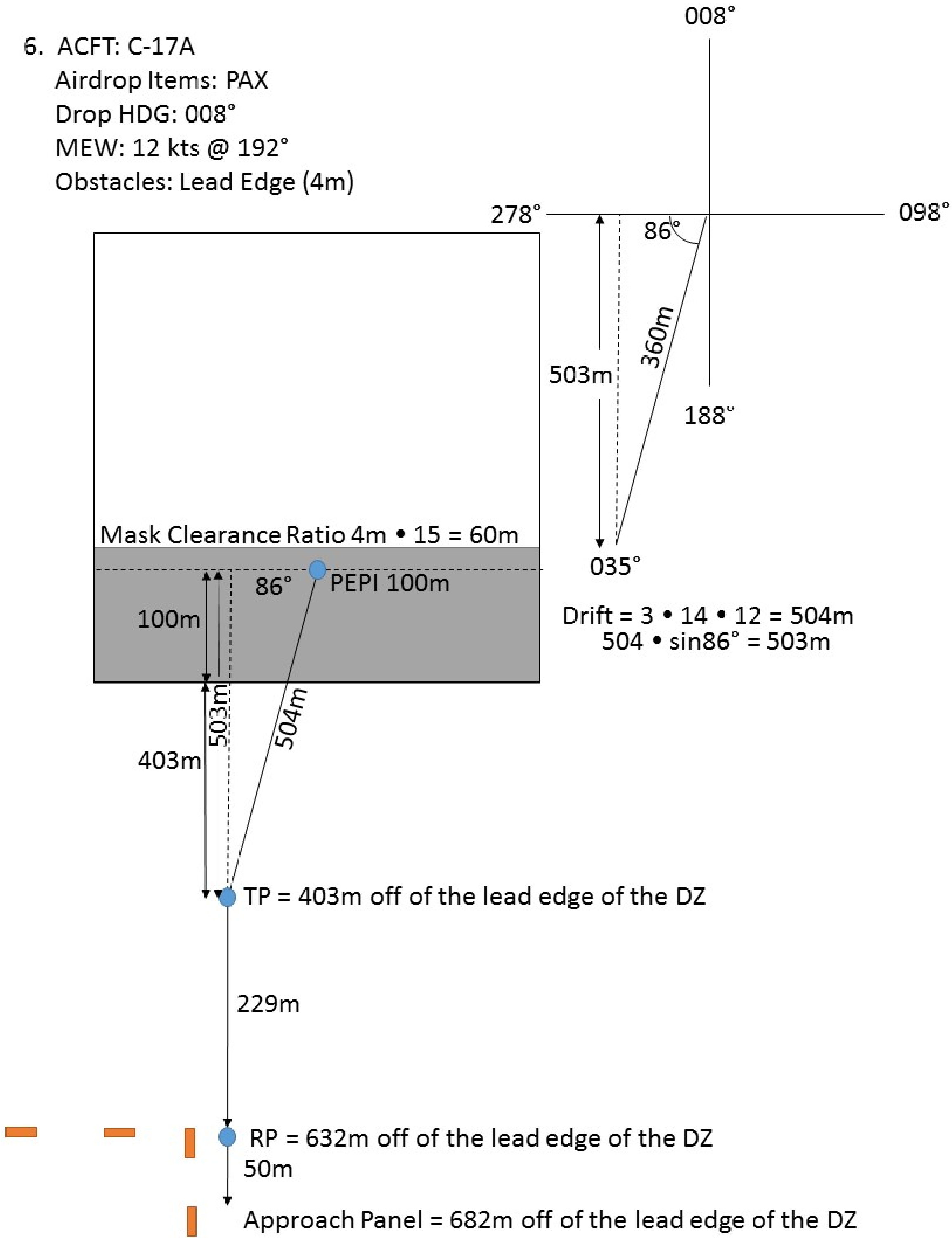


5. a) 220m
   b) 180m
   c) 400m

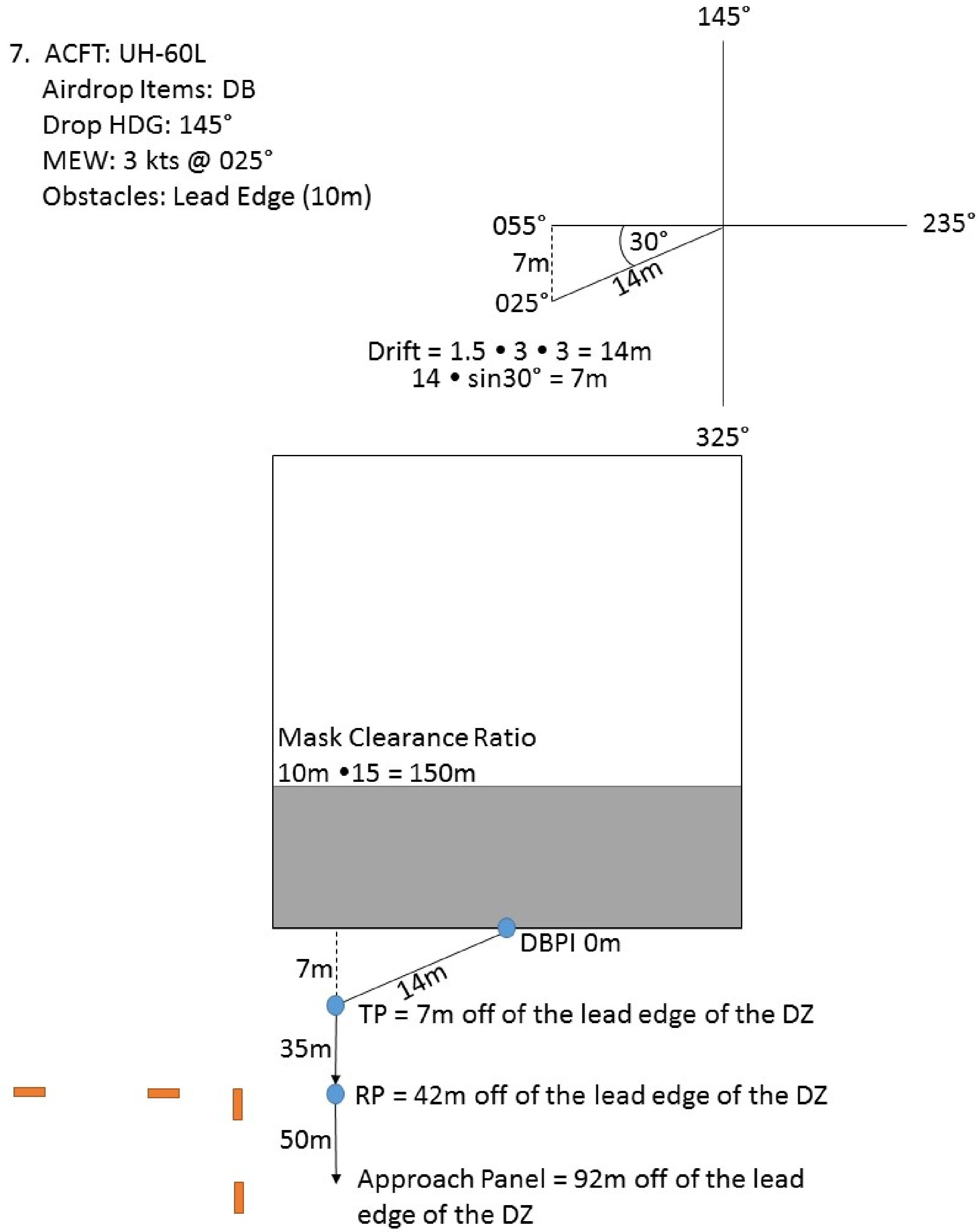


6. a) 682m
   b) 60m
   c) 742m

