



PART FIVE

Drop Zones





## CHAPTER 20

**PROCEDURES ON THE DROP ZONE**

*A drop zone is any designated area where personnel and equipment may be delivered by means of parachute or free drop. The DZ is located where it can best support the ground tactical plan; it is selected by the ground unit commander. For tactical training, the USAF assault zone availability report should be checked for an approved DZ within the tactical area. If the selected DZ is not on the AZAR, a tactical assessment must be conducted.*

**Section I**  
**DROP ZONE SELECTION AND METHODS**

The GUC uses the tactical analysis to select an area that can best support his mission. However, several technical selection factors must be considered, which are discussed in this section.

**20-1. TYPE OF AIRCRAFT AND DROP SPEED**

Table 20-1 provides recommended drop speeds for various aircraft.

TYPE OF AIRCRAFT	DROP SPEED
UH-1	50 TO 70 KNOTS (OPTIMUM 70 KNOTS)
UH-60	65 TO 75 KNOTS (OPTIMUM 70 KNOTS)
CH-46/53 (USMC)	80 TO 110 KNOTS (OPTIMUM 90 KNOTS)
CH-47	80 TO 110 KNOTS (OPTIMUM 90 KNOTS)
CH-54	65 TO 75 KNOTS (OPTIMUM 70 KNOTS)
CH/HH3 (USAF)	70 TO 90 KNOTS
C-5/130/141/KC-130	130 TO 135 KNOTS (PERSONNEL)
C-5/130/141/KC-130	130 TO 150 KNOTS (DOOR BUNDLES, CDS, AND HEAVY EQUIPMENT) (OPTIMUM FOR ALL LOADS 130 KNOTS)

**Table 20-1. Aircraft drop speeds.**

**20-2. AIRCRAFT DROP ALTITUDES**

See Table 20-2 for aircraft drop altitudes.

	DAY (AGL) (feet)	NIGHT (AGL) (feet)
<b>ARMY AIRCRAFT</b> (ALL SERVICES, ROTARY-WING)		
PERSONNEL	1,500	1,500
BUNDLES	300	500
<b>USAF AIRCRAFT</b> (TROOP CARRIER)*		
PERSONNEL	800	800
<i>(TRAINING)</i>	1,250	1,250
DOOR BUNDLES	300	500
HEAVY EQUIPMENT	1,100	1,100
<p>*AWADS/SKE - DROP ALTITUDE IS 500 FEET ABOVE HIGHEST OBSTACLE THAT FALLS WITHIN 3 MILES EITHER SIDE OF DZ RUN-IN. CDS USING G-13 PARACHUTE, OR ANY OTHER PARACHUTE, MINIMUM DROP ALTITUDE IS 400 FEET AGL. CDS USING G-14 PARACHUTE CAN DROP FROM 300 FEET AGL.</p>		

**Table 20-2. Aircraft drop altitudes.**

**20-3. TYPE OF LOAD**

Type of load includes personnel (1-second drop interval), CDS, or heavy equipment (3-second exit interval).

a. **Obstacles.** To ensure that the airdrop is safe, and that equipment and personnel can be recovered or employed to accomplish the mission, the drop zone and adjacent areas should be free of obstacles. (See Appendix D for DZ risk assessment.) Examples of obstacles are—

- Trees 35 feet or higher impeding recovery of personnel or equipment.
- Water 4 feet deep within 1,000 meters from any edge of the DZ.
- High tension wire that is carrying active current of 50 volts or greater. (Must be turned off prior to drop.)

- Any other conditions that may injure parachutists or damage equipment (inactive electric wires, barbed wire fences, swamps, ditches, gullies, and so forth).

**b. Air Approach and Departure Routes.** Air routes to and from the DZ should not conflict with other air operations or restrictive terrain, or with man-made objects (television or radio towers).

