CHAPTER- 11

AERIAL DELIVERY PROCEDURES

Introduction

1. Air dropping is one of the fastest ways of delivering personnel, equipment and supplies to, within and from combat area. At times it can be the only means of re supply available where other modes of transportation appear impractical or under potential threat. The details of procedures, learns and condition are discussed in this chapter.

Occasions

2. The occasions of under taking aerial delivery/air dropping missions are:

   a. Training.

   b. Display/Demonstration.

   c. Operational/Combat missions.

   d. At the discretion of the captain when the safety of the aircraft is endangered by not doing so.

Authority

3. All ops/combat & display missions must have the approval of Air HQ (Dte of Air Ops). Training missions at designated Drop Zones (DZ) may be carried out with the coordination of local Base authority.

Crew Composition

4. The following is the minimum crew composition of aerial delivery missions:

   a. Captain.

   b. Co-Pilot.

   c. Loadmaster/jump master.

Weather Limitation

5. a. **Peacetime**.

      (1) VMC at operating height except when cargoes are dropped by Ground Radar Aerial Delivery System (GRADS).

      (2) Visual contact with DZ from operating height.

      (3) Wind speed limitation for different types of dropping is as per dropping checklist/types of paratroopers.

b. **Contingency or Combat**. Weather minimums are at the discretion of the theater or task force commander.

Methods of Airdrop

6. a. **Personnel and Door bundle**. This type of airdrop load either exists, pushed, or skidded from the roll up door.

b. **Gravity**. No gravity dropping can be carried out by L410 UVP20 as the side door is used for dropping. But other types of Transport aircraft of BAF has ramp, which is used to perform such type of drop technique.

Types of Airdrop

7. a. **Free-Fall**. Delivery of non-fragile items without the use of parachutes. Loads require special preparation to prevent damage from impact.

b. **High Velocity(Hi-V)**. Delivery of certain supply items rigged in containers with an energy dissipater attached to the underside and supported by a ring-slot parachute. The ring-slot parachute stabilizes the loads and retards the rate of fall to the point of acceptable landing shock. This system may include equipment loads dropped using reefed parachute.

c. **Low Velocity**. Delivery of personnel and various items of supply and equipment by the use of cargo parachutes. Loads are prepared for airdrop by packing items in airdrop containers or by rigging them on platforms.

Airdrop Systems

8. a. The Visual Release Point (VRP) system is based upon placement of a ground marker by ground forces at a location over which the pilot releases the load. The responsibility for placement of the ground markers rests with the airborne unit participating in the airdrop. The airborne unit must account for known wind conditions and the established and briefed approach course from the Initial Point (IP). Care must be taken to ensure that the “T” marker is aligned with the briefed course from the established Initial Point (IP) to the drop zone. When the VRP system is employed it is the aircrew's responsibility to deliver the load/paratroopers over the "T" at the proper heading, altitude and airspeed.

b. The success of VRP drop is greatly enhanced when additional markers are placed on the drop zone, VHF or UHF radio contact is made and the point of desired impact for "T" (VRP) displays smoke; both when requested by the aircraft Captain and intermittently from a period of three minutes to one minute prior to the established release time.

Drop Zone Requirements

9. The selection of drop zones is a joint Airborne-BAF responsibility. The air- borne agency requesting airdrops must ensure that the following drop zone criteria is used. The BAF Mission Commander must ensure that the route to and from the drop zone is safe in all respects.

a. **Personnel Drop from One Aircraft**.

(1) The minimum size of drop zone for one parachutist from a single aircraft is 600 X 600 yards. For each additional parachutist in a stick, add 75 yards to the drop zone length. For example a 20 man stick would be:

600 X 600 yards drop/one parachutist + 1425 yards for 19 additional men. Minimum DZ size 600 X 2025 yards for a 20 man stick

b. **Personnel Drops from Two or more Aircraft in Formation**.

(1) For personnel drop from two or more aircraft in formation, add 100 yards to the basic drop zone width, for example, 700 yards wide x 600 yards long for one parachutist from each aircraft + 1425 yards for 19 additional men. Minimum drop zone size - 700 x 2025 yards for 20 man stick.

c. **Equipment Drop from One Aircraft**.

(1) Minimum drop zone size for one heavy equipment platform dropped from one aircraft is 600 x 1000 yards. For each additional platform, add 400 yards to the drop zone length e.g., drop zone for two platforms will be:

600 yards x 1000 yards for one heavy equipment platform + 400 yards for second platform. Minimum drop zone size for two platforms is 600 yards x 1400.

d. **Equipment Drop from Two or More Aircraft in Formation**. For aircraft in formation drop, the drop zone width is increased by 100 yards calculated as specified in paragraph C above.