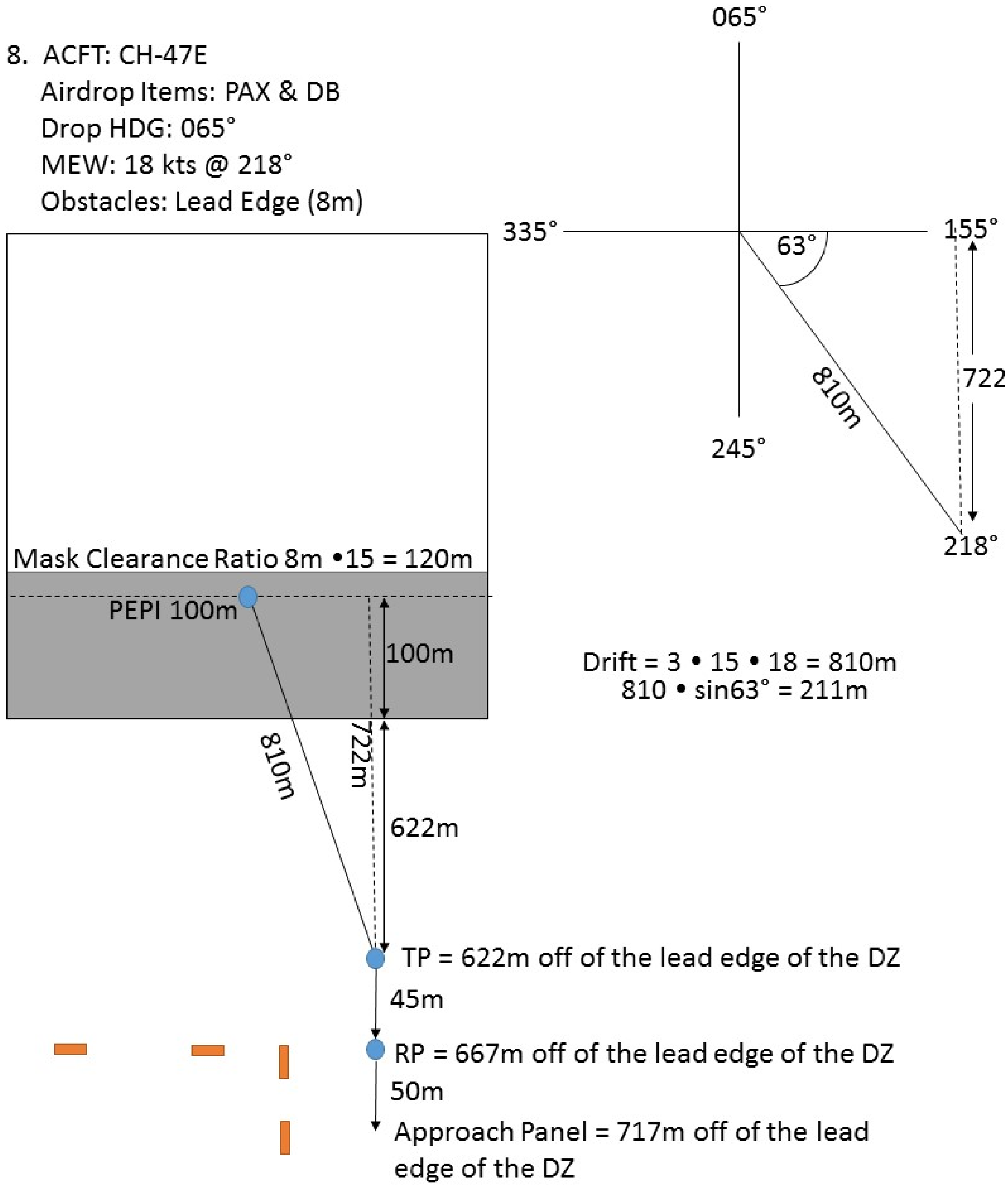
6. ACFT: C-17A
   Airdrop Items: PAX
   Drop HDG: 008°
   MEW: 12 kts @ 192°
   Obstacles: Lead Edge (4m)



