

Introduction

1. In order to maintain an efficient and safe operations of L 410 UVP-E20 aircraft, all aircrew operating L 410 UVP-E20 aircraft and other concerned personnel are to abide by the instructions laid down in this manual.
2. Should a flying order or a local order conflict with the procedures laid down in this manual, the flying order/ local order is to be followed.

Purpose

3. The purpose of this SOP is to promulgate the orders and procedures governing the conduct of flying with specific instructions for L 410 UVP-E20 transport trainer aircraft. The contents of this manual are to be studied by all aircrew operating L 410 UVP-E20 aircraft.

General Operating Guide

4. The captain detailed for the mission will preferably sit in the left seat other than check ride of captain/U/T captain. In such case only, the instructor taking the test may occupy the right seat. The pilot in control will operate control wheel with left hand and the TCL, PCL and trimming or any other switch operation is with right hand. In case of co-pilot, the hands will be changed vice versa. In case of single engine operating trimming of rudder and ailerons are to be done as per requirement. For simulating engine failure, the corresponding TCL may be reduced upto idle and the corresponding PCL to COARSE position. In no case the TCL can be brought below idle or PCL can be brought below COARSE position.

Amendment and Review

5. This manual will be reviewed yearly/as and when required. Suggestions for amendment are to be forwarded to Air (Directorate of Air Operations).

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CHAPTER - 1

PREPARATION FOR FLIGHT

Introduction

1. Transport aircraft operation is teamwork. Because of its mere size and complexity, it is humanly impossible to handle a modern transport aircraft single handed. To achieve the best results and to ensure safety of the flight each and every crew has to do his bit of the job and also cross check others. The first and foremost require for an effective transport operation mission is a thorough and detailed preparation in the planning stage by each crew.

General Preparation

2. Flight planning is to be done for every mission. The Captain is to brief each crew on the specific require of the mission beforehand. He is to supervise preparation of flight plans, maps and charts and calculate the fuel required to complete the mission. Co-pilot is to prepare his maps, log sheets, route profiles and plan the fuel-load combination. He is also to ensure that the aircraft is ready to undertake the mission envisaged. Load Master (LOAD MASTER) is to plan the loading & lashing of cargoes, management of passengers and position of C of G depending on the nature of load and mission.

3. Equipment / Publications:

a. The following equipment/publications are to be carried for all flights. Captain and Co-pilot is to ensure:

- (1) Check list.
- (2) Flight manual.
- (3) SOP
- (4) Let down charts
- (5) I Pad
- (6) Jeppesen Manual
- (7) Relevant maps, charts and forms.

b. The following additional items are to be carried and ensured by Ground Crew whenever an out station landing is involved:

- (1) F-781 (Traveling copy)
- (2) Pliers
- (3) Common screw driver
- (4) Phillips screw driver

- (5) Tyre pressure gauge
- (6) Locking wires and cleaning materials
- (7) Chocks
- (8) Covers blanks

c. The Load Master is to ensure :

- (1) Trim sheet
- (2) Take off/ landing data form
- (3) Cargo / passenger manifest
- (4) Vomiting bag
- (5) First aid box.

4. **Pre-Flight Fuel Planning.** The Co-pilot is to calculate the total fuel required for the mission by consulting the performance graph given in the flight manual plus fuel required to proceed to the farthest alternate plus 0:45 hours of reserve for normal cruise flying. For GF & IF mission involving local flying - planned fuel will be the fuel required for the duration plus 400 kg reserve.

5. Flight briefing will be conducted in the following manner:

- a. Mission specifics to all crew - Captain.
- b. Prevailing and forecast weather, time and distance to be flown – Co-pilot.
- c. Post flight de-brief to all crew - Captain.
- d. Post flight Weather report to Met Squadron - Co-pilot.
- e. Take off brief and Landing brief – Captain/Co-pilot.
- f. Briefing to pilot for solo flights - OC/Flight Commander (Operation)/Instrument clearing the solo.

Power on checks

6. Power on of aircraft and engine sys are to be carried out before the commencement of day's flying by Ground Crew.

Load plan & Trim sheet

7. The load and trim sheet are to be prepared by the Load Master for all commitment mission. The Load Master is to raise it in duplicate, co-pilot is to check the accuracy and captain or co-pilot on his behalf is to countersign. A copy is to be given to the air movement

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section. Other copy is to be on board. Co-pilot is also to calculate V_1 , V_R , V_2 & Single engine climbing speed (V_{se}) etc by consulting the checklist and Flight Manual.

GENERAL FLYING

Introduction

1. General flying is the art of flying which is conducted taking reference from visual cues flying and it is carried out in Visual Meteorological Conditions (VMC). The exercises practiced in General Flying phase build up understanding of Aircraft & Engine performance, general behavior of the aircraft at different power settings and configuration. It also enhances the general lookout & orientation of the airfield and different training areas. The skills earned through this phase contribute to good Airmanship. For better performance a student should be very conversant with the normal & emergency flying Procedures, Local Flying Orders and Aircraft systems.

Aim

2. The aim of this chapter is to introduce you with the general handling procedure & flying technique of L-410 aircraft, different air exercises as per syllabus.

Objective

3. After reading this chapter a clear idea of basic air exercises which are flown in General Flying phase and basic handling of L 410 aircraft in VFR condition can be obtained.

4. **Airmanship**

- a. Look Out.
- b. Orientation.
- c. Operations normal Check.
- d. Engine handling.
- e. Aircraft handling.
- f. R/T Call.

5. **Domestic-I**

- a. Pre-Flight Medical.
- b. ATC/Met Briefing.
- c. Normal & Emergency Session.
- d. Pre-Flight Briefing.
- e. Operations Room Procedure.
- f. Weather check.
- g. Flight Detail & Submitting flight plan.
- h. Signing Author Book.
- j. Sign F-781
- k. Crew Briefing

6. **Pre-flight Preparation**

- a. Carry Check List, SOP, FOB, Letdown Plate, DASH-1, Map, Jeppesen Manual, White papers and Air Rep to the aircraft.
- b. In case of night flying carry torch light & Red pen.
- c. Carry the Douglas Protector, plotter, marker pen and particular mission profile etc.
- d. Be comfortable with flying boots and coverall.
- e. Always carry your ID card, vomiting bag and a handkerchief with you.

7. **Approach to an Aircraft.** App the aircraft from front or rear quarter and while doing so, check the following:

- a. Check covers removed.
- b. Wings level.
- c. No fuel or oil leakage.
- d. Fire extinguisher available.
- e. No loose article around.
- f. Ground crew available.

Checks and Procedure

8. **External Pre-flight Check:**

- a. Do as per the Check List.
- b. Double check the followings:
 - (1) All intake covers are removed.
 - (3) Tire inflation, alignment and oleo extension.

9. **Internal Checks**

- a. Do as per Check List.
- b. Remember the followings:
 - (1) Use the same seat position.
 - (2) Legs should comfortably reach the rudder pedals. Remember the position and it everyday unless comfortable.

10. **Start up**

- a. Follow the check list.
- b. Know abort start procedure be ready to abort when require.
- c. After Start - As per Check List.

11. **After Start Check**

- a. Carry out the after start check as per Check List.

12. **Taxi Check**

- a. As per Check List.
- b. Set altimeter to QNH & note error.
- c. Check nose wheel straining manual before taxi out.

13. **Instrument Check**

- a. Aircraft turning to the Right/Left, TSI needle to the Right/Left, TSI Ball to Left/Right.
- b. DI increasing/decreasing, passing through heading.
- c. A/H no pitch, no bank.
- d. ASI, VVI, Altimeter zero.
- e. ADF, VOR pointing to the station.
- f. Clock is ready for operations.

Departure Brief

14. All station this is Co-Pilot, going over Departure briefing, we are going for a GF/IF/Route mission, load.....passenger.....AUW.....T/O Power.....V1.....VR.....Any emergency before V1, we will abort take off. At or above V1 continue take off and land back at same airfield. All action according to SOP, FOB, Check List and Dash-1 under captain's command. Any question sir?

15. **Before Line up**

- a. Check any aircraft on base turn to finals position.
- b. Check the position and movement wind socks.
- c. Monitor R/T calls to know the traffic situation in and around the airfield.

16. **Line Up**

- a. Always look at the full length of the R/W for aligning with the Centre line.
- b. Do line up checks as per check list.
- c. Check and call out nose wheel straining pedal after the light comes on.
- d. Obtain clearance from tower, complete the take off checks, check up and ahead clear and release brakes.

17. **Take Off**

- a. Release brake and apply right rudder.
- b. Look at the full length of the R/W.
- c. PNF will call out the speed & PF will have the controls for takeoff.
- d. At Vr PF will rotate the nose wheel gradually to take off attitude and airborne.

18. **After Take off**

- a. Carry out as per check list.
- b. Switch off spoiler, auto bank, auto feather switch after crossing 1000ft.
- c. In case of circuit spoiler, auto bank, auto feather switch will remain on.

19. **Training Area Jurisdiction (Dhaka Area)**a. **Training Area North**

Intercept radial 360° to proceed to Training Area North / proceed to right hand downwind of Hazrat Shahjalal International Airport, cross active and intercept radial 360° at height allotted by Dhaka Tower.

Radial 337°- 029°
DME 25-67Nm
Height Ground- Unlimited

b. **Training Area South**

Intercept radial 185° to proceed to Training Area South.

Radial 165°-210°
DME 10-45Nm
Height Ground-FL60

c. **Training Area East**

Intercept radial 090° to proceed to Training Area East / proceed to right hand downwind of Hazrat Shahjalal International Airport, cross active and intercept radial 090° at height allotted by Dhaka Tower.

Radial 060-110
DME 17-37Nm
Height Ground-FL250

20. **Straight and Level flight Parameters.**

Speed(KIAS)	Power	Attitude
135	42°	+3.5°
150	57°	+2.5°

21. **Increase/Decrease of Speed (By 15 Kts)**a. **Decrease speed (Up to 15 Kts)**b. **Pre-Entry**

- (1) Check heading constant, Heading selector on top.
- (2) Check height constant, eg: 4000ft, 5000ft.
- (3) Check speed constant 150kts.

c. **Entry**

- (1) Reduce power 20% less than the power required for new the speed.
- (2) Apply touch of left Rudder to maintain direct (Cross-check 12 o'clock).

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- (3) Maintain height by gradually raising the nose of aircraft (Cross check VVI).
- (4) As speed approaches 05 Kts short, adjust power to the required setting.
- (5) Trim the aircraft for new speed.

d. Increase speed (Up to 15 Kts)

e. **Pre-Entry**

- (1) Check heading constant, Heading selector on top.
- (2) Check height constant, eg: 4000ft, 5000ft.
- (3) Check speed constant 150kts.

f. **Entry**

- (1) Increase power 20% more than the required power for new speed.
- (2) Apply touch of Right rudder to maintain direction (cross-check 12 O'clock)
- (3) Maintain height by gradually lowering nose of the aircraft (Cross check VVI)
- (4) As the speed approaches 05 Kts short, adjust power to the required setting
- (5) Trim the aircraft for new speed

22. **Increase/ Decrease of Speed (Above 15 Kts)**

a. Increase speed (Above 15 Kts)

b. **Pre-entry**

Same as Increase/decrease of speed (Below 15 Kts).

c. **Entry**

- (1) Open power to 80%.
- (2) Maintain direction by applying required amount of rudder (check 12 O'clock ref and Wings level).
- (3) Maintain height by gradually lowering the nose of the aircraft (Cross check VVI).
- (4) As speed approaches 10 Kts short, adjust power to required setting.
- (6) Trim the aircraft for new speed.

d. Decrease speed (Above 15 KPH)

e. **Pre-entry**

Same as Increase/decrease of speed (Below 15 Kts).

f. **Entry**

- (1) Reduce TCL/Power to 20%
- (2) Apply required amount of rudder to maintain direction (12 O'clock ref and Wings level).

- (3) Gradually raise the nose of the aircraft to maintain the height (Cross check VVI).
- (4) As speed approaches 10 Kts short, adjust power to required setting.
- (5) Trim the aircraft for new speed.

23. **Climb**

a. **Definition.** Climbing is a balanced flight in which an aircraft gains height with const speed and power setting.

b. **Parameter.**

- (1) Speed - 110-120 Kts.
- (2) Power - 80%.
- (3) Attitude - 10-11°
- (3) RPM - 1900.

c. **Pre entry Check.** Checks that are to be done before entering into a climb are:

- (1) Heading selector on top.
- (2) Ts & Ps - normal.
- (3) Look out - Check up and ahead clear.
- (4) Orientation - Check position.

d. **Entry into Climb - (PATCAR).** Follow PATCAR procedure to enter into a climb:

- P - Power - Increase to 80.
- A - Attitude raise to 10-11° for 110-120 kts KIAS. AH raise 8-10°
- T - Trim the aircraft. All the trimmers.
- C - Check speed 110-120 KIAS, power 80%, RPM 1900, & TSI ball in the center.
- A - Adjust attitude (if required).
- R - Re-trim the aircraft.

e. **Maintenance of Climb**

- (i) Check visually up and ahead clear and if possible take a reference 12 o'clock.
- (ii) Power gradually reduces below 80%, so time to time adjust the power to 80% and RPM 1900 to maintain constant climb. Torque set 80%.
- (iii) Look out especially along the intended track.
- (iv) Visually avoid cloud and when cleared regain track.

f. **Level off from Climb (APTCAR)**

- (1) Give lead of 10% of ROC.
- (2) A -Attitude smoothly lower for 135 KIAS. 3.5 degrees for 130
 P - Adjust power when speed reaches 130 KIAS (05 KIAS lead). Torque 42%, 1700 rpm
 T - Trim the aircraft.
 C -Check speed, attitude, power & TSI ball.
 A - Adjust parameters, which were not correct (if any).
 R -Re-trim the aircraft (if required).