Drop Altitudes

10. a. For training, drop altitudes are to be as follows:

(1) Personnel drops - 1250 feet AGL.

(2) Equipment drops - Using single cargo chute - 1250 feet AGL.

(3) Equipment drops - Using C-11 parachutes - 1500 feet AGL.

(4) Combination of personnel and equipment - 1500 feet AGL.

b. During wartime training or actual operations, the troop commander and Commander of the Transport Wing/aircraft Captain will determine minimum altitudes for equipment/personnel drops. Such altitude will never be lower than the safe altitude for the chute being used.

Drop Speeds

11. a. Novice Paratroopers - 115 Kts.

b. Qualified Paratroopers - 125 Kts.

c. Equipment – 130 Kts.

Drop Zone Markings

12. See Figures 2-1 through 2-4 of this chapter. When drop zones are not marked in accordance with these attachments, the airborne unit assumes the responsibility for any unsatisfactory results.

Drop Zone Signals

13. During day and night operations the ground parties controlling DZ's are to provide visual signals to aid the aircrew in identifying the DZ release point/point of impact and to indicate

clearance to execute drop. The following signals will be used on the DZ to provide information as indicated:

a. RED SMOKE, RED FLARE OR RED LIGHT FROM DZ. NO DROP" on this pass or "ABORT THE MISSION". Red smoke light indicates these signals must be accompanied by verbal instructions from the ground radio if available. If communications with the drop zone are not established, a "NO DROP" signal on three successive passes will indicate "MISSION ABORTED" return to base.

b. Smoke or light or any color except RED in the vicinity of the point of impact indicates clearance to drop. During night a GREEN LIGHT on the Point of Impact indicates clearance to drop.

c. NO SMOKE OR NO LIGHT. No smoke on the DZ normally indicates "NO DROP" unless otherwise agreed to and briefed by the Drop Zone Control Officer. No light at night, except in combat conditions, will indicate "NO DROP" unless otherwise agreed to and briefed by the Drop Zone Control Officer. At night the drop zone must be identified and properly lighted for night training drops. For night drops, signal lights or flares may be substituted for smoke signals.

d. Special prearranged day or night signals may be used by the ground party or aircraft to suit any specific requirements. However, when such are used they will be thoroughly briefed and acknowledged in writing by both the airborne and BAF Commander.

Communications and Signals between Aircraft and Dz Control and within the Aircraft

14. a. If the drop zone control party is equipped with two-way UHF/VHF/HF radios, frequency for communications will be briefed before the mission. If radio frequencies are available at DZ, the aircraft will establish contact with DZ control in time to ascertain the DZ status/condition. (Normally before slowdown)

b. Interphone and VHF/UHF radio silence is mandatory; only essential conversation will be conducted on interphone and on outside communications.

Checklist Procedures and Warnings for Personnel

15. The following warnings are to be verbally relayed to and acknowledged by the loadmaster/jumpmaster at the time specified (exceptions as specified in paragraph 2-14).

a. 20-minute verbal warning is to be given by the co-pilot, twenty minutes before reaching the Computed Air Release Point (CARP) or by the pilot/co- pilot if the Visual Release Point (VRP) system is employed.

b. 10-minute verbal warning - ten minutes before CARP/VRP.

c. 6-minute - six minute before VRP followed by a red light.

d. 3-minute - three minute warning if required by the jumpmaster.

e. 1-minute - verbal warning - one minute before VRP.

f.If VRP is employed the pilot responsible for calling the drop will, over the VRP, give the command "Green Light" and the other pilot will simultaneously turn on the green light. At the same time the word "GREEN or "GREEN LIGHT" will be used either on interphone or on VHF/UHF/HF.

g. The alarm bell will not be used as a normal signal. The alarm bell will only be used for emergencies. This applies to all types of drops.

Preparation for Personnel Drop

16. All paratroopers are to be briefed by the jumpmaster prior to planning. The briefing will cover normal and emergency procedures and require that the jump- master ensures that all of his paratroops understand such. It will be the responsibility of the jumpmaster to form "sticks" and determine sequence of jumping. The jumpmaster and the aircraft loadmaster will carry out a joint inspection of the aircraft and ensure that anchor line cables are correctly installed, seats are in place, safety belts in order and jump lights are functioning properly. The airborne jumpmaster will provide the loadmaster with three copies of the paratrooper manifest. The paratroopers will be seated in aircraft only after the aircraft Captain has satisfied himself that all items for personnel drops have been checked by the loadmaster and the jump- master. Planning must ensure that this has been completed at least 5 minutes prior to Air Force Stations time.