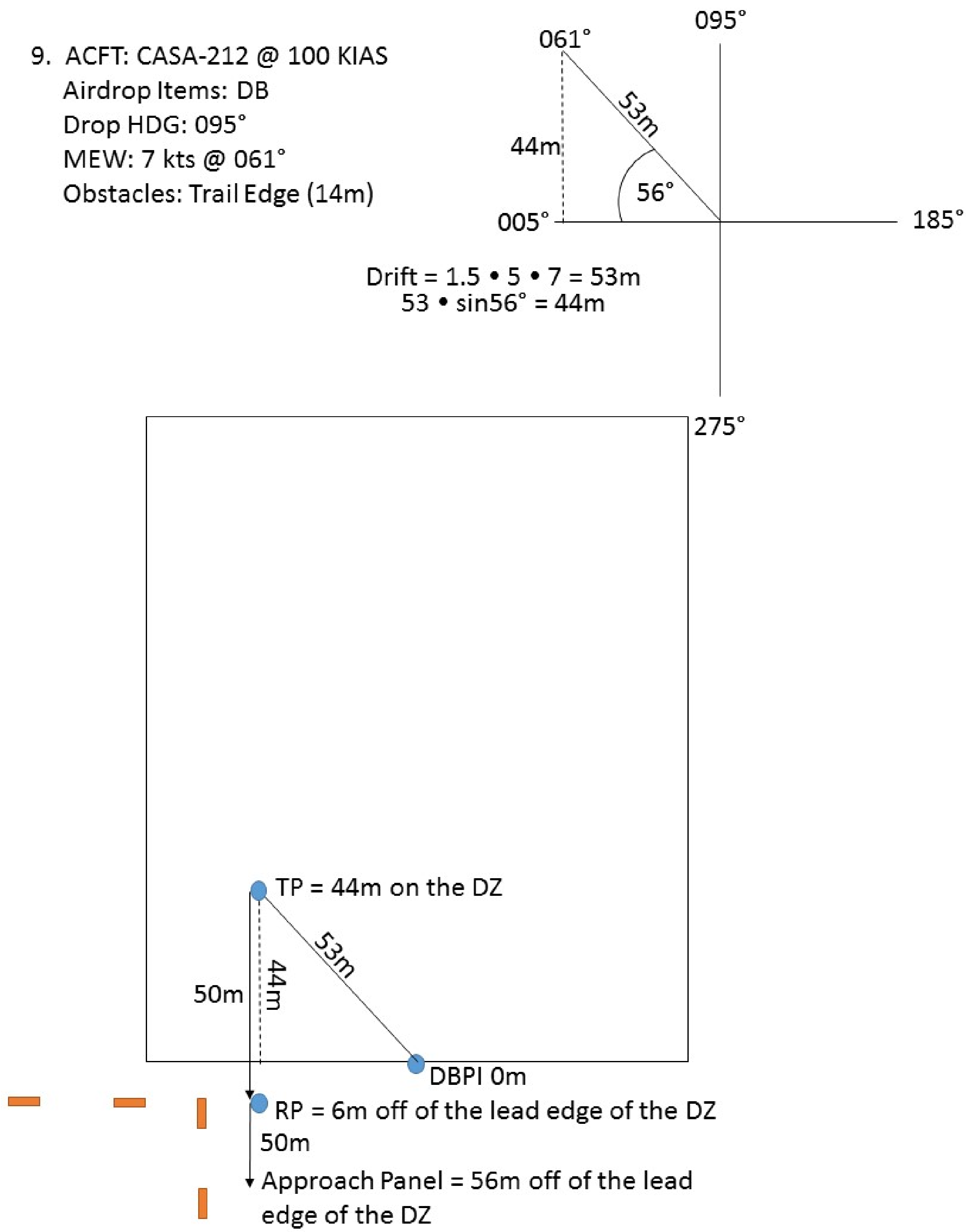
7. a) 92m
   b) 150m
   c) 242m



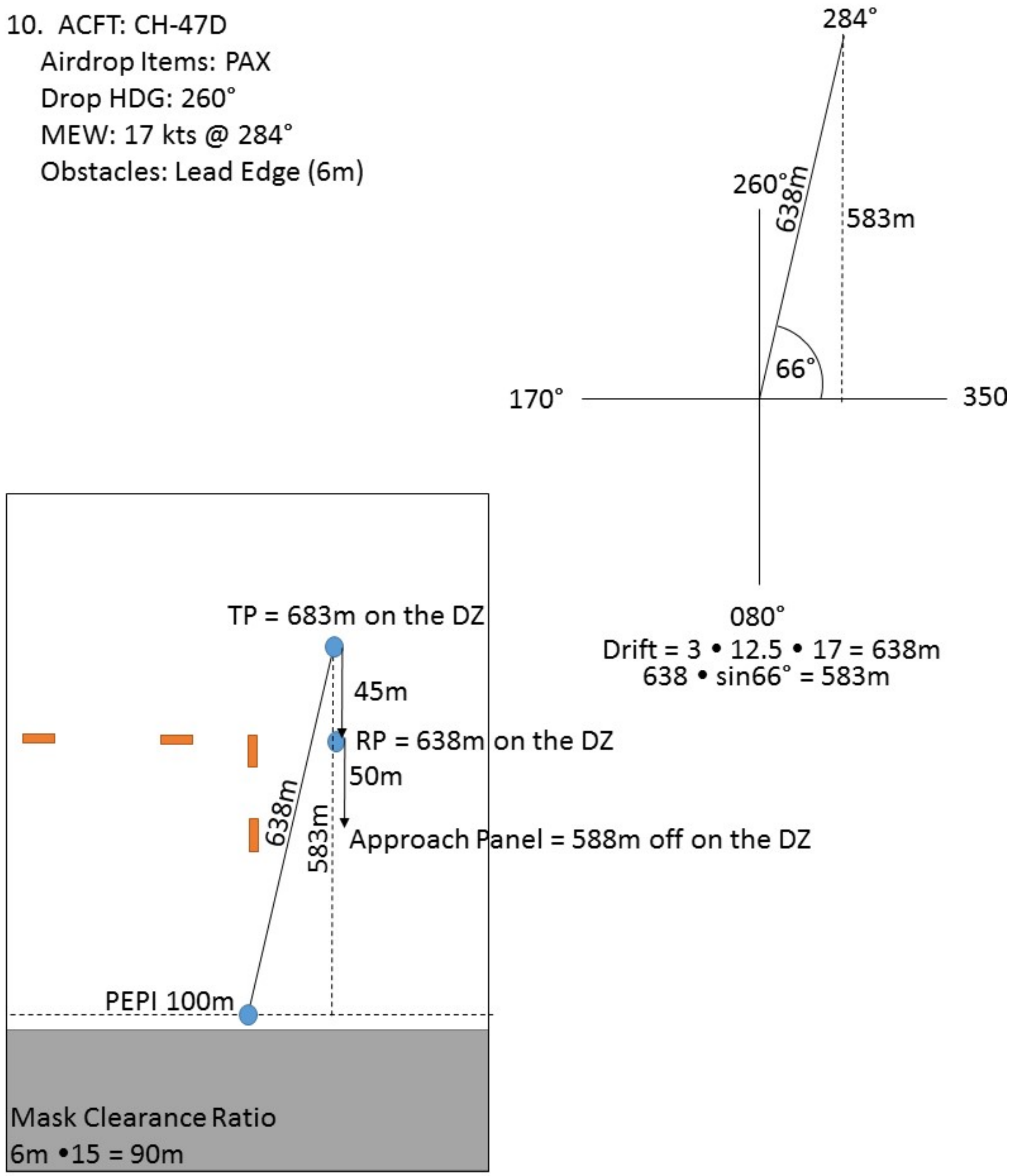
8. a) 717m
   b) 120m
   c) 837m



9. a) 56m
   b) 0m
   c) 56m



10. a) 0m
    b) 90m
    c) 0m



DZST EQUIPMENT FAMILIARIZATION

Amber Rotating Beacon: Electric driven light which provides amber rotating light for trail edge marker on a night CARP drop zone. NSN: Local purchase item.

VS-17 Marker Panel Aerial: Two sided panel. One side is fluorescent orange, sometimes referred to as international orange. The other side is cerise, or commonly referred to as red. The panel is 2 feet wide by 6 feet long. It has six tie down points used to attach the panel to stakes. It also has three snap fasteners on the short ends in the stow pocket. It should be folded up so that the olive drab (OD) green is showing. The color of the panel used should best contrast the surrounding area. NSN: 8345-00-174-6865

Light, Marker, Ground Obstruction: Also known as the "beanbag light". It is powered by one BA-200. The color of the light can be changed with the use of interchangeable colored plastic domes. These can be used in light holes or on the surface, secured with tent pegs, or by filling the bottom with sand or rocks. NSN: 6230-00-115-9996

Whelen Light: Named after the Whelen Corporation which manufactured the light. It is powered by either the BA-4368 or the lithium battery used in the PRC-77 radios. The light is placed on top of the battery and is ready for operation. The color of the light can be changed with different colored domes. NSN: Local purchase item

M-2 Light Baton: A flashlight powered by 2 BA-30's. The color of the light can be changed with different lenses that are stored in the base compartment of the light. This light is used in light holes or on top of the ground attached to a tent peg. NSN: 6230-00-926-4331

Aerial, Marker, Distress: An omni-directional flashing (strobe) light. This light has a very far range. A directional cover can snap on the top for the stealth operator. Colors can be changed with snap on caps. The strobe light also has Infrared (IR) capabilities. NSN: 6230-00--67-5209