24. **Descend**

a. **Definition.** Descending is a balanced flight in which an aircraft loses height with const speed and power setting.

b. **Parameter**

- (1) Speed - 150Kts
- (2) Power - 30%
- (3) Attitude - -1.0°
- (4) RPM - 1700

c. **Pre-entry check** Following checks are to be done before entering into a descend:

- (1) Heading Sel on top.
- (2) Ts & Ps.
- (3) Look out & orientation.

d. Entry into descend - (APTCAR)

- A - Attitude smoothly lower for desired ROD.
- P - Adjust power and maintain speed 150Kts
- T - Trim the aircraft.
- C - Check speed, attitude, power & TSI ball.
- A - Adjust parameters, which were not correct (if any).
- R - Re-trim the aircraft (if required)

e. **Level Off from Descend**

- (1) Give lead 10% of ROD.
- (2) Maintain the sequence:
 - A - Attitude raise to 3.5° .
 - P - Adjust power to 42° power for cruise speed.
 - T - Trim the aircraft.
 - C - Check speed, attitude, power & TSI ball.
 - A - Adjust (if required).
 - R - Re-trim the aircraft.

25. Medium Level Turn (15°)

a. **Definition.** Balanced state of flight in which an aircraft changes direction with a bank not exceeding 15° .

b. **Parameter**

- (1) Speed: 135 kts
- (2) Power: 42%
- (3) RPM: 1700 rpm.

c. **Pre-Entry**

- (1) Check heading constant, Heading selector on top.
- (2) Check height constant, eg: 4000ft, 5000ft.
- (3) Check speed constant 135 kts

d. **Entry**

- (1) Bank Cross check in A/H, holding same attitude Increase bank to 15°
- (2) Balance Stop sidewise movement of the aircraft, ball in the centre.
- (3) Back Pressure If require to maintain height.

- (4) **Scanning**. Scanning technique for medium level turn:

Att -Bank (A/H). While crossing 20° bank 9° hold 42%-44%
 Att -Ball (TSI).
 Att -VVI.
 Att -Alt.
 Att -Speed.
 Att -Look inside the turn is clear.
 Att -DI (include short of roll out).

e. **Corrections**. In case the speed or height is lost for poor maintenance the correction will be as following:

- (1) **Speed**. Speed is corrected by adjusting and readjusting power provided the att is correct. If attitude is not correct attain desired attitude first.
- (2) **Height**. To loose height, lower the nose depending upon the height to be lost, and adjust power to maintain speed. Reverse technique applies for gaining height. Remember to maintain the same bank angle.

26. Medium Level Turn (30°)

a. **Definition**. Balanced state of flight in which an aircraft changes direction with a bank not exceeding 30°.

b. **Parameter**

- (1) Speed: 135 kts
- (2) Power: 42%
- (3) RPM: 1700 rpm.

c. **Pre-Entry**

- (4) Check heading constant, Heading selector on top 4.5.
- (5) Check height constant, eg: 4000ft, 5000ft.
- (6) Check speed constant 150kts

d. **Entry**

- (1) Bank Cross check in A/H, holding same attitude Increase bank to 30°
- (2) Balance Stop sidewise movement of the aircraft, keep ball in the centre.
- (3) Back Pressure Apply if require, to maintain const height.

(4) **Scanning**. Scanning technique for medium level turn:

Att -Bank (A/H).
Att -Ball (TSI).
Att -VVI.
Att -Alt.
Att -Speed.
Att -Look inside the turn is clear.
Att -DI (include short of roll out).

e. Roll out from Turn

- (1) Give lead for roll out, (1/3 of the bank angle).
- (2) Roll out by using opposite aileron and touch of rudder
- (3) Cross check attitude, VVI, altimeter, speed and ball in the center. Re-check DI for correct roll out.
- (4) If required, adjust parameters.

27. Steep Turn (45°)

a. **Definition**. Balanced state of flight in which an aircraft changes direction with a fixed bank angle of more than 45°.

b. **Parameter**

- (1) Speed - 135 kts while xing.
- (2) Power - 60%

c. **Pre-Entry Checks**.

- (1) Carry out HASELO Check.
- (2) Take a ref point, Heading sel - on top.
- (3) Check height const, and speed 135 kts.
- (4) Look out - clear the area same as MLT.

d. **Entry**

(1) Make the entry just like MLT. When bank angle crosses through 30° , gradually apply little back press looking at the horizon. In order to maintain the altitude constant, back press needs to be Increased with the increment of bank angle. Advance power as required to maintain speed 135 kts.

e. **Maintenance of Exercise**

(1) **Bank**. Maintained by aileron and looking at the natural horizon. Occasionally take ref from A/H.

(2) **Balance**. Stop sidewise movement of the aircraft, keep ball in the centre.

(3) **Back Pressure**. Correct attitude & back press ensure constant ht. You can gain or loose height only by varying back press.

(4) **Scanning**. Scanning technique for steep turn:

Att - Bank (A/H).

Att - TSI Ball.

Att - VVI.

Att - Alt.

Att - Speed.

Att - Inside the turn is clear.

Att - DI (Frequent for 45°).

f. **Roll Out From Steep Turn.**

- (1) Give lead (1/2 of Bank angle) 20° .
- (2) Apply opposite aileron and Rudder..
- (3) Check speed & readjust power to 42%.
- (4) As bank reduces to 30 relax back pressure.
- (5) After roll out reduce power the added power.
- (6) Forward trim as require.

28. **Stall.**

a. **Definition**. It is defined as a state of flight, in which an aircraft can no longer maintain level flight. Stalling speed varies with configuration, weight, power and load factor.

b. **Stalling Speed Chart (Clean).**

All Weight(Kg)	Up	Stall Speed(KIAS)	V _R
4500		72	85
5000		76	85
5500		80	85
6000		84	87

6500	88	90
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c. Stall Briefing All station this is co, going over stall briefing. We are going for a clean/dirty stall. Our AUW....., Stalling Speed.....Vr.....During recovery on the first symptom of stall we will lower the attitude and Open power to 80%require power.

d. Stall-Pre-Entry Check (Clean)

- (1) HASELO Check.
- (2) Clear the area.
- (3) Note the height at which exercise is started (min 4000 ft).
- (4) Heading sel on top.
- (5) Check the stalling speed & V_R.
- (6) Carry out stall briefing.
- (7) Rpm 1900.

e. **Entry into Stall (Clean).**

- (1) Put the TCL to idle left rudder, redder trim.
- (2) Wings Level, ball center VVI zero.
- (3) Trim Back-Last trimming speed 110kts

f. **Maintenance of Exercise**

- (1) Trim progressively to maintain height and VVI zero.
- (2) Raise att gradually to maintain height.
- (3) Hold attitude till aircraft stalls.

g. **Symptoms of Stall.**

- (1) Aircraft attitude – high.
- (2) Low speed.
- (3) Controls sluggish.
- (4) Extend Landing Gear It comes on.
- (5) Aircraft judders, critical angle of attack 10-11°.
- (6) Stall warning It and audio signal comes on.

h. Stall Recovery First action are taken to recover the aircraft at initial symptoms of stall.

- (1) Relax back pressure, att lower 0° to -1°
- (2) Open power 80%
- (3) Pull att to 5° when speed approaches V_R
- (4) VVI shows positive ROC, check height lost.
- (5) Speed approaches 110 kts set the aircraft in climb.
- (6) Level off at previous height with 135 kts.

j. **Stalling speed.**

Flaps- 18° - 63 kts 42° - 57 kts

Dirty Stall (Landing Gear Down, Flap 18°)

a. **Pre-Entry Check.**

- (1) HASELO Check.
- (2) Clear the area.
- (3) Check height at which exercise started (min 4000 ft).
- (4) Heading sel on top.
- (5) Check the stalling speed & V_R .
- (6) Carry out stall briefing.
- (7) Rpm 1900.

b. **Entry into Stall.**

- (1) Reduce speed to 135 Kts, wings level and lower gears check 3 green.
- (2) Check speed 128 Kts, lower flaps to 18% check leftt 42°.
- (3) Put TCL to Idle.

c. **Maintenance of Exercise**

- (1) Trim progressively to maintain height and VVI zero-Last trimming speed 110 (18°)/90 (42°).
- (2) Raise att gradually to maintain height.
- (3) Hold attitude till aircraft stalls.

d. **Symptoms of Stall**

- (1) Aircraft attitude – high.
- (2) Low speed.
- (3) Controls sluggish.
- (4) Aircraft judders.
- (5) Stall warning light and audi signal comes on.

e. **Stall Recovery.** First action are taken to recover the aircraft at initial symptoms of stall.

- (1) Relax back pressure, att lower 0° to -1°
- (2) Open power 80%
- (3) Pull att to 5° when speed approaches VR
- (4) VVI shows positive ROC, brakes apply, Gears up, check height loss.
- (5) Speed approaches 110 kts flaps up att 10° and set the aircraft in climb.
- (6) Level off at prev height and settle down with 135kts.

29. **Rejoin.** While leaving training area give call to Dhaka 118.3 tower for leaving the area and ask for rejoining instructions. Maintain height and radial as instructed by Dhaka tower and change to Tejgaon Tower as instructed. After changing to Tejgaon tower freq, request for traffic in the airfield. Before joining the circuit, settle down with parameters and lookout for other traffic and birds. Join downwind or call initial and pass the intention for making low go/full stop landing.)

30. After Landing Procedure & Shut down

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- a. After landing ask for dispersal and carry out 'After Landing Check' as per check list.
- b. Look for Marshaller & taxi to the parking position.
- c. Shutdown as per check list.
- d. Come out of the aircraft and do a thorough post flight inspection. Inspection whole aircraft for bird hit, oil leakage, any other damage or abnormality.

CHAPTER - 3

CIRCUIT AND LANDING

Normal Circuit Procedure (Fig -1)

1. Oval Circuit pattern is to be practiced for all training Purposes.
2. In addition to the LINE-UP checks, the under mentioned procedures are to be following before and during take off:
 - a. On brakes, carry out the following:
 - (1) Check flaps set to 18°
 - (2) Check heating System is off.
 - (3) NWS to Pedal Steering and Pedal Steering It is on in CWD.
 - (4) PCL to fine pitch.
 - (5) Advance TCL to 85% n_G , pause for a while until all Engine indications have stabilized. Then advance smoothly to the full calculated takeoff power setting.
 - b. Release brakes and maintain direct con with the help of rudder pedal, con column forward and keep wings level by Co-Pilot/Pilot Flying (PF) and TCLs by Captain/Pilot Non Flying (PNF).
 - c. Keep the nose wheel on the ground until V_R is reached.
 - d. PNF will call out speed 50, 60, 70 kts and V_1 , V_R .
 - e. Rotate the airplane to a take-off attitude of 5° and lift off the airplane.
3. After airborne maintain min 90 kts speed and att max 5° till gears up and take following action:
 - a. Brakes at a height 10-16 ft above runway.
 - b. Positive climb and Take-off speed+10 kts min, put gears up and check indicators by Pilot and co-Pilot.
 - b. Accelerate 115 kts or min obstacle clear speed and 400 ft or obstacle clear height, retract flaps. Check flaps indicator. Raise att to 10° on A/H.
 - c. TCL Set calculated max. Continuous power (80% Torque and PCL to 1900 rpm).
 - d. Carry out after take-off checks.
 - e. Height 600 ft or end of runway whichever comes later, carry out a cont climbing turn at a speed of 110-120 kts and AOB not more than 30° (15° - 20°).
 - f. Level off at 1000 ft, set TCLs to cruise power settings. (TCL 42% torque and PCL to 1700 rpm).
 - g. Roll out on downwind with speed 135 kts.
4. Call DOWNWIND and carry out "APPROACH CHECKS".
5. Abeam Threshold carry out following:
 - a. Check Hydraulic press and speed below 135 kts, lower gears.
 - b. Check 3 'Green', check landing gear indicator.
 - c. Maintain speed 128 kts with gears, abeam threshold flaps down to 18° .

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- d. Carry out landing briefing.
6. Threshold app 4/8 'O' Clock (approx 25 sec \pm wind effects from abm threshold), commence a cont descending turn to finals at AOB 17°-20°.
 - a. Set TCL to 30% torque depending on AUW.
 - b. Maintain speed 115-120 kts and ROD 200-300 ft/min.
 - c. Roll out on finals at 700 ft with speed below 105-110 kts.
7. On finals carry out the following:
 - a. Adjust TCL to 25% to maintain app speed 105-110 kts.
 - b. Carry out FINALs checks and call final.
 - c. Maintain app/glide path by ref to VASI/PAPI or runway threshold.
 - d. At a height of 50 ft (15 m) above runway, gradually reduce TCL to IDLE.
8. At the height of 10 ft (3 m) above runway gradually flare out; maintain wings level with the same power.
9. As aircraft sinks, give check to control ROD and touch down on the centre line.
10. Immediately after touch-down according to conditions:
 - a. Push-button of spoilers - PUSH AND HOLD.
11. After nose-wheel touch down
 - b. Brakes- APPLY
 - c. TCL- REVERSE RATING as required.
12. Dispersal as cleared by ATC.

NOTE:

1. Left Seated Pilot (Captain) will shift his left hand on NWS and bring the TCLs to Ground Idle by right hand.
2. Left Seated Pilot will bring the symmetric TCLs or all TCLs to reverse position observing the oil temp, cond and length of runway.
3. Apply gradual brakes to stop the aircraft.

Go-Around (Both Engine)

12. **Purpose**
 - a. Training.
 - b. If a landing can not be made due to :
 - (1) Error of judgment
or
 - (2) Instruction FROM ATC.

13. **Procedure**

Having decided to Go-round :

- a. Give call.
- b. Advance TCLs to T/ Off power settings.
- c. Positive climb, gears up.
- d. Retract flaps at 400f height and speed 115 kts.
- e. Carry out after take off checks as of normal T/off.

Touch & Go (Both Engine)14. **Purpose:**

- a. Training

15. **Procedure**

- a. Brief other crew about the intention at the end of the D/W.
- b. After touch down when the main wheels are firmly on ground, set TCLs to required T/Off power setting.
- c. Rotate nose at V_R speed and positive ROC gears up, height 400 ft speed 115 kts retract flaps.

Flapless App & Landing (Fig -2)

16. **Purpose** Flapless approach and landing is to be carried out on the following occasions:

- a. Training.
- b. In case of flap/Hydraulic sys emergency and fire in the wing.
- c. In case of landing with prop wind milling.