Aircraft Configuration for Personnel Drops

17. The loadmaster will ensure the configuration of the aircraft anchor cables and seats are consistent with the number of personnel to be airdropped. During aircraft preflight, the loadmaster will ensure that all seats have a serviceable strap attached. Seats without a serviceable retaining strap will be fitted with a suitable length of type III nylon, pre-measured for sufficient length to secure the seat in a raised position to the seat back support frame. Low altitude personnel drops will be accomplished from the paratroop doors except for combination drops. HALO personnel airdrops may be conducted from roll up door. For single pass drops, ensure that parachutists have secured all seats (as required) and no part of the seat protrudes into the aisle. On multiple passes, raising of the seats is determined by the number of parachutists to be dropped on that pass. Seats will be raised/secured or lowered as required by airborne personnel under the supervision and instruction of the loadmaster.

Loadmaster's (Personnel Air Drop) Checks Prior to Flight

18. The loadmaster will carry out the following checks prior to flight:

a. **Jump Lights/Alarm Bell**. Cheek red and green jump lights for proper illumination and bell for operation.

b. **Jump Area**. Check that aircraft floor is clear of any obstructions and does not have a slippery surface.

c. **Troop Seats**. Check all seats for proper installation. For full capacity jumps of 18 troops.

d. **Safety Belts**. Safety belts will be installed for all troops.

e. **Anchor Lines**. Install anchor lines as required. Check cable support arms and bolts for correct installation and any cracks in the belts or support arms.

f. **Paratroop Doors/Door Areas**. Inspect roll up door for proper operation and locking in opened position. Door area will be taped as desired by jumpmaster.

Checks for Personnel Airdrops

19. The following checks will be carried out at times specified:

a. **20 Minute Warning**. The senior loadmaster will acknowledge the warning and alert the jumpmaster who will carry out his checks. After the jumpmaster has carried out his checks, the loadmaster will notify the aircraft Captain that “20 MINUTE CHECKS COMPLETED”.

b. **10 Minute Warning**. Proceed as prescribed for 10 minute warning verified and reported by the loadmaster.

c. **6 Minute Warning/Slowdown**.

(1) After the 6 minutes warning has been given, the co-pilot will put the "CAUTION/RED" light "ON" and the senior loadmaster will acknowledge and alert the jumpmaster and confirm that the red light is on.

(2) After slowdown the loadmaster will open the roll up door and the door is fully opened and locked.

d. **3 Minute Advisory**. The loadmaster will advise the jumpmaster of this advisory if it has been requested.

e. **1 Minute Warning**. The Senior loadmaster will acknowledge the warning and alert the jumpmaster to carry out his checks. After the jumpmaster has completed his checks, the senior loadmaster will notify the aircraft Captain that the “1 MINUTE CHECKS COMPLETED”.

f. **Arrival at the Release Point**.

(1) The Co-pilot will begin countdown ten seconds prior to the VRP and at the VRP will call "GREEN LIGHT" on interphone. The co-pilot will then turn on the Green Light.

(2) One second prior to expiration of usable length (in time) of the DZ, co-pilot will give the command: “RED LIGHT” and the co-pilot will put the Red Light "ON".

(3) The Red Light will remain on until static lines have been retrieved, exit door closed.

(4) After the loadmaster has closed the roll up door, he will notify the aircraft commander on intercom; “ALL CLEAR".

g. **Static Line Retrieval Procedures**. To facilitate retrieval and to preclude entanglement, airspeed will not be increased above 125 Kts until static lines are retrieved. Designated aircrew members will retrieve static lines as soon as possible after parachutist and/or Para bundle exit is completed or exiting is suspended. (If in formation, any aircraft experiencing difficulty retrieving static lines, closing doors, will peel away from the formation and, if unable to rejoin at the end of the formation, follow the pre- briefed emergency route to the recovery base). During combat, static lines that cannot be retrieved will be cut loose so that door may be closed. On other than combat, the static lines will be manually retrieved by using a web tie down strap as follows:

(1) Secure the hook end to a point forward enough in the cargo compartment to permit static lines to enter completely into the aircraft.

(2) Insert the other end of the strap from the bottom up, making a around the static lines.

(3) The loadmaster assisted by other available crew members will pull the strap forward thus retrieving the static lines into the aircraft.

Multiple Passes

20. Multiple passes can be made if agreed to by the Captain and jumpmaster provided that it has been coordinated during the pre-mission briefing and wind conditions do not significantly change. If they do, a new "T" will be required.

Winds

21. The following are the wind speed restrictions:

a. **At Drop Altitude**. Drops are not be made when the wind speed exceeds 25 knots at drop altitude. (Use GTN-750 or estimate if VRP method is used).

b. **Surface wind**. Maximum surface wind limit for equipment or paratroop drops is normally 12 knots; however, it is to be at the discretion of the aircraft Captain or jumpmaster/DZ Safety Officer. In case of NOVICE paratroops, jumps are not normally allowed when surface wind exceeds 12 knots.