Mirror, Emergency Signaling, Type II: The signal mirror, when used properly, can be used to signal aircraft by reflected sunlight. There is a set of instructions on the back of the signal mirror for proper use and aiming. The signal mirror can still be used on hazy days. One misconception is that it can only be used when facing the sun. It can be used in all directions and can be seen as far as the horizon will go. NSN: 6350-00-105-1252

SE-11 Light Gun: A long range directional visual signaling device used to signal aircraft to mark the release point on the drop zone. It is powered by 5 BA-30's and can be set up for remote operations. It has a red cap/lens, normally used as a no drop signal. LIGHT, TRAFFIC AIR B-2 replaces the SE-11. NSN:6210-00-578-6754

Pilot Balloon: The PIBALL is a ten or thirty gram rubber balloon that, when filled with helium to the specified circumference is used to measure the mean effective wind which is the average wind from the ground to drop altitude. NSN: Balloon Meteorological 10 Gram 6660-00-663-7933 Balloon Meteorological 30 Gram 6660-00-663-8159

Lighting Unit (PIBALL): This light is attached to the PIBALL for night operations. The PIBALL is inflated to a greater dimension to compensate for the weight of the light so that the same ascension rate is achieved. The

PIBALL l light has a wet cell battery that is activated by water, or fluid. When temperatures fall below 50 degrees the PIBALL light activates faster by using warm water. NSN: 6660-00-839-4927

Drift Scale: Slide type scale that uses a 90 degree angle to measure the ascent of the PIBALL for determining the mean effective wind. NSN: Locally produced by TASC (a protractor with a string through the center with a weight can be used). Also for this purpose, the dolite, NSN 6675-00-8617939, Pocket Transit, (with built in clinometer) NSN 6675-00-6415735, and the Clinometer, NSN 6675-01-3139730.

AN/PRC-113: Is a man portable UHF/VHF/AM and has quick jam resistant electronic counter-countermeasures (ECCM) transceiver. Designed for short range (5 to 15 miles) tactical ground-to-ground, or ground-to-air communication.

AN/PRC-119: (Model) RT-1523A/B/C is a VHF-FM man-portable radio with built-in COMSEC and is part of the Single Channel Ground and Airborne System (SINCGARS) radio family used for contacting the aircraft with FM communication capabilities. This radio can also be used for NAVAID with aircraft that have FM homing capabilities. It has a range of 4 to 16 kilometers without power increasing accessories.

ASIP: (Model) RT-1523E/F/G, is a VHF-FM man-portable radio system with built in COMSEC and is part of the Single Channel Ground and Airborne Radio System (SINCGARS) radio family. The radio also has a built in test (BIT). Frequency range is 30.000 to 87.975 MHz. There are two ways the ASIP can be used, in a man pack or vehicle mounted. To power up the ASIP in man pack configuration it takes 13.5 VDC given by one BA5590. In vehicular it takes 27.5 VDC from the vehicular battery. There are four power settings: LOW (200m-400m), MEDIUM (440m-5km), HI (5km-10km), and PA (10km-40km). PA is only used when the ASIP is vehicular mounted. DATA rates of 600, 1200, 2400, 4800, and 16000 bits per second.

AN/ML-433A/PM: Produced in the 1940's as a component for the S-2's belt weather kit to provide the field commander with rudimentary local weather data. The anemometer provides wind speed data, but not winds direction and cannot be calibrated. The AN/ML-433A/PM is about 12 inches long and is pistol belt carried, hand-held device which has two wind speed ranges: 0-8 knots and 0-40 knots. It is packaged in a canvas pouch with snap flap and weighs 5 pounds. The AN/ML-433A/PM's ability to perform accurately register gusty wind data has been questioned. This is no longer authorized for use on drop zone operations.

AN/PRC-117F: (Model)RT-1796, is a man-portable radio capable of transmitting and receiving in the 30MHz to 512MHz frequency range. This means that the radio can be used for FM, AM, and SATCOM communications. With this one radio system a Ranger RTO is able to communicate with any other radio system used in Ranger operations. The 117F operates in three distinct frequency ranges.

- VHF-FM (Low Band) – 30MHz to 89.99999MHz
- VHF-AM (High Band) – 90MHZ to 224.99999MHz
- UHF-AM – 225MHz to 512MHz
- One hundred ten programmable radio nets

The 117F is capable of 20 watts of power output in the 90MHz to 400MHz range and 10 watts in the upper and lower frequency ranges. The 117F is a menu driven radio. The 117F can use VINSON, ANDVT, Fascinator, and KG-84 embedded encryption. The 117F requires 26v DC power and thus, uses two BA-5590 non-rechargeable batteries. The 117F includes one H-250 handset, VHF blade antenna with a flexible adapter base, VHF/UHF flex antenna, KDU remote control cable, wide battery box, and the AN/PRC-117F transceiver. The AV-2040 satellite antenna is used for SATCOM communications. The 117F uses menu driven programming. The 117F with batteries weighs 15.9 lbs.

Anemometers: Services should only use approved anemometers to measure surface winds during all personnel and cargo parachute operations. The approved anemometers are the DIC, DIC3, Turbo Meter, and AN/PMQ-3A. The AN/ML433A/PM and the anemometers that use floating balls or small floating lightweight aluminum devices in a tube are not authorized for use during personnel or cargo airdrop operations. The DIC, DIC3, and Turbo Meter cannot be calibrated; they must be given an expedient check just before use.

* Ensure fresh batteries are installed in the anemometer.

* Check the anemometer in a no-wind condition such as in a vehicle cab or a building. Turn on the anemometer and, if any reading other than zero registers, the anemometer is not fit for use and must be discarded.

* Use a three-anemometer check by comparing the reading on three anemometers in identical conditions. Discard the one anemometer that doesn't read the same as the other two.

* The Turbo Meter must be held within 20 degrees of wind line with the wind entering the rear of the meter to ensure accurate readings.

* The AN/PMQ 3A and the DIC/DIC-3 are omni-directional

* Calibration requirements for the AN/PMQ-3A will be conducted IAW appropriate TMs. Other anemometers not tested and recommended for use should be employed only after a command-initiated risk assessment is completed. Regardless of the method or device used to measure DZ winds, the airborne commander is responsible for ensuring winds on the DZ do not exceed 13 knots during static line personnel airdrops.

AN/PMQ 3A (anemometer): Designed in the 1950's as a two-piece, hand held or tripod mounted, periodically calibrated, omni-directional anemometer capable of providing wind speed and direction. The anemometer weighs approximately 4 pounds. Total weight for the components, minus the tripod and the box, is approximately 10 pounds. When ordered through the U.S. Army supply system the item cost is $963.00. Although durable, the AN/PMQ 3A must be transported in its storage box to prevent damage. Its size, cost, and other limitations restrict its use by the Light Infantry units in operational settings; NSN: 6660-00-515-4339

Turbo Meter: This is an electronic wind speed indicator. It provides wind speed accurately, and is pocket size for convenience. The Turbo meter has four scales which are displayed on a three digit Light Emitting Diode display. the scales are knots per hour, feet per second, meters per second, and miles per hour. For best results, keep the axis of the Turbo meter within 20 degrees of the direction wind. The Turbo meter does not display wind direction data and post-manufacturer re-calibration methods for the turbo meter are not available. Approximate cost is $165.00 NSN: 1670-00-T33-9004

DIC: This is one-piece, hand-held, compact, light weight, and is factory calibrated. The DIC uses wind-cups externally mounted on folding wind-vanes to catch the wind and electronically displays the wind speed data, but does not display wind direction. The wind cups and vanes fold away for storage in the hard case provided by the manufacturer. Post manufacturer calibration methods are not available. DIC has the capability to depict wind data in miles per hour, knots, kilometers per hour, or meters per second on a LED readout. Approximate cost is $295.00.