17. **Procedure**

- a. The procedure upto rolling out on finals is same as of normal app except lowering the flaps.
- b. Attain and maintain the speed recommended, app speed 115-120 kts by last 45° of final turn.
- c. On finals take reference from the AOA indicator.
- d. Maintain app speed & adjust TCL.

- e. Continue with normal app att till flare out.

Caution

- a. AOA shall not be more than 8°

Note:

1. In case of full-stop landing- Bring the TCLs to 0° of upright during flare out.
2. Action after touch down remain same as of normal landing.

App with 18° Flaps

18. **Purpose**

- a. Training.
- b. Strong 'x' wind
- c. In case of flap and hydraulic sys emergency.

19. **Procedure (Fig no-3)**

- a. Continue as of normal circuit pattern till end of runway.
- b. Initiate base turn with 17° - 20° AOB.
- c. At base maintain speed 115-120 kts and ROD 200 ft/min.
- d. Attain and maintain the recommended app speed 105-110 kts by last 45° of the finals turn.
- e. On finals height 700 ft, carry out Finals check.
- f. Flare out at the beginning of the runway and bring TCLs to flight idle during the initiation of flare out.
- g. Subsequent action are as of normal landings.

App with 42° Flaps (Fig-4)

20. **Purpose** Flap 42° app will be carried out for:

- a. Training purposes.
- b. If runway length is 5000 ft or less.
- c. If air field elevation is 3000 m or more.

21. **Procedure**

- a. Continue as of normal circuit pattern till base turn pt.
- b. Initiate base turn with 17°-20° AOB.
- c. At base maintain speed 110 kts.
- d. On finals TCL 20%, speed >110 kts, flaps to 42°.
- e. Open power to 30%, speed 95 kts.
- f. Adjust app to initiate flare out at the beginning of the runway and maintain TCL to min 30%.
- j. Bring TCLs to flight idle after completion of the flare out.
- k. Subsequent action are as of normal landings.

Go-Around (Both Engine)22. **Procedure** Having decided to go-round:

- a. Confirm bleed closed & Auto retraction sw-on.
- b. Give call.
- c. Advance TCL to full power.
- d. Flaps set to 18°.
- e. +ve ROC -gears up
- f. 400ft height, speed 115 kts retract flaps.

Touch & go23. **Procedure.**

- a. Brief crew at the end of D/W.
- b. After main wheel firmly on the ground, gently nose wheel on the ground & set TCL to T/O power.
- c. Set flaps to 18°.
- d. Once VR SPEED then continue as of normal touch & go.

Bad Weather Circuit (Fig-5)

21. **Purpose** Bad Weather circuit is to be carried out:

- a. Training purposes.
- b. Circling app.

22. **Procedure**

- a. Upto upwind same as of Normal circuit.
- b. Level off at 500ft & speed 135 kts:
 - (1) Level turn for 'x' wind
 - (2) AOB 30°-40°
 - (3) TCL 42%.
- c. Roll out Down wind & carry out D/W checks imm.
- d. At Base turning pt
- e. Level turns with AOB 30°-40°
- f. Speed-115-120 kts.
- g. Last 90° of Final turn
 - (1) TCL 30%
 - (2) ROD 200-300 ft/min
- h. Last 45° of final turn
 - (1) Flaps - 18°/ Landing flaps
 - (2) Speed – app speed 105-110 kts
 - (3) ROD – 200-300 ft/min
- g. Finals:
 - (1) Height 300 ft
 - (2) Continue as of normal approach & landing

Note: Circuit is to be carried out at 500 ft height, clear of cloud keeping the runway in sight.

Short Circuit (Fig-6)

23. **Introduction** Short circuit demands a very high degree of accuracy and judgment on the part of aircrew. As such it should be practiced only during dual missions. In commitment it is prohibited to carry out such circuit at Tejgoan Air field due high obstructs around the air field.

24. **Purpose**

- a. Training.
- b. Carry out circling app in marginal weather conditions.

25. **Procedure**

- a. Turn for D/W at 300 ft after take off at a speed of 110-130 kts, AOB 40°-45° with gears and flaps 18°down and TCL 50%-60%.
- b. Level off at 500 ft and carry out the D/W checks after giving the D/W call.
- c. Abm threshold commence final turn at app speed +5 kts.
- d. 90°to finals, lower flaps to 42° & reduce speed to the recommended app speed 90-100.
- e. Initiate descent to intercept the glide slope during last 45° of the final turn to roll out at 300±10 ft. Then onward continue as of normal app and landing.

26. **Purpose**

- a. Training.
- b. To land the aircraft in case of an Engine failure.

27. **Procedure**

- a. In case of an engine failure at or after V_1 take action as per check list.
- b. Positive ROC raise gears, maintain V_2 speed till 400 ft or clear of obstacles. Then lower nose to accelerate to 119 kts.
- c. Adjust live engine TCL to 80% depending on AUW. Continue climb to 1000 ft. Turn left/right to cross wind with AOB never crossing 20°.
- d. Join down wind with 1000 ft height and adjust live engine TCL to 100%.
- e. Carry out D/W checks & set TCL to 80% depending on AUW & temp & give call.
- f. Turn base with AOB never crossing 20°, TCLs 30%, maintain speed app speed +10 for flaps 18° and ROD 600-700 fps.
- g. Last 45° of turn, for flaps maintain speed 115-120 kts depending on AUW.

- h. Roll out on finals with 700 ft height & correct app speed.
- j. Intercept the G/S with flaps 18° at the correct (or slightly higher) app speed recommended.(110-115 kts)
- k. Carry out asymmetric checks before reaching the VCH of 300 ft :
 - (1) Gears down-Three greens.
 - (2) Cleared to land -(By ATC)
 - (3) Approach and R/W clear.
 - (4) Good approach (speed & approach angle correct)
- l. If the conditions are satisfied flaps can be lowered to 18° by 300 ft and make a normal app full stop landing. (approach speed 100-110 kts).
- m. If any of the conditions is not satisfied initiate go round by 300 ft .

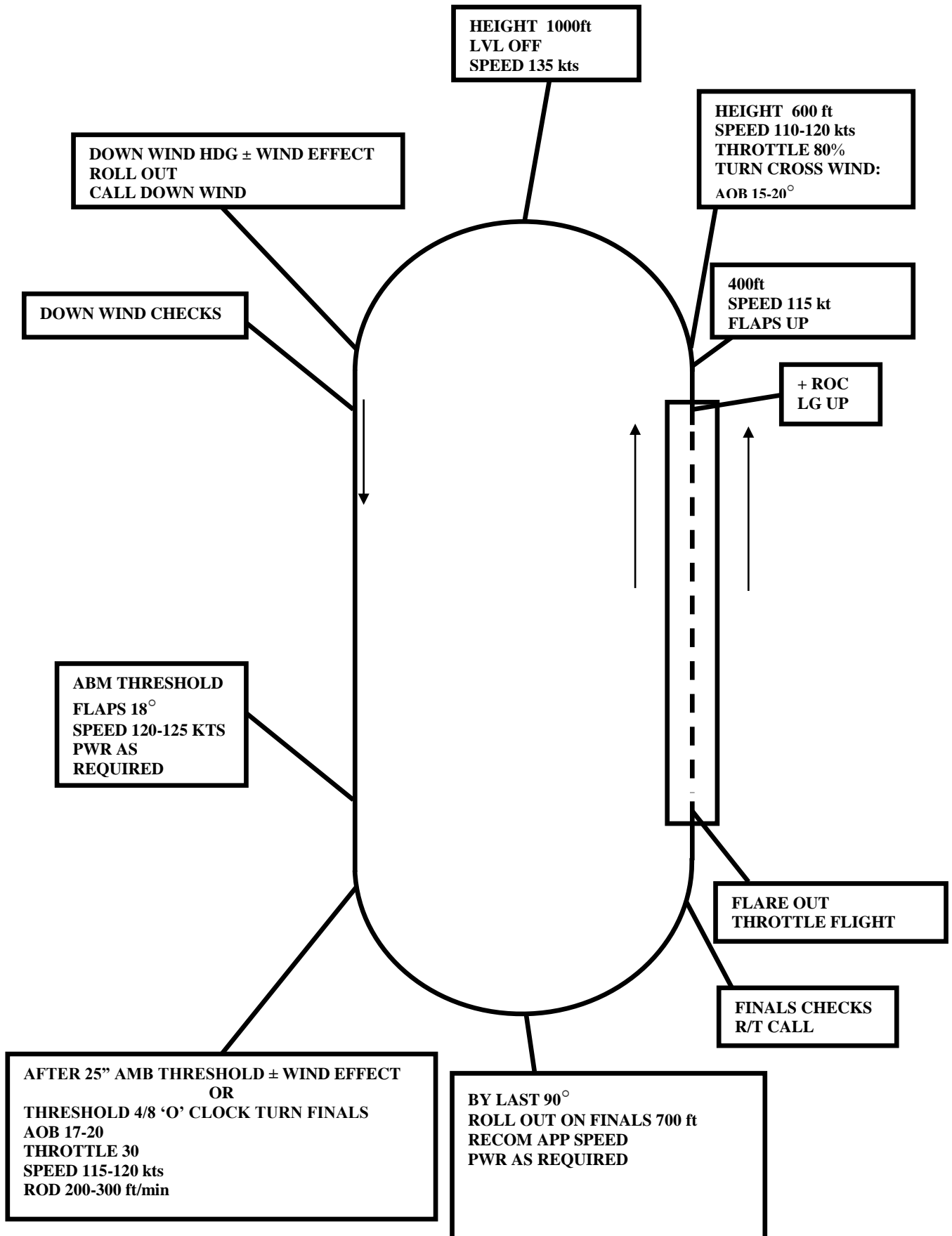
Landing with Cargo Door Open

28. **Purpose:**

- a. Demonstration flight.
- b. In case of emergency, if it is not possible to slide parachute door backward.
- c. Training.

29. **Procedure:**

- a. The circuit is same of normal circuit except on finals maintain rigidly approach speed 100-110 kts.
- b. Initial flare out at a height of 20-10 ft descending gradually until touchdown.

NORMAL CIRCUIT PATTERN**Fig: 1**

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CIRCUIT WITH FLAPS ZERO (0°)