Forced Landing

22. When an aircraft is unable to maintain altitude and is committed to force land and conditions are not acceptable favorable for bail out of paratroops, the following procedure be followed:

a. If time permits, give six short rings on alarm bell and a warning over the PA system to prepare for crash landing. All personnel must be seated with seat belts securely fastened.

b. The red light will be put on and kept on.

c. Just before crash/forced landing give one long continuous ring on alarm bell and a warning over the PA system to "BRACE FOR IMPACT".

Combination Drops

23. Combination drops are those during which parachutists exit from the aircraft after the extraction of equipment platform(s).

a. **Restrictions**. Combination drops are restricted to a single ship or the last aircraft of a heavy equipment formation. No of parachutists dropped in each pass will be determined in connection with no of bundles. One anchor cable will be used for their static lines. No more than two passes will be planned. When a second pass is required, the opposite anchor cable will be used. Static lines and deployment bags will be retrieved after the first pass to minimize fouling risk. Both static lines and retrievers will be rigged prior to takeoff.

b. **Procedures**. In addition to the heavy equipment CARP, the copilot will compute a personnel CARP, using the same IAS and altitude as for the heavy equipment, 10 seconds down track from the heavy equipment release point. If the probable point of impact falls within 150 yards of any boundary of the DZ, the jumpmaster will be informed.

Airdrop Aborts

24. When a drop is aborted the following procedures will be used:

a. The aircraft captain will notify the loadmaster "NO DROP". The senior loadmaster will notify the jumpmaster.

b. The red light will be kept on until door is closed.

c. The jumpmaster will raise his hands above his head, crossing and uncrossing his arms rapidly, as a signal to the paratroopers that mission is aborted.

d. The jumpmaster will have the paratroopers unhook, take their seats and fasten their safety belts. The loadmaster will notify the aircraft commander when this is accomplished.

Paratroop and Equipment Free Drops

25. Free drops will not be made at an altitude lower than 700 feet AGL. If paratroop and equipment free drop are mixed, the drop altitude will not be lower than 1000 feet AGL.

Crew Drills and Checks for Equipment Drops

26. The various checks prescribed in this SOP will be followed when standard warnings and signals are given. For simplicity in operations and to avoid inadvertent release of load, the following supplements procedures specified below:

a. After the "SLOWDOWN" warning has been given, the red light turned on, and the loadmaster will open the door.

b. After the "ONE-MINUTE WARNING- checks have been completed by the loadmaster, pilot (VRP) will give the precautionary command "STAND BY" about 15-20 seconds before VRP. The co-pilot will place his right hand on the green light switch. On reaching VRP pilot will give the command "GREEN LIGHT". The co-pilot will turn the green light “ON”.

Equipment Drops

27. a. **General**. Only equipment rigged in accordance with Flt Manual will be airdropped from tactical airlift aircraft. Non-standard equipment and loads will require specific instructions and written waivers from Air HQ, DAO prior to being airdropped. However there is no provision for heavy equipment drop from L410 UVP E-20 ac, only small cargoes/bundles containing 5 kg of load may be used for airdrop.

b. **Reference Publications**. The aerial delivery unit supporting the mission will provide the loadmaster with current reference publications to ensure standardization of acceptance inspections. Sufficient copies of these publications will be maintained by the aerial port squadrons for use in the field
during all airdrop missions whom they support. Mission planning will dictate the technical publications requirements.

c. **Aircrew Responsibilities**.

(1) **Pilot Responsibilities**. The pilot will verify weight and balance, ensure the load is adequately secured and that the passengers are seated and briefed. Pilots will refuse loads when accurate weights are not available, when nonstandard airdrop loads are presented or for any reason which may constitute hazard to flight.

(2) **Co-pilot Responsibilities**. The Co-pilot will coordinate with the loadmaster to determine actual number/type of parachutes and weight of loads.

(3) **Loadmaster Responsibilities**. Exercise supervision of all operations in the cargo compartment related to the airdrop of equipment and supplies.

d. **Emergency Procedures**. In the event of a malfunction in which the load does not release, primary consideration will be to the safety of paratroopers, the aircrew and personnel on the ground. When notified of a malfunction, the pilot will maintain drop airspeed/altitude and turn toward the pre-briefed salvo area. The loadmaster will take corrective actions (as appropriate), and notify the pilot when all actions are complete.

WARNING

Emergency aft restraint will be pre-measured, disconnected and stored forward of the load prior to takeoff. Required restraint will be connected and slack removed simultaneously, left and right. Restraint chains should be attached to the item to which the extraction force is applied. No one will proceed aft of the load until it is secured. When required, all extraction lines will be cut aft of the extraction clevis. Failure to do so may result in deployment of the main parachutes.