#### 20-4. METHODS OF DELIVERY

Different drop methods are described as follows:

a. **High Velocity.** A drogue chute stabilizes and keeps equipment upright but does not slow the descent (for example, a poncho parachute on a rations box).

b. **Low Velocity.** A parachute slows the rate of descent for a soft landing (for example, personnel and cargo parachutes).

c. **Free Drop.** This is cargo that has no device to stabilize or slow the rate of descent (for example, durable items such as clothing bundles).

#### 20-5. ACCESS TO AREA

The unit must have access to and from the DZ to recover equipment or conduct troop movement. DZs with no roads leading to them or next to a river with no bridges are examples of impeded access to areas.

#### 20-6. SIZE

The following information provides minimum peacetime sizes when using Air Force aircraft and must be adhered to unless a waiver is issued. During contingency or wartime missions, DZ sizes may also be waived. However, size requirements remain a joint responsibility of the COMALF and the airborne commander.

NOTE: To convert yards to meters, multiply yards times .9144 (yards x .9144). To convert meters to yards, divide meters by .9144 (meters ÷ .9144).

a. **Personnel from Army Aircraft.** The distance required for personnel is determined by the use of the formula  $D = RT$ .

b. **GMRS DZ.** Minimum size is 275 meters by 275 meters.

c. **Personnel from USAF Aircraft Using a CARP DZ.** The ground space required is 550 meters by 550 meters for one parachutist from a single aircraft (add 70 meters to the length for each additional parachutist).

(1) For drop altitudes above 1,000 feet AGL, add 28 meters (14 meters each side) to the width and 28 meters (trail edge) for each additional 100 feet.

(2) From official sunset to sunrise, add 90 meters to the width (45 meters each side) and length (both ends) for visual drops.

(3) For visual formation, add 90 meters (45 meters each side) to the width.

(4) For AWADS and SKE, add 370 meters (185 meters each side) to the width.

**d. Heavy Equipment Drops from USAF Aircraft Using a CARP DZ.** The ground space required is 550 meters by 915 meters for one platform from a single aircraft.

(1) For a C-130, add 370 meters to the length (trail edge) for each additional platform.

(2) For a C-141, add 460 meters to the length (trail edge) for each additional platform.

(3) For drop altitudes above 1,100 feet AGL, add 28 meters to the width (14 meters each side) and to the length (trail edge).

(4) From official sunset to sunrise, add 90 meters to the width (45 meters each side) and to the length (45 meters each end) for visual drops.

(5) For visual formation drops, add 90 meters to the width (45 meters each side).

(6) For AWADS and SKE, add 370 meters to the width (185 meters each side).

**e. Containerized Delivery System (CDS) Drops for the C-130 Using a CARP DZ.** The ground space required is 370 meters by 370 meters for one container from a single aircraft.

(1) For altitudes above 600 feet, add 37 meters for each additional 100 feet in altitude to width (18.5 meters each side) and length (trail edge).

NOTE: Airdrops from above 1,000 feet are not recommended.

(2) From official sunset to sunrise, add 90 meters to the width (45 meters to each side) and to the length (45 meters to each end) for visual drops.

(3) For visual formation drops, add 90 meters to the width (45 meters each side).

(4) For AWADS and SKE, add 365 meters to the width (182.5 meters each side).

**f. Containerized Delivery System Drops for the C-141 Using a CARP DZ.** The ground space required is 410 meters by 540 meters for one container from a single aircraft.

(1) For altitudes above 600 feet, add 37 meters for each additional 100 feet to the width (18.5 meters each side) and to the length (trail edge).

NOTE: Altitudes above 1,000 feet are not recommended.

(2) From official sunset to sunrise, add 90 meters to the width (45 meters each side) and to the length (45 meters each end) for visual drops.

(3) For visual formation drops, add 90 meters to the width (45 meters each side).

(4) For AWADS and SKE, add 370 meters to the width (185 meters each side).

NOTE: The size of the CDS drop zone depends on drop altitude, number of bundles, formation, and type of aircraft. (Refer to AMC Reg 55-60, Figure 1-1, for additional information.)