DIC-3: This exhibits all the features of the DIC but it also displays peak wind velocity over a given time period and average wind velocities over two time periods. Approximate cost is $350.00.

GLOSSARY

A/C	Aircraft
ACP	Air Control Point
AF	Air Force
AFB	Air Force Base
Aft	To The Rear, Behind, Or Toward The Tail Of The Aircraft
AGL	Above Ground Level
Airborne Commander	Provides A Safety Officer, Medical And Malfunction Officer For Training Missions. Jointly Selects The DZ With The Tactical Airlift Commander.
ALO	Air Liaison Officer
ALT	Altitude
AMC	Air Mobility Command
AMC Mission Commander	Provides For The Precise And Timely Delivery Of The Airborne Force To The Selected Assault Zone. The Mission Commander Has Operational Control Of The Assault Zones Being Used By His Forces.
AMLO	Air Mobility Liaison Officer – USAF Rated Airlift Officer Assigned to Support US Army Units to Provide Expertise in the Efficient Use of Air Mobility Assets
Anemometer	An Instrument For Measuring And Indicating The Force Or Speed Of The Wind
AO	Area Of Operations

ARR	Arrival
Assault Zone	Generic Term Used To Include DZs, ALZs, and HLZs
ATA	Actual Time Of Arrival
ATC	Air Traffic Control/Air Traffic Controller
ATD	Actual Time Of Departure
AWADS	Adverse Weather Aerial Delivery System
AZAR	Assault Zone Availability Report
CAPES	Chemiluminescent Light-Assisted Personnel Exit System
CARP	Computed Air Release Point
CC Control Center	
CCP	Communications Checkpoint
CCT	Combat Control Team
CDS	Container Delivery System
CH	Cargo Helicopter
CEILING	Meausrement of the cloud base height relative to the ground and reported as part of METAR (METeorological Aviation Report)
COMALF	Commander of Airlift Forces/Tactical Airlift Commander - Responsible For All Assigned Tactical Airlift Forces. Jointly Selects The DZ With The Airborne Commander Or The Commander Of The Forces Being Supported
CONUS	Continental United States
CRC	Control And Reporting Center
CRL	Container Ramp Load
CRRC	Combat Rubber Raiding Craft
CRS	Container Release System
DF	Direction Finding
DTG	Date-Time Group

DZ	Drop Zone
DZC	Drop Zone Controller The DZC Is Normally USAF ST Combat Controller (E-4 Or Above With A 5-Skill Level Or Higher Certified By The Unit Commander)
DZSO	Drop Zone Safety Officer—The Appointed Representative Of The Airborne Commander Who Is Responsible For The Safe Operation Of The DZ. The Specific Duties And Responsibilities Vary According To The Using Airborne Units Standard Operating Procedures.
DZST	Drop Zone Support Team (DZST)- A Qualified Team (Non-CCT, Air Force And Sister Service) Which Supports DZ Operations When CCT Is Not Present.
DZSTL	Drop Zone Support Team Leader—Individual In Charge Of The DZST. Utilized When CCT Is Not Supporting The Drop Zone.
Energy-Dissipating Material	Artificial Cardboard Packing Material. In Parachute Operations, Protects Equipment By Dissipating Shock Or Energy When The Package Lands
ETA	Estimated Time of Arrival
FLA	Frontline Ambulance
FM	Frequency Modulated
GMRS	Ground Marked Release System—A Procedure Used By Ground Forces To Determine And Mark The Release Point For An Airdrop.
GPS	Global Positioning System
GUC	Ground Unit Commander
HAARS	High Altitude Airdrop Resupply System
HAHO	High-Altitude, High-Opening
HALO	High-Altitude, Low-Opening
HARP	High Altitude Release Point
HE	Heavy Equipment
HSK	High Speed Kit
HSSLADS	High Speed Low-Level Aerial Delivery System
HVCDS	High Velocity Container Delivery System

IMC	Instrument Metrological Condition(s) - an aviation flight category that describes weather conditions that require pilots to fly primarily by reference to instruments, and therefore under instrument flight rules (IFR), rather than by outside visual references under visual flight rules (VFR).
IAW	In Accordance With
IFR	Instrument Flight Rules
JAAT	Joint Air Attack Team
JA/ATT	Joint Airborne/Air Transportability Training
JMD	Jump Master Directed
KIAS	Knots Indicated Airspeed
MAC	Military Airlift Command
MEDEVAC	Medical Evacuation
MEW	Mean Effective Wind - The Theoretical Wind Of Constant Velocity And Direction, Extending From The Surface To A Predetermined Altitude Above The Ground.
MPI	Multiple Points Of Impact
MSL	Mean Sea Level
NATO	North Atlantic Treaty Organization
Nautical Mile	A unit of length used in navigation equivalent to the average length of a minute of latititude: 6076.12 ft or 2025.37 yds or 1852 mtrs
NAVAID	Navigation Aid
NCO	Non-Commissioned Officer
NFZ	No-Fly Zone
NLT	Not Later Than
NM	Nautical Mile
NVD	Night Vision Device
NVG	Night Vision Goggles An Image-Intensification Device That Improves Visibility In Low Light Situations By Amplifying Available Light

OG/CC	Operations Group Commander
Oscillate	To Swing Back And Forth Like A Pendulum
Over Fly	To Fly Over; To Pass Over In An Airplane
Phraseology	A Manner Of Organizing Words And Phrases Into Longer Elements; A Choice
PI	Point Of Impact - The Point On The DZ Where The First Parachutist Or Airdropped Cargo Item Lands Or Is Expected To Land.
PIBALL	Pilot Balloon
Port Side	The Left-Hand Side (As One Looks Forward)
Racetrack	To Fly In An Oval Flight Pattern Over A Drop Zone Or Point Of Impact
RAM	Raised Angle Marker - A Device Used To Mark The Point Of Impact During Airdrops. A Triangular Shaped Marker Constructed Of Bright Orange Material, Six Feet Wide At The Base (Minimum) And Six Feet High (Minimum), Displayed At A Sixty-Degree Angle Into The Direction Of Flight.
RP	Release Point - The Point Over The DZ Where Personnel Or Equipment Should Exit The Drop A/C.
RPI	Random Points Of Impact
SATB	Simulated Airdrop Training Bundle
SATCOM	Satellite Communications
SINCGARS	Single-Channel, Ground And Airborne Radio System
SKE	Station Keeping Equipment - An A/C Avionics System Which Can Be Used To Maintain Formation Position In IMC. When Used In Conjunction With AWADS Lead A/C, IMC Airdrops Are Possible. C-130, And C-17 SKE-Equipped A/C Have An IMC Airdrop Capability When Employed With A Ground-Based Zone Marker.
SOLL	Special Operations Low Level (SOLL)—Mobility Air Forces (MAF) C-17 And C-5 Qualified Aircrews That Support Special Operations Using Non-Standard Procedures And Criteria, Including Operations Using Nvgs. AMC Provides NVG Trained C-130 Crews Capable Of Using Procedures Similar To SOLL Aircrew. These C-130 Aircrews Are Notionally Referred To As C-130 NVG
SOP	Standard Operating Procedure