Note: After completion of malfunction checklist, the loadmaster will accomplish the "Completion of Drop" checklist.

High Altitude Low Opening (HALO) Procedures

30. HALO personnel paradrops are conducted using a programmed free fall prior to parachute deployment. All HALO operations will be conducted in accordance with the amplified checklist contained herein. A High Altitude Release Point (HARP) solution will be computed for all HALO drops.

a. **Aircrew Procedures**.

(1) **At the 20-minute warning**. The jumpers will arm parachute at desired altitude.

(2) **At slowdown**. The loadmaster will ensure door is open when cleared by the pilot.

(3) **Flaps**. Normal configuration is with 18^0 flaps; however, at high altitudes it may be desirable to use less flaps.

(4) **Exit**. All jumpers will exit the aircraft during the green light time. All jumpers, with the exception of the jumpmaster, will stand forward of the door until the one-minute warning. After departure of the jumpers, the loadmaster will close the door .

b. **Drop Zone Criteria**. Minimum DZ requirements are determined by the service of the personnel being dropped.

c. **Drop Zone Markings**. Drop zone Markings will be coordinated with the user forces.

d. **Winds**. There are no altitude wind restrictions for personnel HALO operations.

e. **Briefings**. In addition to the pilot-jumpmaster briefing, the pilot will also brief the jump master on the following:

(1) Weather.

(2) Emergency descend procedures .

(3) HARP and prominent terrain features.

(4) DZ Markings.

(5) Time at which all mission personnel will commence pre-briefing.

(6) Coordinate the location and duration of the green light. Normally the jumpers exit the aircraft at their own discretion; however, their exit must occur during the green light time.

f. **Communications and Signals**. Interphone and hand signals are the primary methods of communication. When dropping parachute, the Army jumpmaster may monitor loadmaster's hand signal.

(1) **Hand Signals**. The loadmaster will coordinate the following hand signals with the jumpmaster:

(a) Time warning (20, 10, 6, 2, 1) may be given to the paratroopers by the loadmasters pointing at their watch and then indicating with their fingers the correct warning.

(b) The velocity of winds on the DZ are given by the loadmaster by cupping one hand and blowing into it, then indicating with upturned fingers the speed of the wind.

(c) A no-drop can be indicated by passing the forefingers across the throat.

(2) **Written Messages**. Each loadmaster will carry pencil and paper to write out messages that cannot be dealt with by use of hand signals. Messages from the paratroopers for relay to the pilot will be written out.

Air Drop Rigging Kits

31. Aerial port will maintain sufficient numbers of rigging kits to support tactical airdrop missions. The riggings kits will be delivered to the aircraft loadmaster when required by the mission.