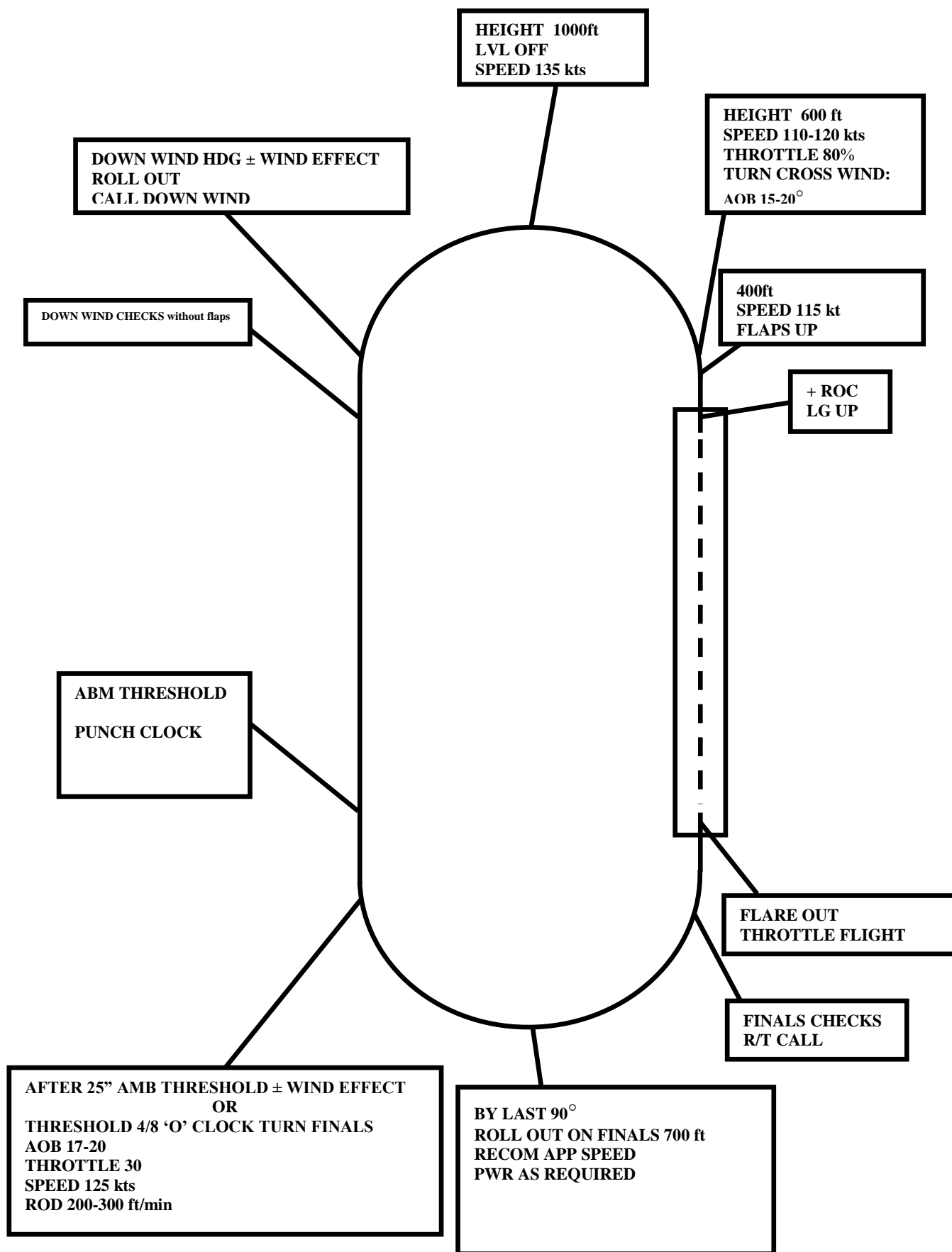


Fig: 2

CIRCUIT PATTERN WITH FLAPS 18°

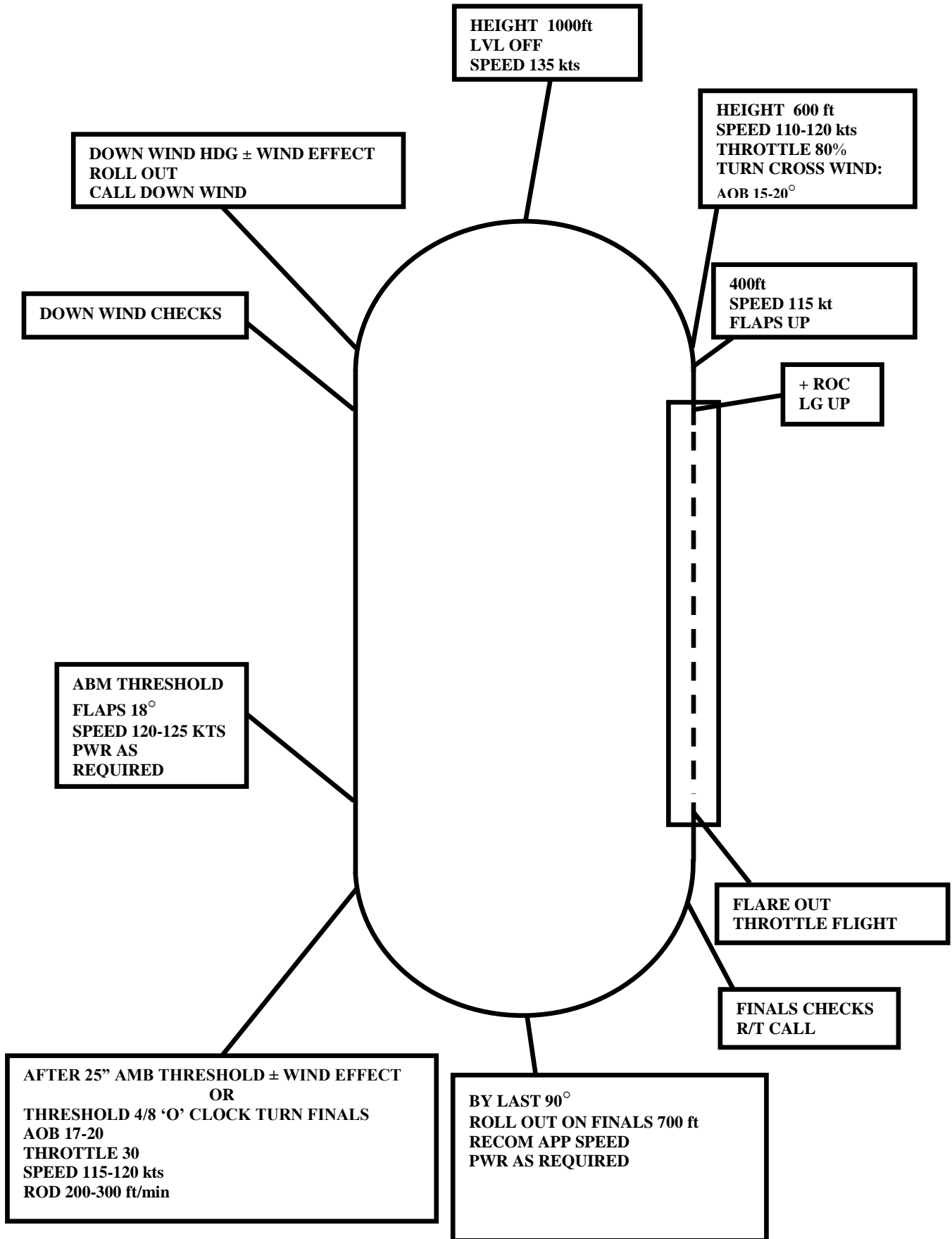


Fig: 3

CIRCUIT PATTERN WITH FLAPS 42°

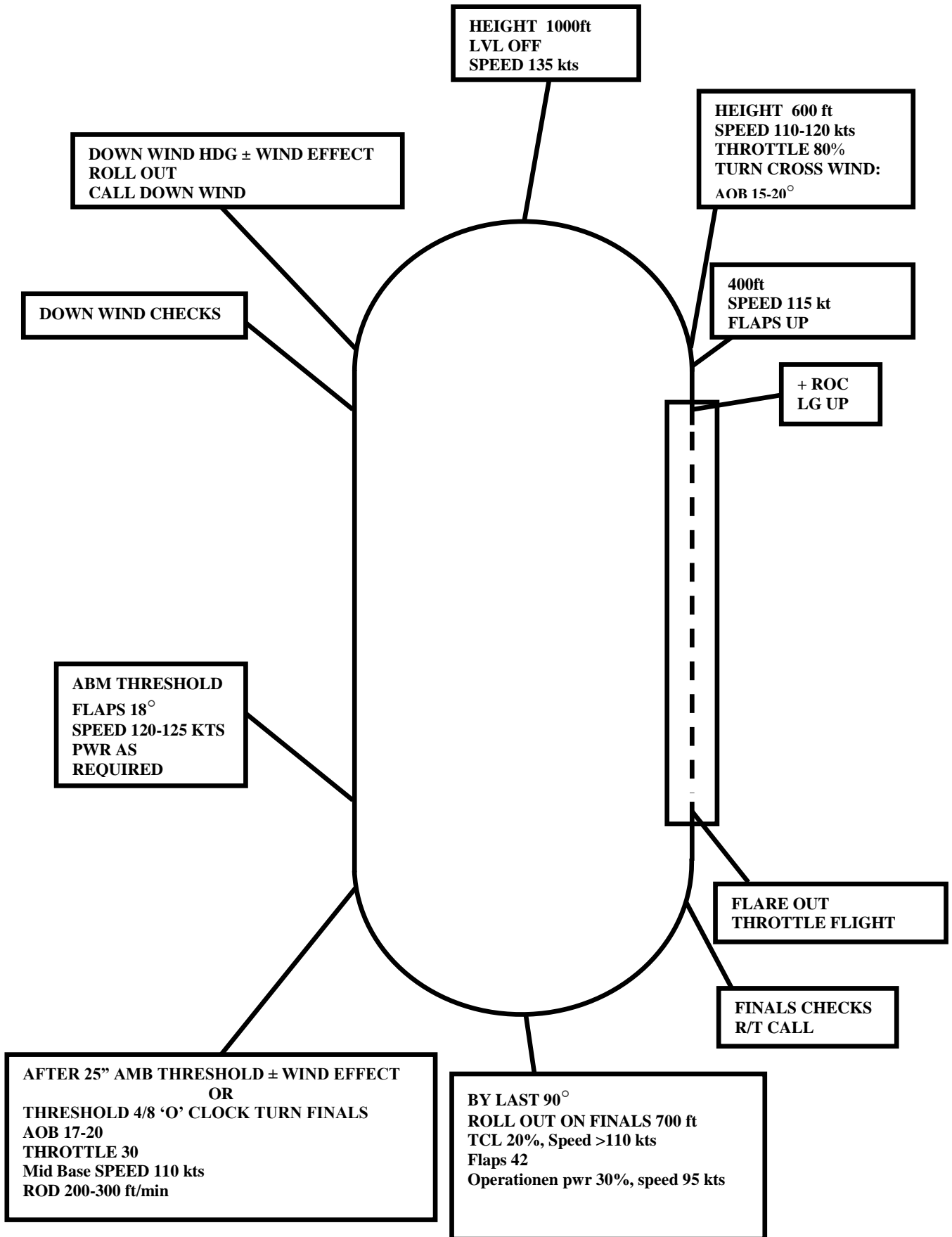


Fig: 4

BAD WEATHER CIRCUIT PATTERN

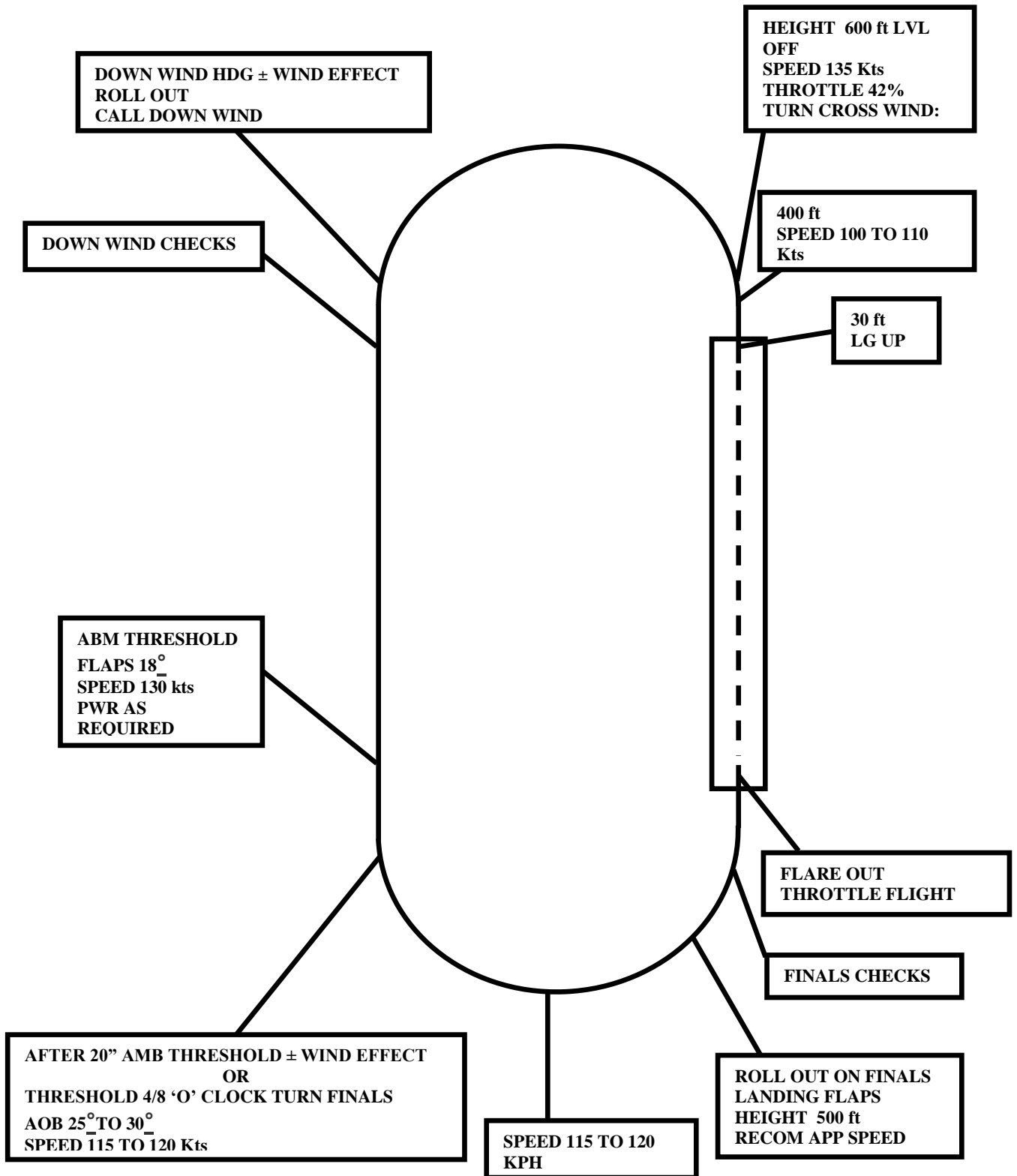


Fig: 5

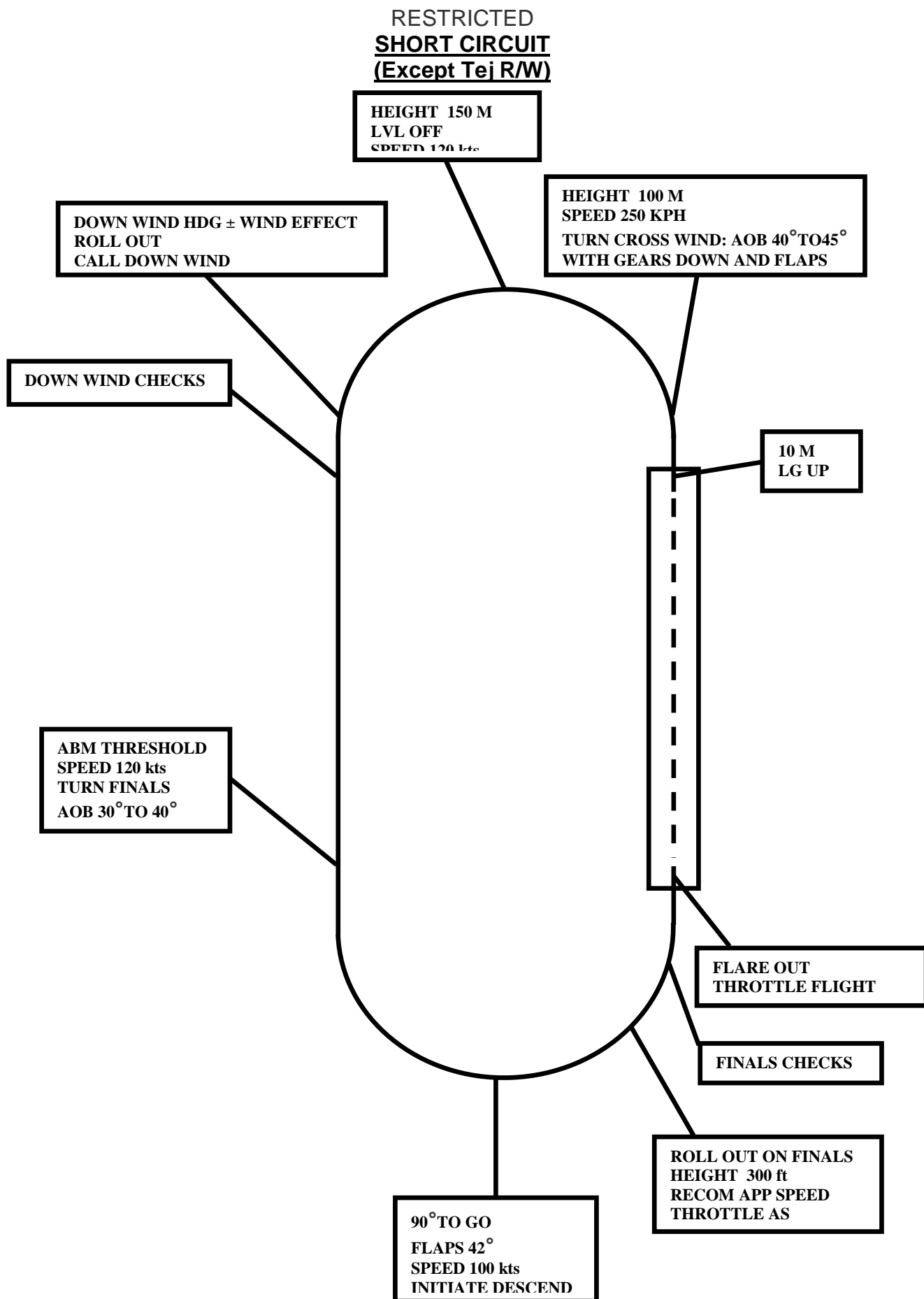


Fig: 6

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SHORT FIELD T/O AND LANDING

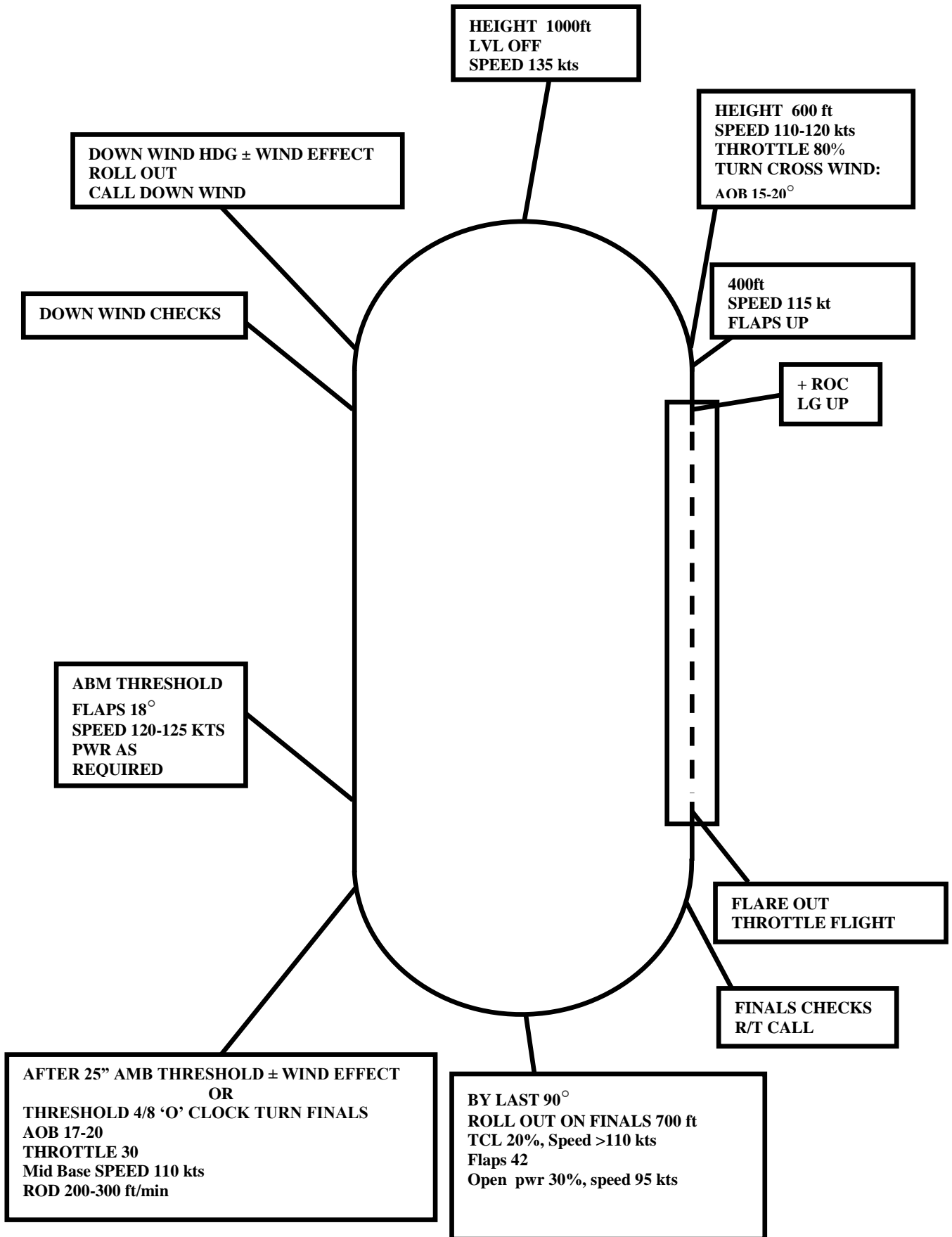


Fig: 7

CHAPTER – 4

INSTRUMENT FLYING

1. Simulator instrument flying is to be carried out to train Pilots to be proficient in handling the aircraft in actual weather conditions. Simulator instrument flying will mainly be carried out with front visor on /under the front hood covered in the following manner:

- a. Pilots are to carry out instrument checks positively while taxiing out (once clear of the tarmac area)
- b. The Pilot who is to practice Instrument flying may be remained with visor in front / front hood covered and the other pilot will action as safety Pilot for avoidance of bird and collision with other aircraft (In flight only and inside training area).
- c. The other side clearance will be provided by the Load Master/Air Steward sitting in the same side of the Pilot/Co-Pilot under hood.
- d. The partial panel practice will be carried out by dimming the PFD of his side. During this time the safety Pilot shall closely monitor the his side's PFD for any abrupt change of bank and pitch.
- e. Under hood approach shall be upto minima only. Under hood Take off landing or landing in weather conditions below the minima spec is prohibited.

2. **Increase and Decrease of speed.** When increase speed by more than 15 kts, increase power to 80% and adjust power as the speed reaches. When increase of speed is less than 15 kts, increase power to 77%. When reducing speed by less than 15 kts than retard TCL 22%. To decrease the speed, it is strictly prohibited to bring the TCL to ground idle.

3. **Turning.** Turnings are to be prac at 135 kts. Max AOB is limited upto 45° in simulator IF, and 30° in actual IF. HASELO checks are to be carried out before prac of 45°bank turns.

4. **Rate One Turn.** Rate one turn is to be prac at 135 kts and AOB is 21°. Power required to maintain 135 kts is 42% during the turn depending on AUW.

5. **Vertical S 'A' 'B' 'C' & 'D'.** Vertical S A B C & D are to be prac at 135 kts with a 100 ft/min ROD and ROC and rate one turn. Power required during descent is 15% and during climb 85% depending on AUW & temp. Approx pitch in artificial horizons 0°-1° during descent and 7°-8° during climb.

6. **Let Down.**

- a. The co-pilot shall carry all relevant maps, charts and Jeppesen manual containing original let down plates. The original let down plate may be placed in front captain and co-Pilot in addition to i Pad when carry out a particular instrument approach.
- b. The co-pilot shall carry out the briefing in details about the app before arrival over the navigator aid during descent phase to initial approach alt and carry out pre let down checks.

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- c. The Pilot flying the aircraft shall carry out part briefing of the app an subsequent actions during the let down.
- d. On inbound of let down, the gears and flaps shall be lowered under the command of the Pilot on controls from moment the minima is reached till after the missed app, gears are retracted. The hood may is to be removed latest by the minima specified for the approaching if a landing is contemplated.

CHAPTER – 5

NIGHT FLYING

1. In order to conduct efficient and safe night flying following procedures are to be strictly adhered to :

- a. A detailed night flying briefing is to be carried out by squadron operations off (SOO) or any designated officer and aircraft lighting system and night flying procedures and tech
- b. Before every sortie a mission brief is to be carried out by the captain.
- c. A blind fold cockpit check of all aircrew is to be conducted before commencement of night flying.
- d. Pilots must be have flown a day mission with in last 5 days.

2. **OIC Night Flying and Ground Supervisor.** One unit Pilot of the rank of Flight Lieutenant and above is to be detailed as OIC night flying along with one instructor/OC being on ground supervisor. OIC Night Flying who is to co-ordinate the night flying program with other units, assist the aircraft in emergency and update the aircraft position and weather scenario to on ground supervisor.

3. **Pre Flight Inspection.** It is to be carried out as per the day time In addition the following should be checked by the Load Master/Co-Pilot.

- a. Functional checks of all ext lights.
- b. Cleanliness of the canopy and wind screen.
- c. All cockpit lights.
- d. Display of the standard position.

4. **Start Up.** Before starting all crew are to put all cockpit lights. To max illumination and subsequently adjust the brightness with the dimmer. For starting the main engine pilot is to flicker the taxi lights once or twice to indicate whether the left or right engine is going to be started. Engines are to be started only after getting clearance from ground crew.

5. **Taxing.**

- a. When ready to taxi out, Co-Pilot is to switch on the taxi light and obtain clearance from the ground crew.
- b. Taxing is to be done with taxi lights on.
- c. The judgment of speed and distance is more difficult at night then day time due to lack of visual cues. Care must be taken, therefore to keep taxing speed down to norm. In case of any doubt stop immediately, use the Taxi/landing light.
- d. Switching off the taxi lights when the aircraft straightens out for stopping in the parking