## Section II

### AIRDROP RELEASE METHODS AND PERSONNEL

The number and type of aircraft that air-delivers personnel and equipment, using one of the four methods, usually dictate the type and composition of the ground support party, which can be tailored for a mission.

NOTE: The unit mission request for aircraft specifies the type of drop method to be used, such as CARP, GMRS, VIRS, or WSVC, and composition of the ground support party (CCT or DZSO; DZST or DZSO).

#### 20-7. METHODS

To ensure accurate delivery on the DZ, JMs use four different methods. Each method uses various input from the ground and air in the calculation formula.

a. **Computed Air Release Point (CARP).** The CARP is the most often used method in aerial delivery for conventional airborne operations. The CARP is computed by the aircrew (navigator) and determines the release point from the air.

b. **Ground Marking Release System (GMRS).** The GMRS is the method used mostly by special operations forces (SOF). The GMRS is computed by the DZSTL and determines the release point from the ground.

c. **Verbally Initiated Release System (VIRS).** The VIRS is one of the two methods used by services (Army and USMC) having rotary-wing and small fixed-wing aircraft for small DZs, for dropping a specified number of personnel. VIRS is computed by the DZSTL; the release point is indicated by an oral command to the aircraft.

d. **Wind Streamer Vector Count (WSVC).** The WSVC is one of two methods used by services having rotary-wing and fixed-wing aircraft for DZs for dropping a specified number of personnel. The release point is JM-directed and is the only method not requiring markings on the DZ.

#### 20-8. ORGANIZATION

To become operational, drop zones require key personnel to be located on the DZ for controlling, marking, medical evacuating, wind readings, and malfunctions.

a. **USAF CCT and DZSO.** CCT and DZSO personnel are normally used in joint airborne operations of more than three troop carrier aircraft. CARP is usually used.

b. **DZST.** The DZST consists of single-service personnel (Army). It is normally used in small joint airborne operations involving three or fewer troop carrier aircraft. CARP or GMRS is used.

c. **DZSO.** Acting alone, without CCT support, the DZSO operates a small drop zone, with a small number of aircraft dropping a limited number of personnel. GMRS can be used (usually SOF units). If rotary-wing and small fixed-wing aircraft are employed, either VIRS or WSV methods are used.

### **20-9. DROP ZONE SAFETY OFFICER DUTIES**

The USAF CCT and Army DZSO have specific duties, which are discussed as follows:

a. When the USAF CCT is supporting an airborne operation, the DZSO is the airborne commander's (Army) direct representative on the drop zone. He is responsible for the safe operation of the DZ. No personnel or equipment is dropped if the DZSO is not physically on the DZ.

NOTE: The prerequisites to perform the duties of the DZSO are outlined in Chapter 1.

- (1) **Special duties.** The duties of the DZSO are—
  - (a) Coordinating with the USAF CCT.
  - (b) Ensuring the drop zone is fully operational 1 hour before drop time.
  - (c) Opening the drop zone through range control and closing it when accountability of personnel, air items, and equipment is completed.
  - (d) Before the drop, conducting ground or aerial reconnaissance of the DZ for obstacles or safety hazards.
  - (e) Collocating with USAF CCT and taking initial wind readings 1 hour before the scheduled drop time.
  - (f) Establishing communications with the DACO NLT 1 hour before drop time.
  - (g) Conducting continuous surface wind readings NLT 12 minutes before the scheduled drop. Giving the CLEAR TO DROP or NO DROP to the CCT (to relay to aircraft) 2 minutes before the scheduled drop.
  - (h) Monitoring surface winds from the parachutists' point of impact and at the highest point of elevation on the drop zone. A no-drop situation exists when surface winds exceed the maximum allowable limits within 10 minutes of the actual drop. (See paragraph 22-5.)
  - (i) Controlling all ground and air medical evacuations. Priority for airspace must be given to medical evacuations. This is particularly important when rescue or medical aircraft are involved, since they may be delayed if follow-on jumps continue.