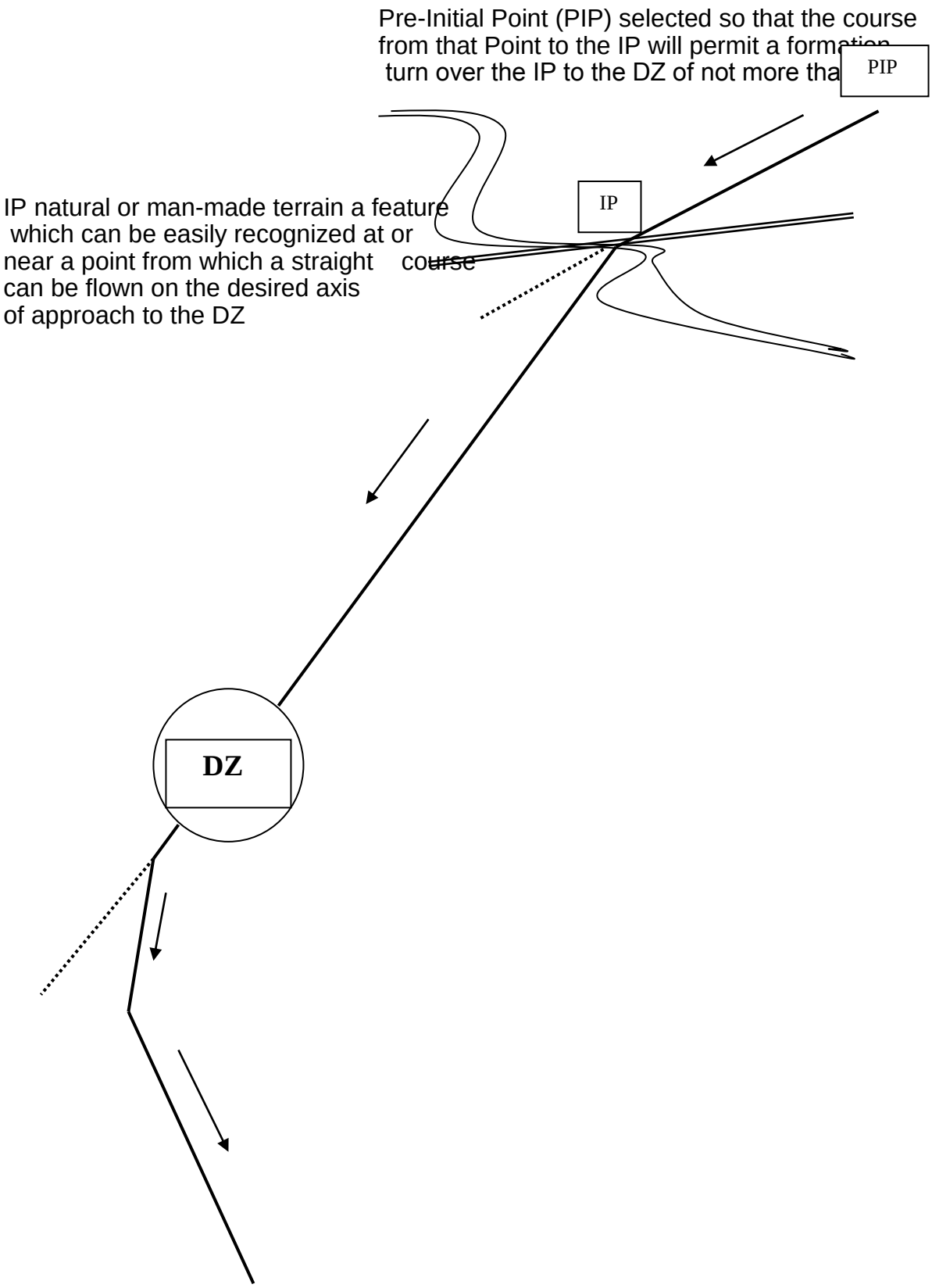
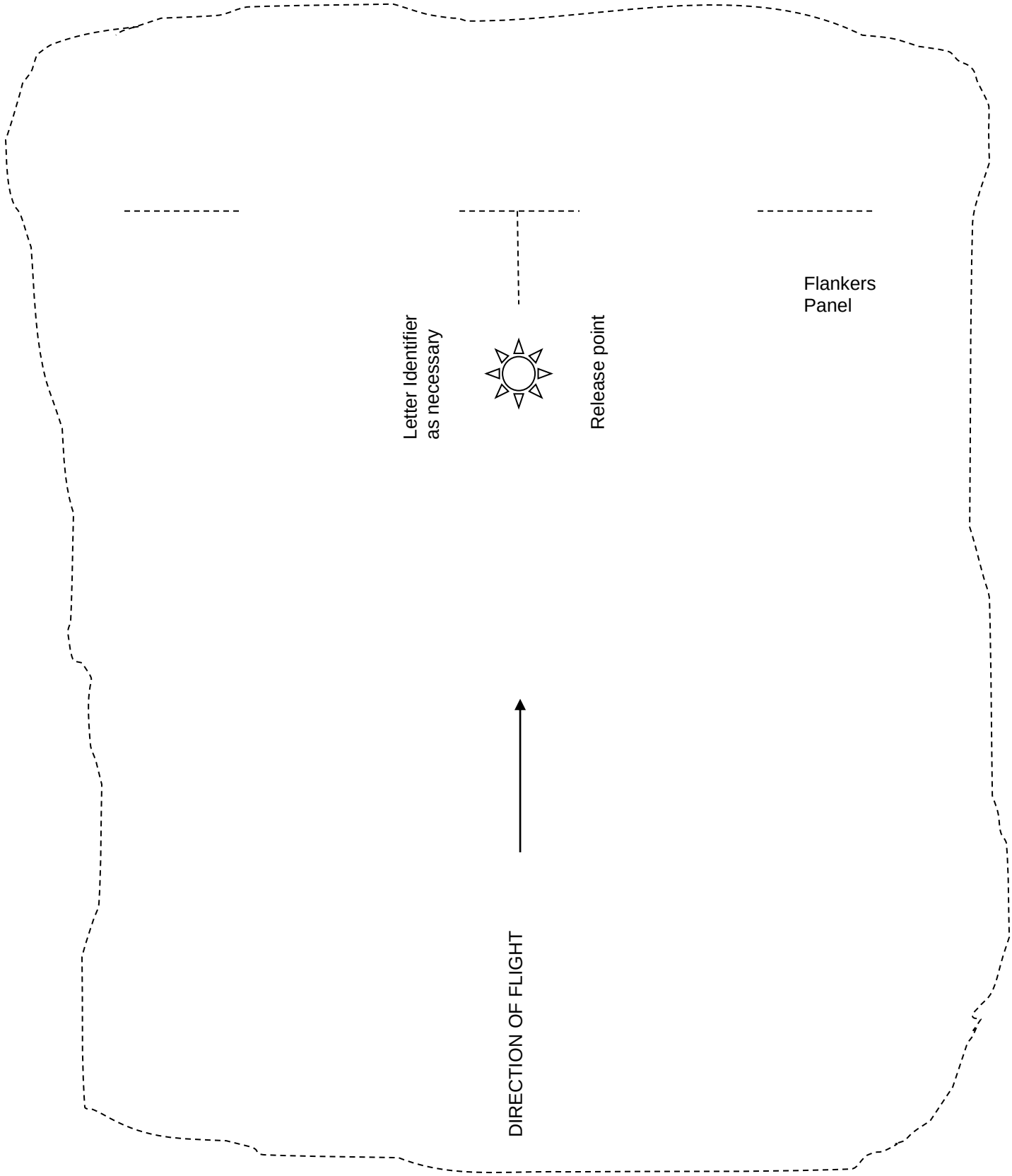