Starboard Side	The Right-Hand Side (As One Looks Forward)
Statute Mile	A unit of distance on land in English-speaking countries equal to 5280 ft or 1760 yds/ or 1609 mtrs
STOL	Short Takeoff And Landing
STT	Special Tactics Team
Supported Unit	A Unit Requesting The Mission To Transport Supplies And Equipment ,
TALO	Theater Airlift Liaison Officer - An Officer Specially Trained To Implement The Theater Air Control System And To Control Tactical Airlift Assets. Theater Airlift Liaison Officers Are Highly Qualified, Rated Airlift Officers, With Tactical (Airdrop) Airlift Experience, Assigned Duties Supporting US Army Units.
TOT	Time On Target
Trailing Edge Of A DZ	Represents The Imaginary Line Extending Between The Left And Right Rear Corners Of A Surveyed DZ.
TSC	Training Support Center
TTB	Tactical Training Bundle
Turbo Meter	An Instrument For Measuring Ground Wind Speed
UH	Utility Helicopter
UHF	Ultra-High Frequency
Unilateral	Describes Any Operation Involving Only a Single Service. A Unilateral Mission Will Not Be Considered A Joint Operation Merely Because The Parachutists Or Loads Are From Another Service.
VFR	Visual Flight Rules
VHF	Very High Frequency
VIRS	Verbally Initiated Release System—A Method Of Positioning A/C For Airdrop By Verbal Instruction From The DZSTL.
VMC	Visual Meteorological Condition(s) - Weather Conditions In Which VFR Applies; Expressed In Terms Of Visibility, Ceiling Height, And A/C Clearance From Clouds

	Along The Path Of Flight. When These Criteria Do Not Exist, Instrument Meteorological Conditions Prevail And IFR Must Be Followed.
WDI	Wind Drift Indicator
ZAR	Zone Availability Report
ZM	Zone Marker - An Electronic NAVAID Used By Specially Equipped A/C To Aid In Positioning Over The AZ Or Release Point.

DZST GUIDE REFERENCES:

AFI 13-217 Drop Zone And Landing Zone Operations

AFI 11-231 Computed Air Release Point Procedures (CARP)

AFI 11-410 Personnel Parachute Operations

AFI 11-2C-17v3 C-17 Operations Procedures

AFI 11-2C-130v3 C-130 Operations Procedures

AFI 11-2MC-130v3 MC-130 Operations Procedures

AFI 11-2C-130Jv3 C-130J Operations Procedures

AFI 11-2CV-22v3 CV-22 Operations Procedures

AR 385-10 The Army Safety Program

AR 59-4 Joint Airdrop Inspection Records, Malfunction Investigations, And Activity Reporting

FM 3-5.210 Special Forces Air Operations

FM 3-5.211 Special Forces Military Free-Fall Operations

TC 3-21.220 Static Line Parachuting Techniques And Training

FM 3-21.38 Pathfinder Operations (VIRS)

USASOC REG 350-2 Airborne Training Airborne Operations (GMRS)

USASOC/USSOCOM REG 350-6 SOF Infiltration/Exfiltration Techniques

Memorandum Of Agreement, Airdrop Operations Without Combat Control Teams (Ccts), Dated 27 June 1987

HANDOUTS

AIRBORNE UNIT ASSUMES RESPONSIBILITY FOR PERSONNEL INJURY AND EQUIPMENT DAMAGE ON DZ

DROP ZONE SURVEY

1A. DZ NAME	1B. ZAR INDEX NO.	2A. COUNTRY	2B. STATE
3. MAP SERIES/SHEET NUMBER/ EDITION/ DATE OF MAP			

4. SURVEY APPROVAL/DISAPPROVAL DATA

4A1. DATE SURVEYED	4A2. TYPED NAME AND GRADE OF SURVEYOR	4A3. PHONE NUMBER *(DSN)*	4A4. UNIT

4B. DROP ZONE APPROVAL/DISAPPROVAL A = APPROVED D = DISAPPROVED	FOR	CDS/CRL/CRS	PER	HE	MFF	SATB	CRRC	HSLLADS	HVCDS
	DAY								
	NIGHT								

4C. DATE APPROVED FOR GROUND OPERATIONS	NAME, GRADE AND SERVICE OF APPROVAL AUTHORITY	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		
4D. DATE SAFETY OF FLIGHT REVIEW APPROVED	NAME AND GRADE OF REVIEWING OFFICER	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		
4E. DATE OF MAJCOM APPROVAL	NAME AND GRADE OF APPROVING AUTHORITY	PHONE NUMBER *(DSN)*	SIGNATURE
	UNIT AND LOCATION		

5. COORDINATING ACTIVITIES

A. DZ CONTROLLING AGENCY OR UNIT	B. MEMORANDUM OF UNDERSTANDING/LAND USE YES ☐ NO ☐ ATTACHED ☐	C. PHONE NUMBER *(DSN)*
D. RANGE CONTROL		E. PHONE NUMBER *(DSN)*

6. DZ DIMENSIONS *(YDS/MTRS) (FOR CIRCULAR DZ, ENTER RADIUS ONLY)*

A. LENGTH	B. WIDTH	C. RADIUS

POINT OF IMPACT DISTANCES FROM DZ LEADING EDGE	D. CDS PI	E. PE PI	F. HE PI

7. DZ AXIS DATA *(OPTIONAL FOR CIRCULAR DZ)*

A. MAGNETIC	B. GRID *(MGRS)*	C. TRUE	D. SOURCE/DATE OF VARIATION DATA

8. GROUND POINT ELEVATION	A. CDS PI	B. HE PI	C. PE PI	D. HIGHEST

9. DZ COORDINATES

A. SPHEROID	B. DATUM	C. GRID ZONE	D. EASTING	E. NORTHING

F. GPS DERIVED COORDINATES YES ☐ NO ☐	G. POINT OF ORIGIN

H. POINT	MGRS COORDINATES	WGS84 LATITUDE *(D-M.MM)*	WGS84 LONGITUDE *(D-M.MM)*
DZ CENTERPOINT			
CDS PI			
PE PI			
HE PI			