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are to help the marshaller ascertain the exact position of the nose wheel.

- e. Instrument checks must be carried out whilst taxiing out (away from the maneuvering area)

CAUTION : Landing light can be used on ground for max 5 min.

6. **Take off:**

- a. Initially Pilot will remain visual by ref to the runway lights and complete transfer to instrument should be accomplished by the time runway lights disappear.
- b. 'X' wind turn is to be initiated at 600 ft.

7. **Circuit and Landings:**

- a. **Ni Circuit Procedure.** At night the circuit procedure is same as of the day time except the following:

- (1) After take off remain on instrument till 600 ft height.
- (2) On time final app take the help of the VASI,PAPI or any other available approach light system is available.
- (3) If the aircraft has not touched down within 4000 ft or avail runway length is less than 4000 ft, an immediate go round is to be executed.

- b. **Bad Weather and Short Circuits.** Bad weather and short circuits may be practice at night with specify authorization of the Officer Commanding.

- c. **Use of Lights during Take off/Landing:**

- (1) As a general rule, all take off and landing are to be carried out with landing lights on.
- (2) Taxi/no light take off and landing may be carry out for training purposes in dual mission only.
- (3) It is allowed to app and land with Taxi lights during rain, drizzle or fog.

NOTE :

- 1. During mission involving day and night flying, the aircraft's internal light sys is to be switch on 30 min before official sunset.
- 2. At night every effort must be made to give all circuit R/T calls from the standard position.
- 3. If there is a strong reflection of navigator and anti-collision lights from cloud, rain, drizzle or fog, then the lights may be switch off.

CHAPTER – 6

NAVIGATION FLIGHTS

General

1. **Purpose.** Training and commitment.
2. **Types.** The flight may be of the following types:
 - a. Med Level - 2000 ft to FI 100
 - b. Low Level - 2000 ft and below.

Preparation:

3. **Captain.** Before starting a Navigator sortie the captain must give a clear briefing on the task to be carried out.
4. **Co-Pilot.** Co-Pilot is to prepare the following items for the cross country flight.
 - a. **Preparation of Maps.** The preparation should be made as per the methods described in AP – 3456G PART A4 SEC2 CHAPT 1 and PART A5 SEC1 CHAPT 3.
 - b. **Route Weather forecast.** Weather expected at departure enroute and diversion A/F should be studied thoroughly and following info should be derived from forecast:
 - (1) Synoptic Sit.
 - (2) The best Level to fly to take advantage of the prevailing wind condition.
 - (3) The mean wind at 2/3 of height to climb and at the mid height in the descent on track.
 - (4) Winds and temps at cruising Levels.
 - (5) Icing layer including intensity of icing expected inside clouds.
 - (6) Amount of cloud cover enroute plus radar observation.
 - c. Total fuel required for the mission including diversion.
 - d. Log sheet preparation of aircraft.
5. **Co-Pilot.** Co-Pilot is to independently prepare a log sheet and map with drift lines & time/distance scale for the route and compare it with the nav. He is also to calculate V_1 , V_R , V_2 and total fuel required for the flight. He is to obtain fuel required for the flight and check that aircraft is ready for flying.

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6. **Load Master.** For commitment flight he is to prepare trim sheet, all up weight and plan the loading of the cargoes passenger to be carried. For training flight carrying of Load Master may be optional at the discretion of squadron commander.
7. **Mission Briefing.** Before the commencement of the mission the navigator will brief all crew about aim of mission, route, alternates, total distance–time fuel, individual leg dist-time-FL, Brg & Distance at TP & check points and WEATHER briefing. The CP will brief about aircraft no, fuel on board endurance, call sign, ETD, Start up, Taxi, T/O landing emergency procedure and crew detail.
8. **Start Up.** After starting of one Engine navigator should switch on radar and note the time.
9. **Taxi.** Depending on weather and switching on time RDR may be put on after entering the taxi track,.
10. **Line Up.** During back track/Line up Navigator should give departure briefing and CP should mention V_1 , V_R , V_2 and Engine failure procedure.
11. **Take Off.** During take off run Navigator should call out speed (V_1 , V_R , V_2), put Doppler to operations mode and punch the Clock along with captain.
12. **Engine Operations.**
 - a. Cruise climb technique will be followed in navigation cross- country when the route is more than 200 NM.
 - b. During cruise constant IAS is to be maintained by reducing the power.
 - c. For climb 110-120 kts IAS and for descend 150 kts IAS is to be carry out.
13. **Turning Point Drills and AMSP.** Navigator should show the turning point at least 3 min short of reaching overhead and carryout HAT check. Once visual contact is established the aircraft is to be flown straight to the point and Co-Pilot may handover the control to the instructor and prepare estimates, maps etc. for next leg.
14. After setting course FHARTI checks are to be carried out.

Use of Auto Pilot, Radar and Doppler

15. a. Maximum use of auto pilot may be made during Navigator mission with the discretion of instructor.
- b. Normally radar is to be kept in weather mode, it may be change to ground mapping as when required. At proximity of cu and cb cloud radar is to be monitored closed keeping range 20/40 NM.