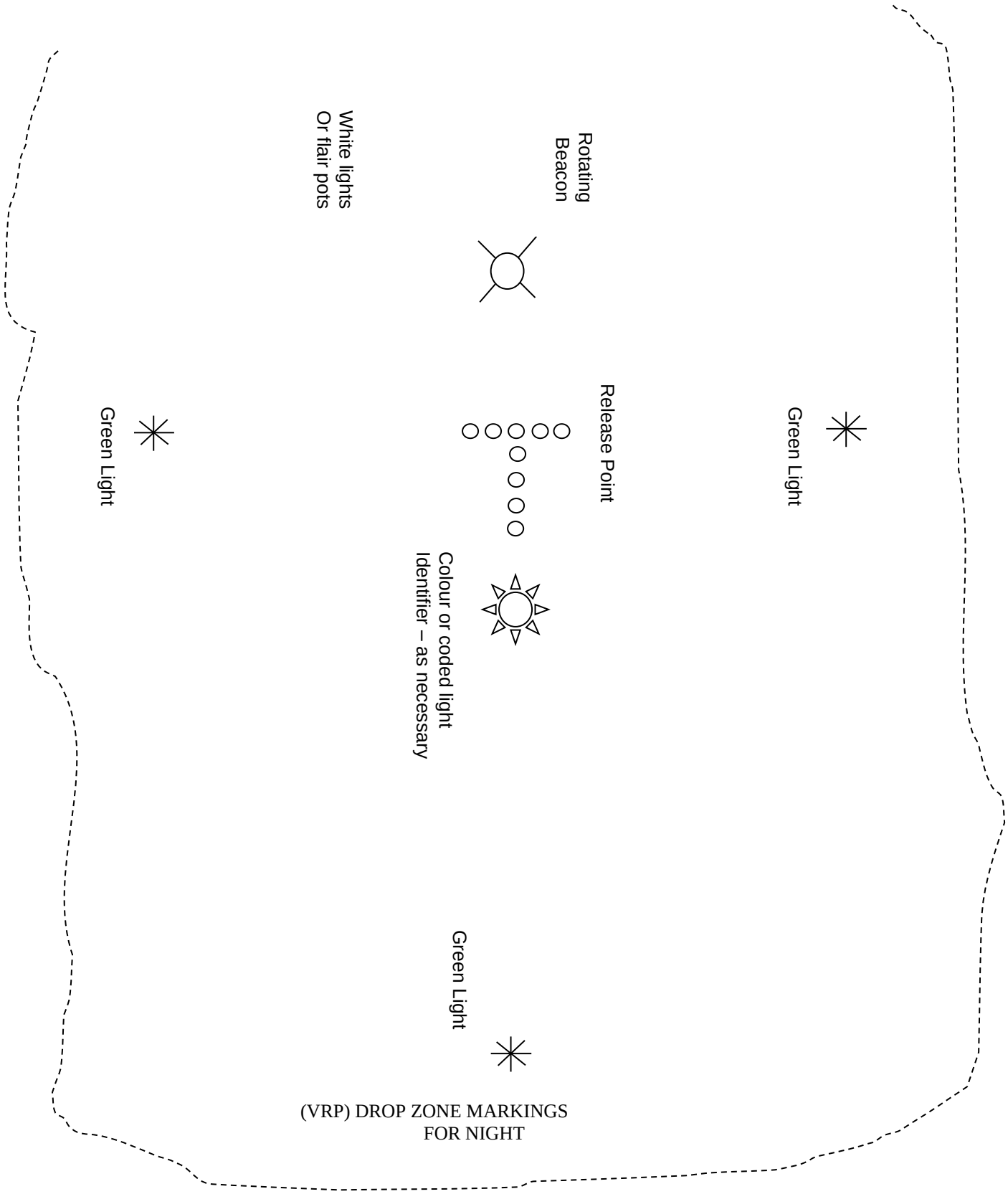