I. DZ CORNERS MGRS COORDINATES

LEFT LEADING EDGE	RIGHT LEADING EDGE
LEFT TRAILING EDGE	RIGHT TRAILING EDGE

DZ NAME

10. DZ DIAGRAM

11. REMARKS

12. PHOTOGRAPH AVAILABLE

YES ☐ NO ☐

LOW LEVEL ROUTES

☐ NONE AVAILABLE

☐ ROUTE NAME/DESIGNATOR

VIRS Transmission

GTA Transmission	**Pilot Transmission**
	A1L16 this is Raven 11 – over
Raven 11 this is A1L16 – over	
	L16 this is Raven 11, CCP inbound – over
Raven 11 this is L16, State Number, Type and Intentions - over	
	L16 this is Raven 11, I am a single UH-60 with paradrop, inbound to your location - over
Raven 11 this is L16, Heading_____ degrees, Distance______ kilometers, Drop heading______ degrees, Drop Speed____knots, Drop Altitude______ft. AGL. Signal on call, I can accept your A/C at my location with______jumpers/bundles per pass. Be advised all no fly areas are in effect. Continue approach for visual identification.– over	
	L16 this is Raven 11, Roger – over
Raven 11 this is L16, I am at your ____ o'clock ____ meters. Signal out, can you identify? – over	
	L16 this is Raven 11, I identify orange VS-17 panel – over
Raven 11 this is L16, Visual contact. Enter (Right / Left / Down Wind), and report base – over	
	L16 this is Raven 11, on base – over
Raven 11 this is L16, Roger – over	

ONCE AIRCRAFT IS POSTIONED FOR FINAL ON DROP HEADING

GTA Transmission	**Pilot Transmission**
Raven 11 this is L16, turn drop heading________degrees – over	
	L16 this is Raven 11, turning drop heading________degrees - over

Raven 11 this is L16, Steer Left/Right; on course

<u>8 TO 10 SECONDS OUT</u>

Raven 11 this is L16,
with______jumpers(s)/bundle(s), stand by - over

L16 this is Raven 11, standing by – over

Raven 11 this is L16, with______ jumpers(s)/bundle(s), execute, execute, execute – over

Raven 11 this is L16, I observe______ jumpers(s)/bundle(s) clear and away. State intentions. Report when clear of my control zone. Be advised all no fly areas are in effect – over

A1L16 this is Raven 11, intention classified. Clear of your control zone – over

Raven 11 this is A1L16, out

CCP Transmission

GTA Transmission	**Pilot Transmission**
	A1L16 this is Raven 11 – over
Raven 11 this is A1L16 – over	
	L16 this is Raven 11, CCP inbound – over
Raven 11 this is L16, state number, type and intention – over	
	L16 this is Raven 11, single UH-60 with sling load inbound for your location – over
Raven 11 this is L16, Heading_____degrees, Distance______ kilometers, Land heading_______ degrees, signal on call, I can accept your aircraft at my location. Be advised all no fly areas are in effect. Continue approach for visual identification. – over	
	L16 this is Raven 11, roger – over
Raven 11 this is L16, I am at your____ o'clock______ meters, signal out, can you identify? – over	
	L16 this is Raven 11, identify orange VS-17 panel – over
Raven 11 this is L16, visual contact. Form you own approach and report final – over	
	L16 this is Raven 11, on final – over
Raven 11 this is L16, wind_____degrees at_____knots. You are clear to approach (land). Take all further commands from the signalman on the ground – over	
	L16 this is Raven 11, request departure instructions – over
Raven 11 this is L16, wind_______degrees at_____knots. You are cleared to depart. State	

intention. Report when clear of my control zone.
Be advised all no fly areas are in effect – over

A1L16 this is Raven 11, intentions classified.
Clear of you control zone – over

Raven 11 this is A1L16 - out

MEDEVAC REQUEST TRANSMISSION

GTA Transmission

Medevac Control this is A1L16 – over

Pilot Transmission

A1L16 this is Medevac Control – over

Medevac Control this is L16, Request Medevac – over

L16 this is Medevac Control, Send Request – Over

Medevac Control this is L16, Request as follows:

Line 1: (Grid Coordinates to your site)

Line 2: (Your Call Sign and Primary / Alternate Frequency

Line 3: (# of patients by precedents)

Line 4: (Special Equipment)

Line 5: (# of patients by type)

Medevac Control this is L16, End request, Read back – over

A1L16 this is Medevac Control, Have all pertinent information – over

Medevac Control this is A1L16 – out

MEDEVAC Aircraft arrives

A1L16 this is Raven 11 – over

Raven 11 this is A1L16 – over

L16 this is Raven 11, 6 kilometers S.W. of your location – over

Raven 11 this is L16, State Number, Type and Intention – over

L16 this is Raven 11, Single UH-60 inbound for casualty pickup – over

Raven 11 this is L16, Heading_____degrees, Distance____kilometers, Land heading________degrees, signal on call, I can accept your aircraft at my location. Be advised all no fly areas are in effect. Continue approach for visual identification. – over

L16 this is Raven 11, Roger – over

Raven 11 this is L16, I am at your____ o'clock,______ meters. Signal out, can you identify? – over

L16 this is Raven 11, Identify orange VS-17 panel – over

Raven 11 this is L16, Visual contact. Form your own approach and report final – over

L16 this is Raven 11, on final – over

Raven 11 this is L16, Wind at______degrees at_____knots. You are cleared to approach (land). Take all further commands from the signalman on the ground – over

L16 this is Raven 11, Request departure instructions – over

Raven 11 this is L16, Wind______degrees at______knots. You are clear to depart. State intention. Report when clear of my control zone. Be advised all no fly areas are in effect – over

A1L16 this is Raven 11, Intentions classified. Clear of your control zone – over

Raven 11 this is A1L16 – out

*** NOTE: For transmissions with a single, non-Medevac aircraft, enter them in the closest and quickest leg of traffic, and have them report base.

*** NOTE: For any type of situation with a traffic pattern all ready established, with aircraft in it, all aircraft must enter the traffic pattern.

DEPARTMENT OF THE ARMY

HEADQUARTERS AND HEADQUARTERS COMPANY

1ST BATTALION, 507TH PARACHUTE INFANTRY REGIMENT

FORT BENNING, GEORGIA 31905

ATSH-TPP-AM (350) ____________

DATE

MEMORANDUM FOR: THE PATHFINDER STUDENT

SUBJECT: Pathfinder Course graduation requirements

1. **PURPOSE:** To outline the requirements for a student to successfully complete the United States Army Pathfinder Course.

2. **GENERAL:** The Pathfinder cadre strives to make your training as professional and rewarding as possible. You will be required to meet the minimum POI standards in order to graduate. A 70% or higher must be maintained in all ten areas. The maximum score attainable for the course is 1000 points.

3. **GRADUATION REQUIREMENTS**:

   a. **ADMINISTRATIVE POINTS:** You will start the course with 100 administrative points. Examples of administrative points are found in enclosure 1, page 1. If you drop below 70 administrative points, you will be removed from the course.

b. **<u>SLING LOADS NOMENCLATURE:</u>** This is a general knowledge exam that tests you in your knowledge of nomenclature of the various items and instruments utilized in sling load operations. You will start this exam with 100 points. Scoring 80% or greater on this test will provide you with re-entry attempt (should you need it) on the Sling Load Hands-On test, thereby affording you three opportunity to pass instead of only two. You may be re-tested one time; maximum score attainable on the re-test is 70%.

c. **<u>SLING LOAD WRITTEN:</u>** This is a general knowledge exam that tests you in all areas of sling load instruction. You will start this exam with 100 points. You may be re-tested one time; maximum score attainable on the re-test is 70%.