Descent Phase

16. All efforts should be made to ensure that the aircraft regains the track before the descent. If the new descent path is different from the planned one, route safety height is to be revised.

Air way Flying/ Route Flying

17. While flying on air way/ ATS route, if found to be off track by 10 NM or more, the track is to be regained immediately by tracking out with the help of radio aids/by help of iPad/GTN-750 irrespective of distance to go to the destination/ turning point.

18. **Emergencies:**

- a. **Icing.** In case of icing with faulty de – icing system descent to lower altitude is to be made.
- b. **U/S Navigator Equipment.** In case of unserviceable standby compass, do not taxi out. In all other cases, asses the situation – discontinue the mission if required.
- c. **Unsure of Position.** Unsure of position, read from ground to map. Take help of iPad/GTN-750. Plot the position from VOR, NDB & DME. If doubt exists ask ground radar.

Navigation Flight Abroad

19. **Purpose.** The abroad navigation flights are to be undertaken in the following cases:

- a. Training of U/T pilots
- b. Commitment flights with passengers.
- c. Ferry flights.

20. **Crew Qualification.** The crew detailed must hold at least cat 'C' except the U/Ts (incase of training cross country).

21. **Detachment Commander.** For navigation flights abroad involving carriage of other personnel besides the operating crews, a commander may be detailed in addition to the captain. The captain himself or the squadron commander or a staff captain who is senior and experienced may be detailed as detachment commander.

CHAPTER - 7

LOW LEVEL FLYING

General

1. **Introduction.** Low flying is defined as any flying within 2,000 ft of the ground except for the purpose of taking off or landing. Modern operational techniques necessitate low flying by most types of aircraft in support of ground forces to penetrate radar defenses.
2. **Purpose.** Low level navigation missions may be carried out by L 410 UVP-E20 aircraft under the following occasions;
 - a. Training.
 - b. Tactical requirements.
 - c. Search and rescue/Recce mission
3. **Authorization.** OC/Flight commander is to authorize the mission with specific minimum height. AGL.
4. **Public Nuisance.** Low flying by noisy and high speed aircraft such as the L 410 UVP-E20 causes considerable annoyance to the public. Flights should not be made below the height necessary to achieve the object of the exercise.
5. **Altimeter Settings.** On ground QFE is to be set in the altimeter. The regional QNH with altimeter correction is to be set if a climb to safety height becomes necessary.
6. **Height Restrictions.** Height restrictions as per AIP and AFM 60-1 to be adhered to at all time unless otherwise any specific requirement is imposed by Air HQ.
7. **Radio Altimeter.** Minimum height will be set on the radio altimeter.
8. **Speed.** A constant ground speed of 150 Kts is to be maintained for low level Navigator mission.

Preparation Before Flight.

9. **Route Selection.** Route has to be selected after considering following factors:
 - a. Clear of known ground obstructions.
 - b. Not through restricted airspace.
 - c. Not over populated and build up areas.
10. **Selection of map.** The half million topographical map will be used. The half million are useful for pre flight study of significant features.

11. **Marking the Map.** Map is to be prepared as per the Annex 'A' to this chapter.

12. **Preflight Briefing.** Before a low level flight begins, the crew must be given a clear brief on the task, any restrictions enroute and flying limitations is to be observed. In particular the minimum height to be maintained and the minimum visibility below which they must abandon the low level phase of the flight are to be specifically mentioned. The crew should build up a mental picture of the route and should be aware of check points before take off.

13. **Weather Minima.** Weather forecast of the entire route is to be obtained from local met office. The visibility must be more than 5 Km and cloud not more than 2 Octas at or below 1000' AGL.

During Flight.

14. **Safety Height.** In any emergency or requirement safety climb height is 2000 ft AGL.

15. **Weather.** It is possible to detour around an area of Low cloud provided that it is of limited extent. If there appears to be no way round the cloud, climb to a safety height and obtain radar or Air Traffic Control.

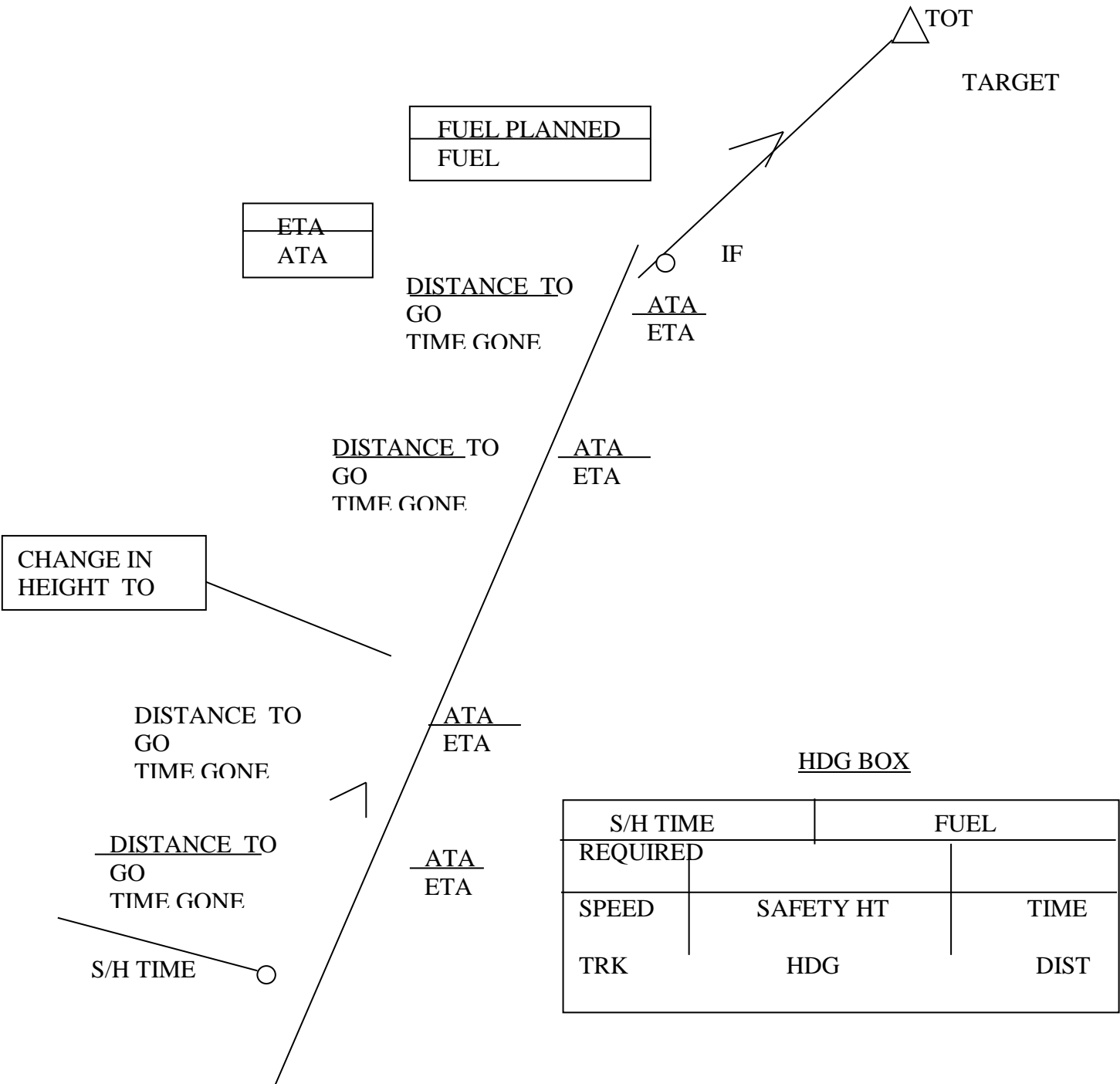
16. **Fuel and Other Checks.** Every after 10 minutes fuel quantity and pressure will be checked by CP and Captain must acknowledge. To compare with planned and actual fuel left Co-Pilot should check the fuel at each turning point and calculate the mission fuel requirement.

17. **Turning Point Drills.** Turning point drills remain same as of medium level Navigator missions. Emphasis will be given for quickest possible safe turn to the next leg (up to 30° of bank). During turning one pilot will remain exclusively with the controls and lookout and other will carry out the checks.

18. **Emergency.** During low level flight, emergencies call for the prompt actions. When an emergency arises at low level the probability is that less time will be available for thinking and actions than at height. During low level frequent emergencies are:

- a. Bird Hit.
- b. Collision.
- c. Unsure of Position.

NOTE: Actions are to be taken as per the FOB.



CHAPTER - 8

SINGLE ENGINE PROCEDURE

General

1. In case of single Engine procedure either actual or simulated, the circuit pattern is to be followed as of normal circuit except the changes mentioned in the subsequent paras.

2. On finals maintain slightly overshooting approach with higher recommended speed as per flight check list.

3. **Engine Failure in Flight**

a. **Immediate Actions**

- (1) Control the aircraft
- (2) Identify the failed Engine
- (3) 80% power on live Engine (if required).
- (4) Dead Engine Automatic Feather, if not depress Manual feather.
- (5) Carryout clean up checks depending on situation.

b. **Subsequent Actions**

- (1) Close fuel shut off valve
- (2) TCL idle of the failed Engine
- (3) Switch off generator of the failed Engine
- (4) Inform ATC
- (5) Trim, if required.
- (6) Land as soon as possible

4. **Engine Failure before V₁**

Follow the procedure as per the flight check list.

5. **Engine Failure at or after V₁**

- a. Continue take-off
- b. Confirm failed Engine prop feathered. Proceed as per Chapter 2 of this SOP.

6. **Engine Failure in the circuit**

- a. In case of bad weather circuit – climb to normal circuit altitude if possible.
- b. Lower gears and flaps after abeam threshold depending on AUW and wind condition.

7. **Engine Failure in the Final Approach**

- a. In case Engine fails in the final approach, take appropriate actions depending on the reactions time, situation and at the discretion of the Captain.
- b. If Engine fails just before flare out, control the aircraft and make straight landing.

8. **Asymmetric Checks.** On final approach before reaching the visual committal height (VCH), satisfy the following four conditions:

- a. Gears down – 3 Green.
- b. ATC clearance to land.
- c. Approach path and runway clear.
- d. A good approach (Speed and Approach angle correct).

CAUTION

- a. Decide whether to land or not by visual committal height (VCH = 300').
- b. Select flaps 18° only when the aircraft is committed to land.
- c. Go-around is not allowed below VCH with flaps 18°.
- d. Go-around is strictly prohibited with propeller wind milling.
- e. Do not exceed bank beyond limitation.

9. **Voluntary Engine Shutdown Procedure**

- a. For training purpose voluntary engine shut down in air is prohibited unless otherwise situation dictates or Air HQs approval is sought. In such case shut down only Right Engine and relight in Air.
- b. For the purpose of FCF where two instructor pilots with valid Cat are conducting, voluntary engine shut down and air relight is allowed. In such case ATC should be intimated before the flight and an entry in authorization book and F-781 is to be made.
- c. The minimum height to carry out voluntary engine shut down in flight is FL60 if operating around the Airfield within 10 NM. If beyond that the operation to be carried out at /above FL 80.
- d. The chronological actions in respect of actual engine shut down in air are appended below:

- (1) Both PCL - 1900
- (2) Left engine power – 80
- (3) Right engine power – Idle
- (4) Manual feather button (right) - Press
- (5) Fuel shut off valve (right) - Shut
- (6) DC & AC Gen (Right) – Off
- (7) Fuel pump (right) – Off
- (8) PCL (right) – Feather
- (9) Engine starting ELU (4 sw) – Off

Caution: Single engine speed – 108 – 119 kts recom up to 162 kts engine can be started (bank max 20°) (toward the live engine)

e. The Air start procedure are as follows:

- (1) Rt TCL - Idle
- (2) Rt PCL - Feather
- (3) Heating - off
- (4) Engine starting, ELU on (4 sw)
- (5) Auto Feather, Auto Bank Cont sw (2 sw) - off
- (6) Fuel stop cock – open (upto red mark)
- (7) Fuel pump (right) – on
- (8) DC & AC Gen – off (Confirm)
- (9) Engine start Button (Right) – press 3 sec
- (10) By 12 sec Idle parameter,
 - Max ITT - 730°C
 - Max Torque – 10-15
 - NG – 57 + 3
 - NP – 400 ± 50
- (11) Fuel stop cock – open détente
- (12) PCL (Right) – Coarse pitch
- (13) PCL (Right) -1900
- (14) TCL (Both) – 40
- (15) AC & DC Gen - on

CHAPTER - 9

EMERGENCY DRILL

Actual Emergency

1. In case of any actual emergency, all actions are to be taken as per the flight manual, check list, flying order, SOP and AFM 60-13.

Simulated

2. For training purpose, emergencies may be simulated by switching off circuit breakers which will not endanger the flight.

Asymmetric Flight

3. Simulated and Actual asymmetric flight may be carried out as following

a. Simulated asymmetric flight is to be carried out by bringing the TCL to 20% position. Such flights are to be done by all pilots during their continuation training and tests. All actions are only to be called out. Go around below 300 ft and Touch & Go are to be carried out with both Engines.

b. Actual asymmetric flight is not to be practiced in any missions other than FCF. All actions are to be annotated in the authorization book. For actual asymmetric flight ATC must be informed.

CAUTION

Simulated/Actual asymmetric flight is not to be carried out from nose lift off till gears are retracted .

CHAPTER - 10

FORMATION

Purpose

1. Formation flying in L 410 UVP-E20 aircraft is to be carried out for the following purposes :
 - a. Training.
 - b. Demonstration/display.
 - c. Other operational requirements.

Crew Qualification

2. Formations are to be led by the captain detailed for the mission. For commitment/display all the pilots have to have valid operational starm as captain and as copilot from respective crew position.

Mission Planning

3. A detailed planning is to be made which should include following :
 - a. Crew details.
 - b. Training syllabus (Exercises).
 - c. Operations al requirements.
 - d. Mission fuel planning.
 - e. Navigation and weather factors.
 - f. Recovery.
 - g. Diversion.
 - h. Emergency.