Fig : Drop Zone Area Route Procedure(Example)

DROP ZONE MARKINGS
VISUAL RELEASE POINT SYSTEM (VRP)
DAY
USING WHITE OR COLOURED PANEL

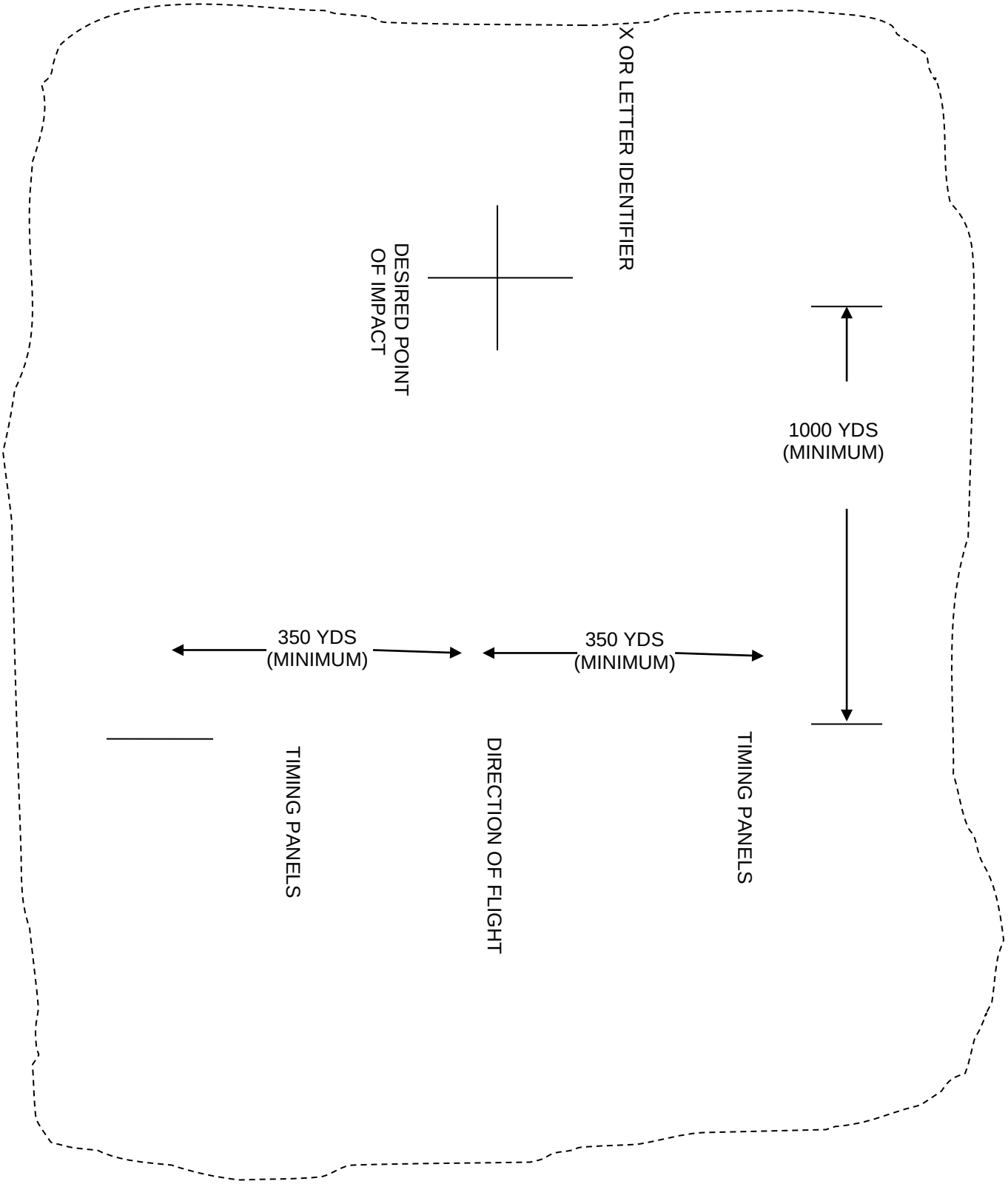


DROP ZONE MARKINGS
VISUAL RELEASE POINT SYSTEM (VRP)
NIGHT



(VRP) DROP ZONE MARKINGS
FOR NIGHT

DROP ZONE MARKINGS
FOR COMPUTED AIR RELEASE POINT SYSTEM (CARP)
DAY



DROP ZONE MARKINGS

FOR COMPUTED AIR RELEASE POINT SYSTEM (CARP)
NIGHT