d. **<u>SLING LOAD HANDS ON:</u>** This is a hands on inspection exam. You will have 4 total test stations with four loads to inspect overall. Each station is worth 100 points and the whole test is worth 100 points (the average score of the four testing stations). You will receive 5 minutes at each station for inspecting the loads. Proper nomenclature is required for identifying rigging deficiencies. You will lose points for missing deficiencies or misidentifying deficiencies. You will start this exam with 100 points. You may be re-tested one time; maximum score attainable on the re-test is 70%. Individuals who scored 80% or higher on the Nomenclature Exam will be afforded a re-entry Sling Loads Hands On exam (if required).

e. **<u>HLZ/PZ/AAP/ATC:</u>** This is a general knowledge exam that tests you in all areas of Helicopter landing zone and pick-up zone instruction, air assault planning, and air traffic control procedures. You will start this exam with 100 points. You may be re-tested one time; maximum score attainable on the re-test is 70%.

f. **<u>DZ:</u>** This is a general knowledge exam that tests you in all areas of CARP, GMRS, and VIRS drop zone instruction. You will start this exam with 100 points. You may be re-tested one time; maximum score attainable on the re-test is 70%.

g. **<u>VIRS TRANSMISSION:</u>** This is a verbal test that tests your ability to identify and direct a rotary wing aircraft to the drop zone. You will also be graded on your ability to successfully exit jumpers over the release point on the VIRS drop zone. You will start this exam with 50 points. You may be re-tested one time; maximum score attainable on the re-test is 70%.

h. **FTX:** This is a comprehensive examination of all skills learned during the course. You will be tested on the planning and execution phases of Pathfinder operations. You will also execute a sling load operation during the day and night. You will be graded twice during the FTX. Graded positions in the field will be:

- Team leader or assistant team leader positions
- GTA or INR positions

You will start with 200 points. You may re-test one time; maximum score attainable on the re-test is 70%.

4. ATTENDANCE: A student cannot miss more than 2 hours of instruction throughout the course. Any unexcused absences are grounds for immediate release from the course.

5. PROFILES: Profiles that limit an individual in any way from completing the physical activities required throughout the course will be grounds for dismissal. PULHES 111211

6. HONOR GRADUATE: The student with the highest academic score, who has not been a re-test in any area may be selected as the Honor Graduate. No student who has previously attended any Pathfinder course of instruction is eligible for Honor Graduate.

7. APPEALS: A student has the right to appeal any grade that he/she receives if they feel that they have been unfairly graded or can present extenuating or mitigating circumstances that may warrant consideration for a higher grade. Appeal procedures are as follows:

A student has the exam review to appeal the grade. Appeals occurring after the exam review will not be considered. Also, appeals for an initial examination will not be considered if the individual takes and fails the re-test, then comes forward to appeal the initial examination.

The student will start the appeals process with the test proctor for that exam. The test proctor will consider the nature of the appeal and try to rectify it satisfactorily at that level.

If the appeal cannot be handled at that level it will then go to the Branch Chief (or Operations NCO if the Branch Chief is unavailable). THE BRANCH CHIEF HAS FINAL AUTHORITY ON ALL APPEALS!!

HONOR CODE:

The USAIS Honor System operates on the principal that integrity is an essential attribute of any military person; therefore, any student found guilty of a breach of integrity may be released from the course of instruction as well as face possible disciplinary action. The honor code accepted at the Infantry School, while broad in application, is precise in its meaning: "Every student's work is to be his/her own."

The honor system does not preclude students from working together in or out of the classroom when directed to do so by an instructor; nor does it preclude mutual discussion of individual solutions to upgrade homework requirements prior to submission. The honor system is not designed to stifle individual academic freedom, preclude the sharing of knowledge, or interacting with fellow students; however, all graded requirements, oral or written, weighed or unweighed, must be an individual effort. Students are specifically precluded from any act, or omission, which will provide an unfair advantage over their peers.

It is my policy that questions you may have throughout this course be directed to the Primary Instructor for that period of instruction. The Section Sergeants and Branch Chief will not become involved unless a question or situation arises that the Primary Instructor cannot resolve.

Any questions regarding prerequisites or grading should be directed to the Pathfinder Branch Chief or Operations NCO at DSN: 835-1111/3812, or commercial: (706) 545-1111/3812.

ADMINISTRATIVE GRADING SYSTEM

1. REPORTING LATE	-16 EACH TIME
2. SLEEPING	-15 EACH TIME
3. NOT HAVING ID CARD AND ID TAGS ON YOUR PERSON	-10 EACH TIME
4. IMPROPER UNIFORM	-5 EACH TIME
5. CELL PHONE IN CLASS	-16 EACH TIME
6. FAILURE TO FOLLOW INSTRUCTIONS	-10 EACH TIME
7. CREATE AN UNSAFE ACT	RELEASED FROM THE COURSE
8. LATE FOR MOVEMENT	RELEASED FROM THE COURSE
9. NOT PRESENT/LATE FOR TEST	FIRST TEST GRADE 0%
LATE FOR MANIFEST	RELEASED FROM THE COURSE
11. NOT PRESENT/LATE FOR RE-TEST	RELEASED FROM THE COURSE
12. SERIOUS OFFENSE (DUI, ARREST, CONFINEMENT, ETC…)	RELEASED FROM THE COURSE
13. DISRESPECT TOWARDS AN INSTRUCTOR	RELEASED FROM THE COURSE

JAMES A. SMELSER
SFC, USA
Pathfinder Branch Chief

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Class number and date of Previous Pathfinder Course attended______________________________________

I have been briefed and fully understand the requirements to successfully complete Pathfinder School and I will comply to the best of my abilities.

____

Print: Last Name, First Name MI

____

Signature

PATHFINDER STUDENT INFORMATION SHEET

CLASS #______

1. _______ ___________________________ ____ / ___ / _____ GT Score:___________

RANK NAME (LAST, FIRST MI) SSN

2. ____

PRESENT UNIT / ORGANIZATION

3. ____

UNIT / ORGANIZATION UPON COMPLETION OF COURSE

4. ____

COMMAND (ie. Divison, Group, etc)

		Y / N	Y / N
5. USA	ACTIVE DUTY	AIRBORNE	AIR ASSAULT
USMC	RESERVE		
USAF	NATIONAL GUARD		
USN	ALLIED		

BRANCH/MOS __________ YRS SERVICE___________

6. ARE YOU CURRENTLY ON JUMP STATUS (CIRCLE ONE)? YES / NO

7. GENDER? M / F _____/____/_____ _______ MARRIED? YES / NO

DOB AGE

8. TDY ADDRESS: ____

BLDG# ROOM# PHONE #

9. HOME ADDRESS: ____

____

PHONE #: ______________________

10. NEXT OF KIN: ____

RELATIONSHIP:____________ ADDRESS: ____

PHONE #: ______________________

11. IF TDY, IS NEXT OF KIN WITH YOU? YES / NO

12. HAVE YOU EVER ATTENDED THE PATHFINDER COURSE BEFORE? YES / NO.

IF YES, WHERE? ________________

12. DO YOU HAVE A PROFILE? YES / NO IF YES, WHAT? _______________

13. PRIOR HOT OR COLD WEATHER INJURY? YES / NO

14. ETHNIC BACKGROUND: WHITE / BLACK / HISPANIC / UNKNOWN / NATIVE AMERICAN
NATIVE ALASKAN / ASIAN / PACIFIC ISLANDER