Mission Briefing

4. A through pre-flight briefing is to be conducted by the formation leader. All maneuvers are to be executed as per the briefing.
5. The briefing shall include the following:
 - a. ATC/Met.
 - b. Nomination of leader and Deputy leader.
 - c. Call sign.
 - d. RIGHT procedure.
 - e. Start up.
 - f. Taxi.

- g. Line up.
- h. Take off.
- j. Climb and join up.
- k. Mission profile (Exercises).
- l. Periodic instrument checks.
- m. Loss of contact.
- n. Fuel.
- p. Rejoin.
- q. Recovery procedure and Landing procedure.
- r. Diversions procedures.
- s. Emergencies.

Radio Procedure

6. a. **Frequency**. Tower frequency in use is to be maintained in VHF-1. A predetermined suitable frequency is to be set in VHF-2 for inter aircraft communication. Both frequencies are to be checked on ground. A common frequency is to be tuned and kept on as a standby mode of communication.

b. **Calls**. R/T calls are to be given by the leader or the captain acting as the leader.

Start up

7. Formation leader is to obtain permission for start up and on monitoring the call other members are to start up.

Taxi

8. While taxiing stagger distance of 300' is to be maintained. Taxiing sequence will be in the order of take off sequence.

Line up (Fig-1)

9. Aircraft will line up in the alternate halves of the runway at a stagger distance of 300' depending on the cross wind components. The leader shall obtain clearance for line up and take off.

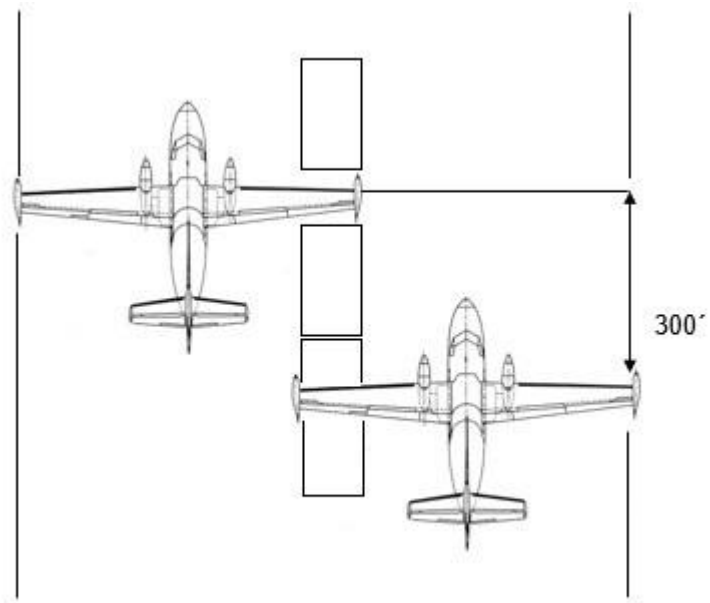


Fig 1

Pre Take Off and Take Off

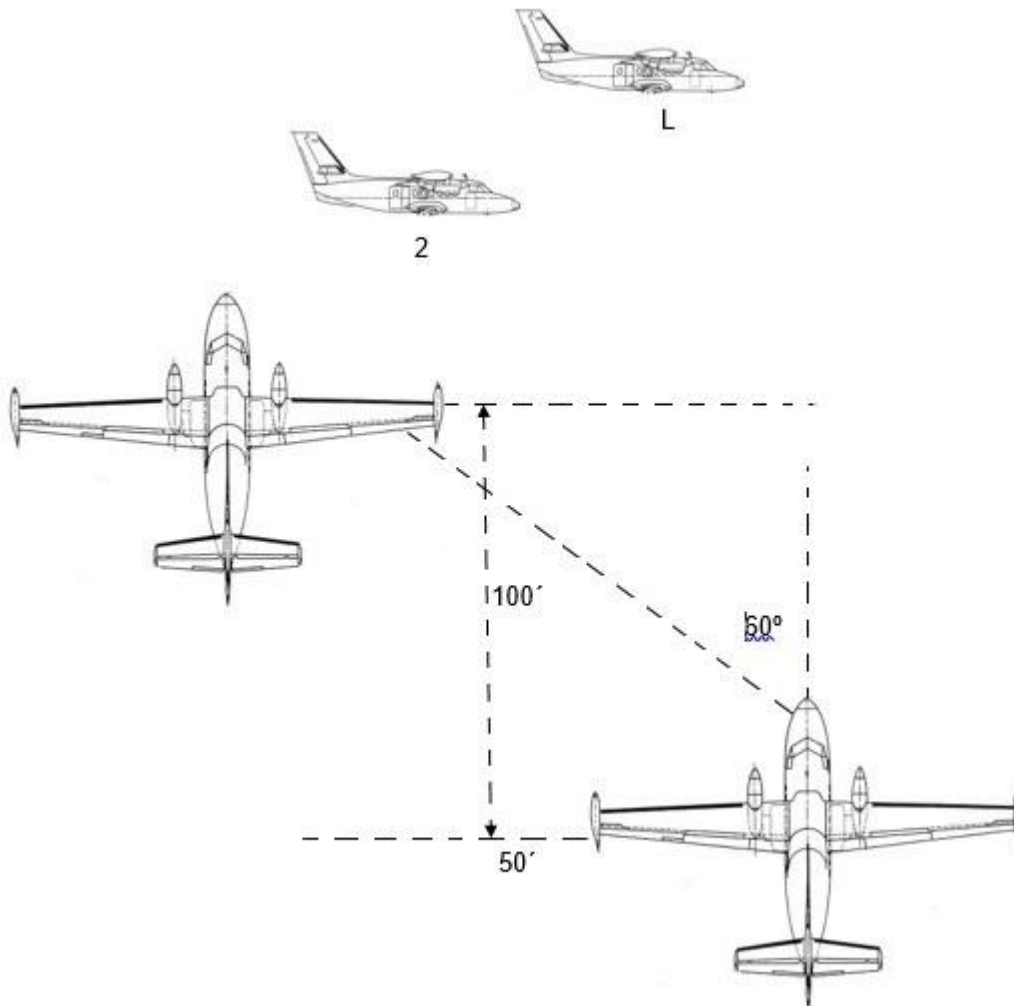
10. All aircraft are to complete the pre take off checks on the taxi way. All take offs are to be in stagger. The second aircraft will roll once the lead gets airborne or at least 10" stagger; subsequent aircraft will roll 10" after the aircraft ahead gets airborne. During take off roll lead aircraft will Open power to 90%. Others will initially Open recommended T/O power, later on as required.

Climb and Join Up

11. Once T/O checks are over, the lead aircraft will reduce power to 70%, rpm 1900 for steady climb.

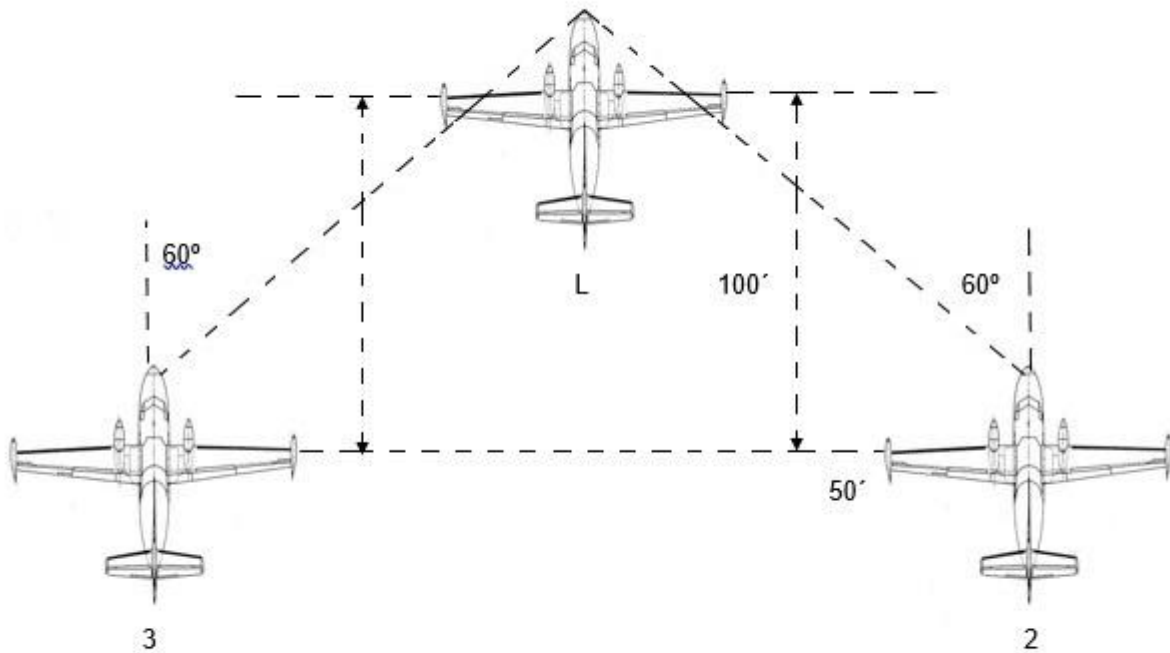
Echelon (Fig-2)

12. In echelon, formation aircraft shall keep a lateral distance of 30' and longitudinal distance of 50' from wing tip to wing tip maintaining slightly lower so that both surface of the wing are visible.



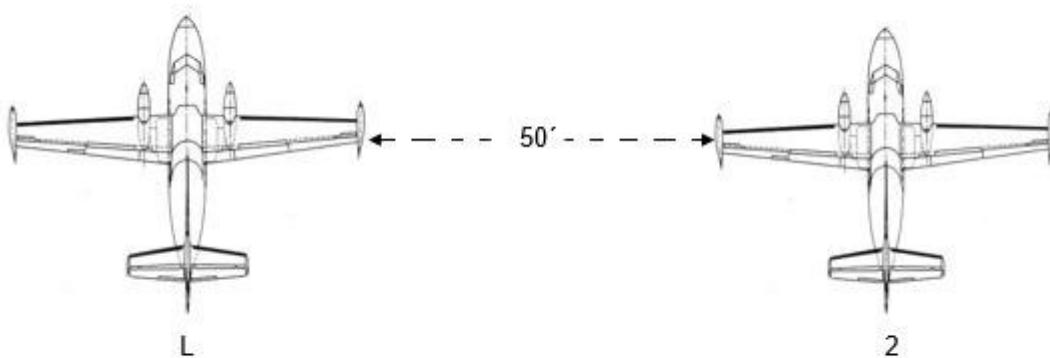
VIC Formation (Fig-3)

13. The VIC formation is carried out with 3 or 5 aircraft. In VIC formation the wing members are to maintain the position as of echelon. The right echelon member is to be termed as No-2 and left echelon member No-3; No-3 will action as deputy leader.



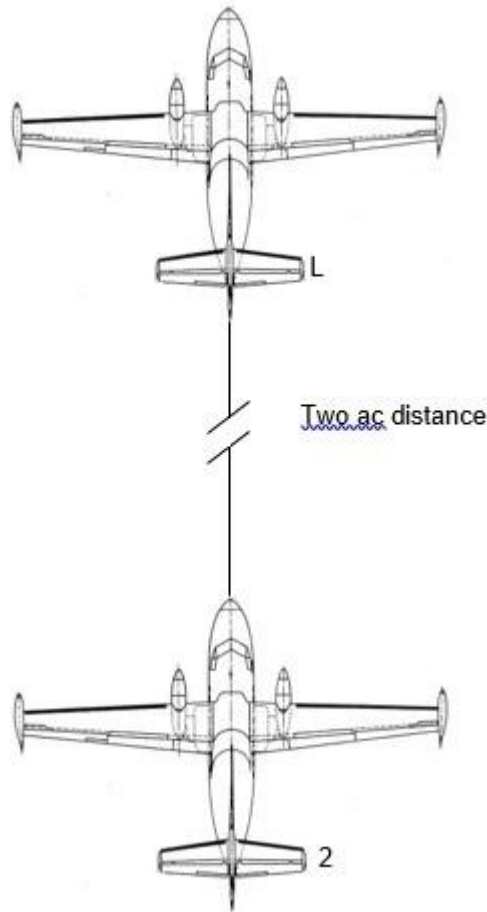
Line Abreast (Fig-4)

14. In line abreast, the formatting aircraft shall be positioned along the lateral axis of the lead aircraft at a distance of half wing span (30 ft) and slightly below.

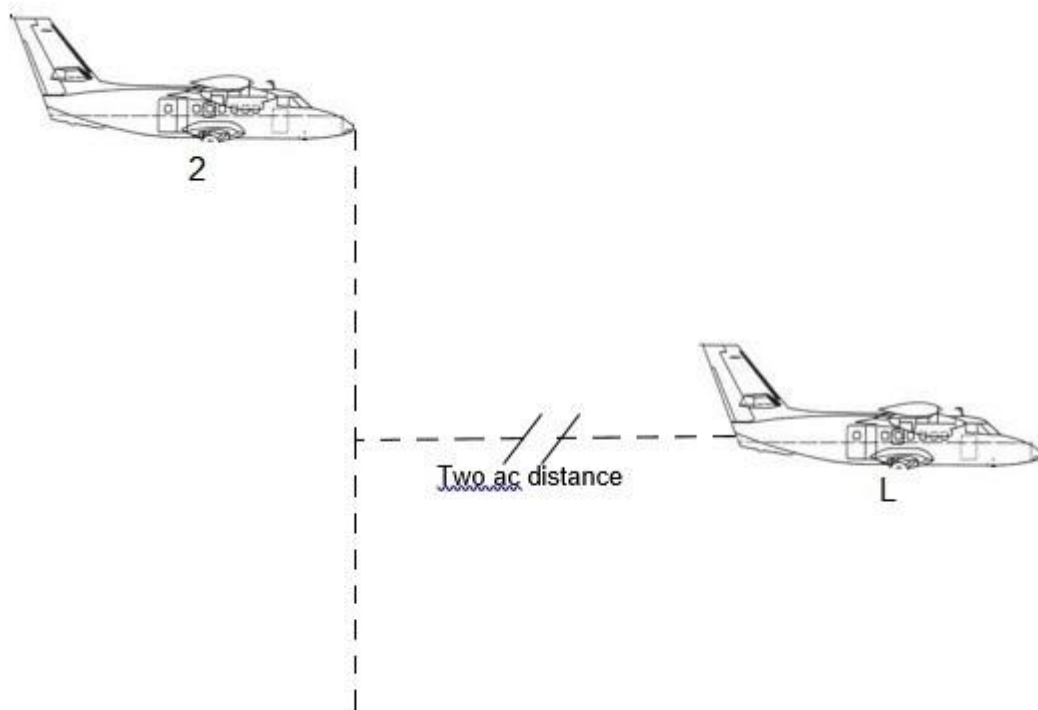


Line Astern (Fig-5)

15. In line astern, the formatting aircraft shall be positioned along the longitudinal axis at a distance of two aircraft length (100 ft) and slightly below to avoid slip stream.