(j) Ensuring that any water obstacle is covered by a boat detail that can provide one life jacket for each jumper on the first pass. A water obstacle is water more than 4 feet deep that is within 1,000 meters from any edge of the surveyed DZ.

(k) Submitting postmission reports (for example, MAC Form 168 [AMC] or incident/accident forms) to the appropriate agency.

NOTE: The CLEAR TO DROP or NO DROP that is relayed at 2 minutes does not indicate the final wind reading. If surface winds increase beyond authorized limits, a NO DROP can be relayed at any time thereafter. If readings exceed the limits, the DZSO must reestablish a 10-minute window.

(2) **Support requirements.** These apply to multiple aircraft formations (USAF aircraft), personnel, and equipment, or to single aircraft operations on drop zones more than 2,100 meters in length.

(a) The DZSO ensures the ground support team is in place on the DZ one hour before the drop. The support team includes:

- Assistant DZSO.
- Two medical personnel (with FLA).
- Malfunction officer (with camera).
- Parachute recovery detail (with saw and tree-climbing equipment).
- Parachute turn-in detail (with vehicles).
- Radios—one for the DZSO and one for the assistant DZSO (minimum).
- Anemometers, AN/PMQ-3A (or commercial anemometers authorized by USAIS messages DTG 101000Z MAR 94, subject: Use of Anemometers During Airdrop Operations, and DTG 212000Z OCT 94, subject: Use of Turbometer During Static Line Airdrop Operations)—two (one each for the DZSO and the assistant DZSO). Other anemometers not 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.
- Compasses—two (one each for the DZSO and the assistant DZSO).
- Smoke grenades.
- Vehicles.
- Road guards.
- Military police (to control vehicles and spectators).
- Boat detail.

NOTE: These requirements may be supplemented based on the type of drop, size of the airborne operation, number of aircraft, and number of parachutists, or where the DZ is geographically located.

(b) Single aircraft (no more than a 20-second exit time or no more than 2,100 meters of usable DZ). The composition of a partial control group is as follows:

- One DZSO (an assistant DZSO is not required).
- Wind reading from a single location on the DZ.
- One medic (with FLA).
- Malfunction officer (with camera, binoculars, and night vision goggles for night operations).
- Parachute recovery detail.
- Radio.
- Anemometers, AN/PMQ-3A (or commercial anemometers authorized by USAIS messages DTG 101000Z MAR 94, subject: Use of Anemometers During Airdrop Operations, and DTG 212000Z OCT 94, subject: Use of Turbometer During Static Line Airdrop Operations)—two (one each for the DZSO and the assistant DZSO). Other anemometers not 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.
- Compass.
- Smoke grenades.
- Boat detail and road guards.

b. The DZSO has operational responsibility for the Army aircraft drop zone. In addition to the DZSO's duties for USAF aircraft drop zones, the DZSO must also—

(1) Be positioned at the release point 15 minutes before drop time. The assistant DZSO is at the highest point of the drop zone or at the opposite end.

(2) Relay a ground weather decision and CLEAR TO DROP or NO DROP signal to the lead aircraft 2 minutes before the drop for each pass.

(3) During night drops, ensure that all lights on or next to the drop zone, which are not a part of the drop zone marking system, are turned off 5 minutes before drop time and remain off during the drop (except those lights that mark obstacles).

(4) Contact the pilot of the aircraft immediately after the drop and ask if any personnel or equipment did not drop. He relays this information to the airborne commander on the drop zone.

c. When advised of the coordination appointment by the airborne commander or his representative, the DZSO is furnished the following information:

- Number of lifts.
- Type of aircraft.
- Drop zone requirements.
- Unit SOP.
- Station time.
- Drop time.
- Number of personnel for each pass.

## **20-10. DROP ZONE SUPPORT TEAM AND DROP ZONE SUPPORT TEAM LEADER DUTIES**

In operations in which the CCT is not present, the Army DZSTL has overall responsibility for the conduct of operations on the drop zone. He represents both the airborne and airlift commanders. The DZSTL assumes all the responsibilities normally associated with the USAF CCT and Army DZSO.

a. Army DZSTs have the primary mission of supporting wartime CDS airdrops for battalion-size units and below, and peacetime airdrops of personnel, CDS, and heavy equipment for one- to three-aircraft operations. With some exceptions, these primary mission airdrops are limited to day/night visual conditions.

b. Army DZSTs also maintain the secondary mission of supporting other types of airdrops. The secondary missions may include wartime force projection and sustainment of personnel, equipment, and CDS; peacetime airdrops under AWADS and IMC conditions; and VMC formation drops with four or more aircraft.

c. The DZST consists of at least two members. More members may be required, depending on the complexity of the mission. The senior member of the DZST functions as the DZSTL.

d. If an individual assumes the duties of both the DZSO and the DZSTL, he also is responsible for the following:

- (1) Conducting premission coordination.
- (2) Evaluating the DZ for suitability and safe operating conditions.
- (3) Ensuring all DZ markings are properly displayed.
- (4) Operating all visual acquisition aids.
- (5) Ensuring no-drop signals are relayed to the aircraft.

e. Once the DZSTL has been notified and assigned a mission, he must conduct accurate premission coordination. The recommended DZST crew mission briefing checklist below reflects the minimum essential information that must be addressed and confirmed by the DZSTL. Normally, peacetime drops should employ every acquisition aid and safety device available, including air-to-ground radio communications, PIBAL mean effective wind measurement, air traffic control light gun, and smoke or flares. During contingency or wartime operations, limited airdrop support equipment is available; therefore, it is important for premission coordination and briefings to be comprehensive with respect to visual signals (drop cancellation, postponement, and authentication procedures). The coordination must be timely to ensure the DZST has enough time for planning and for moving to and establishing the drop zone.

#### **20-11. BRIEFING CHECKLIST**

A recommended DZST/aircrew mission briefing checklist is as follows:

- DZ name/location and JA/ATT mission sequence number verified.
- TOT(s) block time (no-drop procedures, for example, race track).
- Current DZ survey (date) verified.
- Type drop (HE, PE, CDS).
- Type release (VIRS, CARP, GMRS, AWADS, visual).
- Type parachutes.
- Ground quick disconnects.
- Number of jumpers/bundles.
- Number and type of aircraft.
- DZ information.
- Markings/signals:
  - Panels/lights
  - Block letter identification
  - Smoke, flares
  - Emergency no-drop procedures
  - Mission cancellation indication
- DZ support capabilities:
  - Radios available/frequencies
  - Visual acquisition aids available
  - NAVAIDS available
  - MEW equipment

- Airspace coordination verified
- Aircraft (mission) commander's name, unit of assignment, telephone number
- DZSTL name, rank, unit of assignment, telephone number
- Drop score/incident/accident reporting procedure

## 20-12. EQUIPMENT

The DZSTL should maintain an inventory of basic equipment to support an airdrop mission:

- VS-17 panels.
- Smoke (red, yellow, green).
- White steady lights, preferably Whalen.
- Air traffic control gun, SE-11 light gun, or 4-cell MAGLITE flashlight.

NOTE: ATC gun requires a special power source and plug to function properly.

- Signal mirror.
- Binoculars.
- Night vision goggles for night operations.
- Anemometers, AN/PMQ-3A (or commercial anemometers authorized by USAIS messages DTG 101000Z MAR 94, subject: Use of Anemometers During Airdrop Operations, and DTG 212000Z OCT 94, subject: Use of Turbometer During Static Line Airdrop Operations)—two (one each for the DZSO and the assistant DZSO). Other anemometers not 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.
- Compass.
- Signal flares.
- PIBAL system with helium source.

NOTE: Other items of equipment/signals may be required by premission coordination and mission complexity.