**Trail Formation (Fig-6)**

16. The formatting aircraft shall be positioned along with the longitudinal axis of the lead aircraft like line astern. But slightly above the IBV leader keeping constant visual contact. (Only upper surface remains visible).



Pitching Out and Rejoin

17. Pitching out and rejoin are to be carried out at the leader's instruction at a stagger of 5 sec. The lead aircraft is to initiate a 30° level turn towards clear side and roll out 180° in the opposite direction. After counting, 5 sec No-2 is to follow. After roll out No-2 is to establish visual contact with the lead aircraft, and call "In contact". After that lead aircraft is to turn to the side No-2 is to join up. Joining is to be done always from below the leader's level.

Break Off and Rejoin

18. Once lead gives the signal/call to No-2 for break off, No-2 is to break off towards clear side putting 45° bank and about 15° pitch up with power 90°/100°; after 90° direction change (max) reverse bank to establish contact with the lead, call "In contact" and adjust power to join on the side the lead is turning. During break off and rejoin speed will be 150-165 kts. Joining is to be done from below the leader's level.

Looking Out Reporting

19. It is the responsibility of all the members to keep sharp look out for orientation, especially navigator is to keep orientation in training missions. In operational mission the area for look out may be disturbed among the crew members and should be reported to the leader.

Periodic Checks

20. Every after 15 min "Operations Normal" call is to be given.

Descent and Recovery

21. Descent is to be performed with min 30% power setting by lead aircraft and speed 150 kts.

22. Before calling initial at 1000' change formation to echelon. After crossing the threshold the lead will pitch out first and subsequent aircraft will pitch out at 5" stagger. Then onward, all actions are to be carried out individually for landing. Aircraft is to land on the alternate halves depending on cross wind components. In case runway width is less than 150', all aircraft are to land on the center line exercising caution for wake turbulence. For taxiing into dispersal, the taxi sequence is to be as of landing sequence except when back tracking is required. All aircraft are to be switched off together on call from leader.

Emergencies

23. During formation flying any member experiencing any emergency is to inform the leader and take the following actions as applicable:

- a. **Before T/O.** Inform the formation leader and return to dispersal.
- b. **During T/O.** If lead aborts, all other formation members are to abort. If No-2 aborts then No-3 may take off with the permission of formation leader provided No-2 to be cleared off the runway.
- c. **Bird Strike.** On suspected bird strike immediately break off maneuvering the aircraft gently, climb to safety alt and check the extent of damage. If required, take the help of

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other formation member and carry out controllability check. If unable to continue with the formation, head for the base and land ASAP.

d. **R/T Failure.** If R/T fails on ground, discontinue the mission. If leader's R/T goes off in the air, No-3 will take over as a leader. After assessing the situation, the leader is to decide whether to continue or discontinue the mission. He may communicate on HF to the deputy leader if required. The aircraft having serviceable R/T will give all calls for aircraft with unserviceable R/T.

e. **Collision.** After collision both the aircraft will immediately break off and carry out controllability check. Both aircraft shall land back ASAP in loose formation (if possible).

f. **Any Other Emergency In Flight.** If any other emergency occurs in flight, inform the leader accordingly. Leader will decide either to continue or discontinue the mission.

Loss Of Contact

24. **Immediate Actions.** If in clear weather carry out standard break off and rejoin. If inside cloud immediately shift attention to instruments and take the following actions immediately

a. **Straight and Level Flight.** The lead will continue, No-2 is to transmit immediately "NO CONTACT". Then initiate a level turn towards clear side, roll out 45° off, resume original heading after 30" and maintain height and heading called out by the leader.

b. **Straight Climb.** Same as of st and level flight except that the lead will continue to climb and No-2 will level off immediately. Resume climb, maintain a vertical separation of 1000' min till visual contact is re-established.

c. **Straight Descent.** The lead will continue, No-2 is to transmit immediately "NO CONTACT, BREAKING OFF". No-2 is to then level off and resume original heading after 30". Resume descent maintaining 1000' of height difference till visual contact is re-established or min safety height is reached by the leader. In the later case individual recovery through instrument let down is to be carried out.

d. **During Turns.** During level, climbing or descending turn, the No-2 is to give "NO CONTACT" call immediately then take following actions:

(1) **Out Side Turn.** After informing the leader No-2 is to roll out and fly for 30" then resume turn on to heading and height the leader calls out on R/T. Both aircraft shall maintain same amount of bank.

(2) **In Side Turn.** After informing the leader No-2 is to Increase bank to 45°. The leader will straighten out for 30" and resume bank with climb/ descent/ level flight as before. No-2 will continue to turn and level off; resume level flight, climb or descent at leader's instruction and turn on to the heading the leader calls out. Both aircraft shall maintain same amount of bank.

25. **Subsequent Actions.** On failing to establish contact both aircraft will head for rendezvous point after taking immediate actions as mentioned above maintaining a height difference of 1000' min. On reaching rendezvous point, No-2 will make left hand orbit at

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specified height as decided before the mission leader will also make left hand orbit at a height 1000' lower than that of No-2; on establishing contact , No-2 will join as per the instruction of the ldr. If no joy, determine ground position and carry out individual recovery.

NOTE:

1. While flying formation over mountain or sea, the formation must not operate below safety height (Radio altimeter is to be set to the safety height).
2. During formation briefing, the subsequent composition of the formation should be specified in case of any ground or air abort.
3. Rendezvous point is to be selected before flying the mission.
4. In side cloud no turning with more than rate one by the leader is to be carried out.

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:

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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

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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.** Check 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".

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- 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.

RESTRICTED

- 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 18⁰ 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.

RESTRICTED

Pre-Initial Point (PIP) selected so that the course from that Point to the IP will permit a formation turn over the IP to the DZ of not more than

PIP

IP natural or man-made terrain a feature which can be easily recognized at or near a point from which a straight course can be flown on the desired axis of approach to the DZ

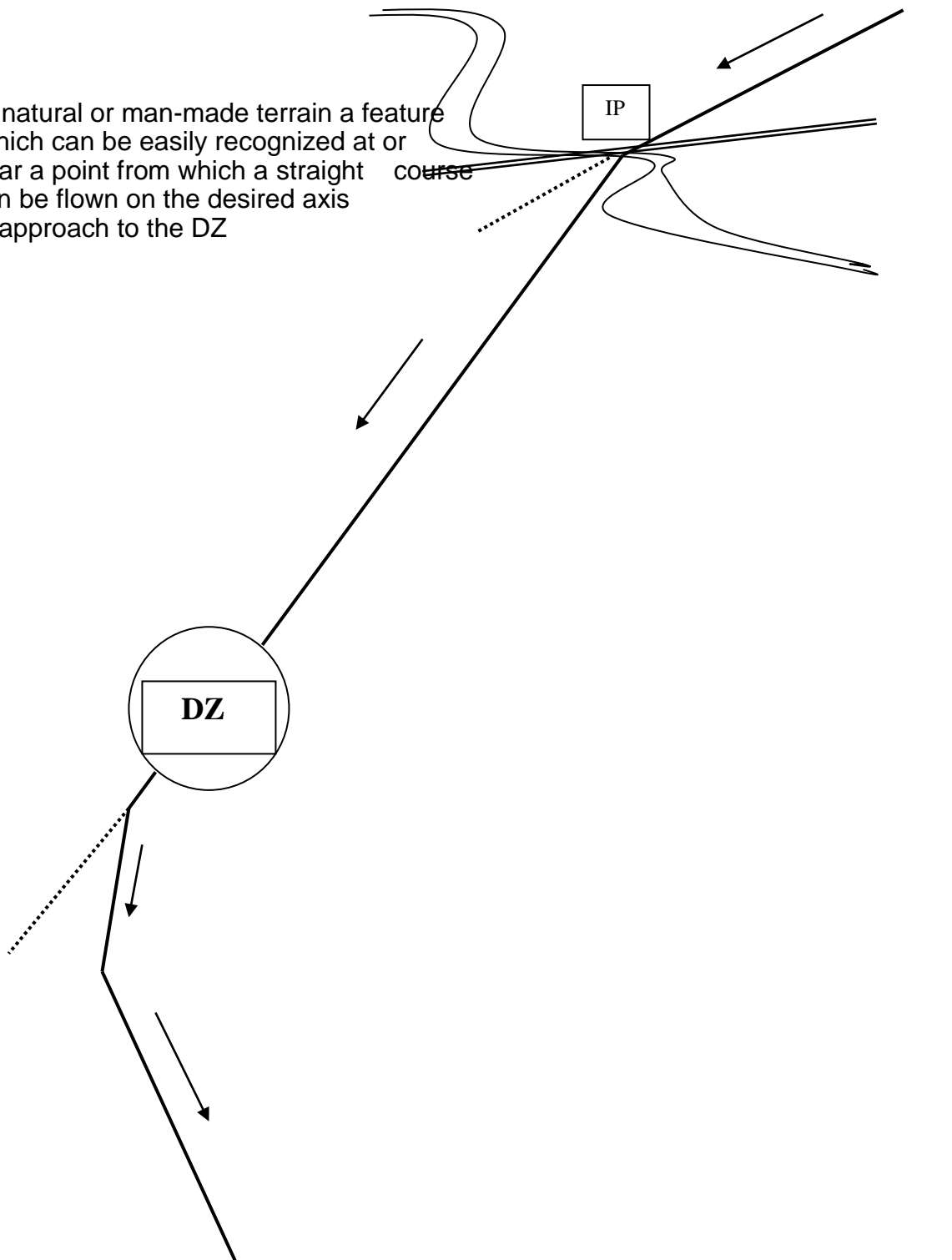
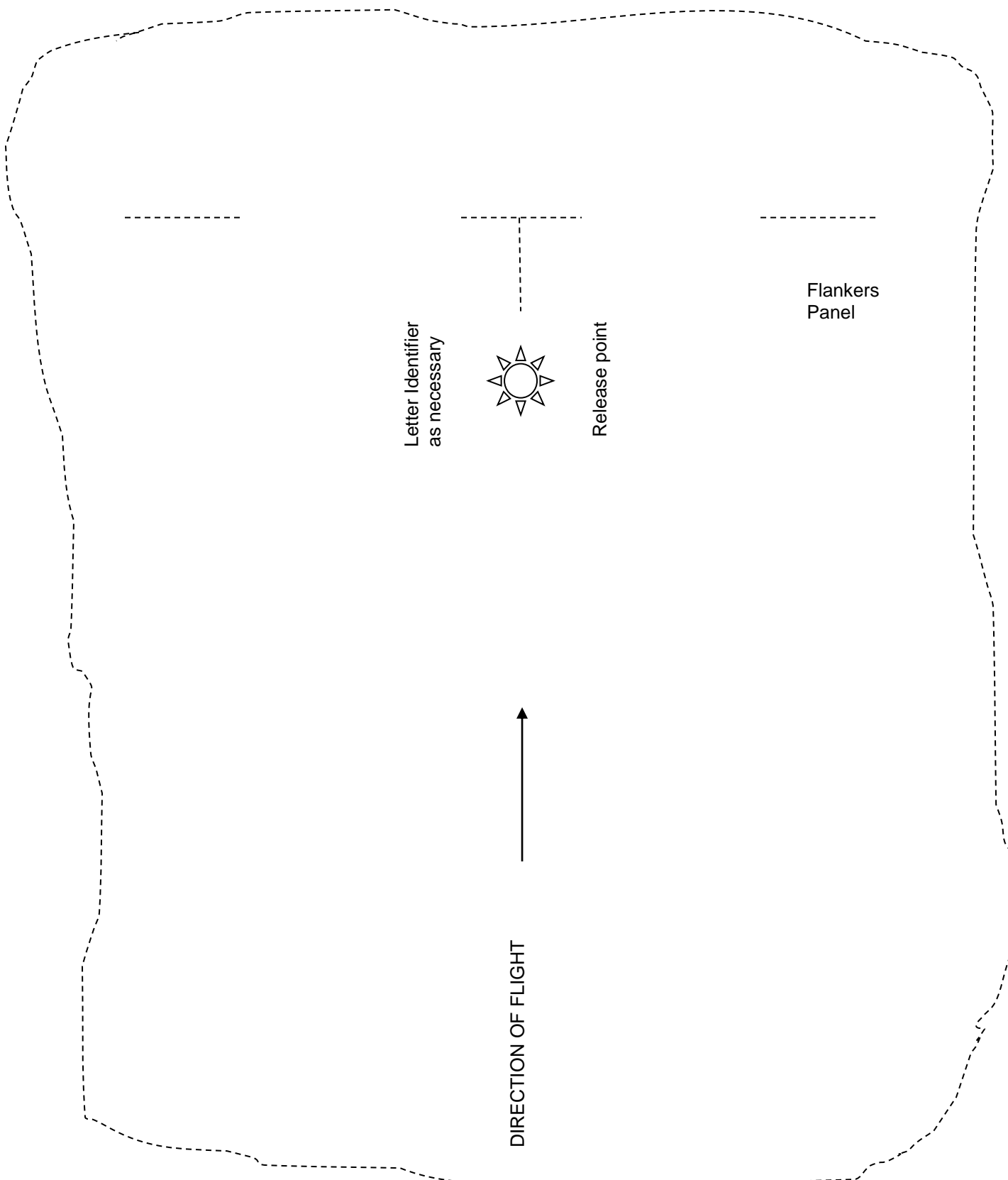
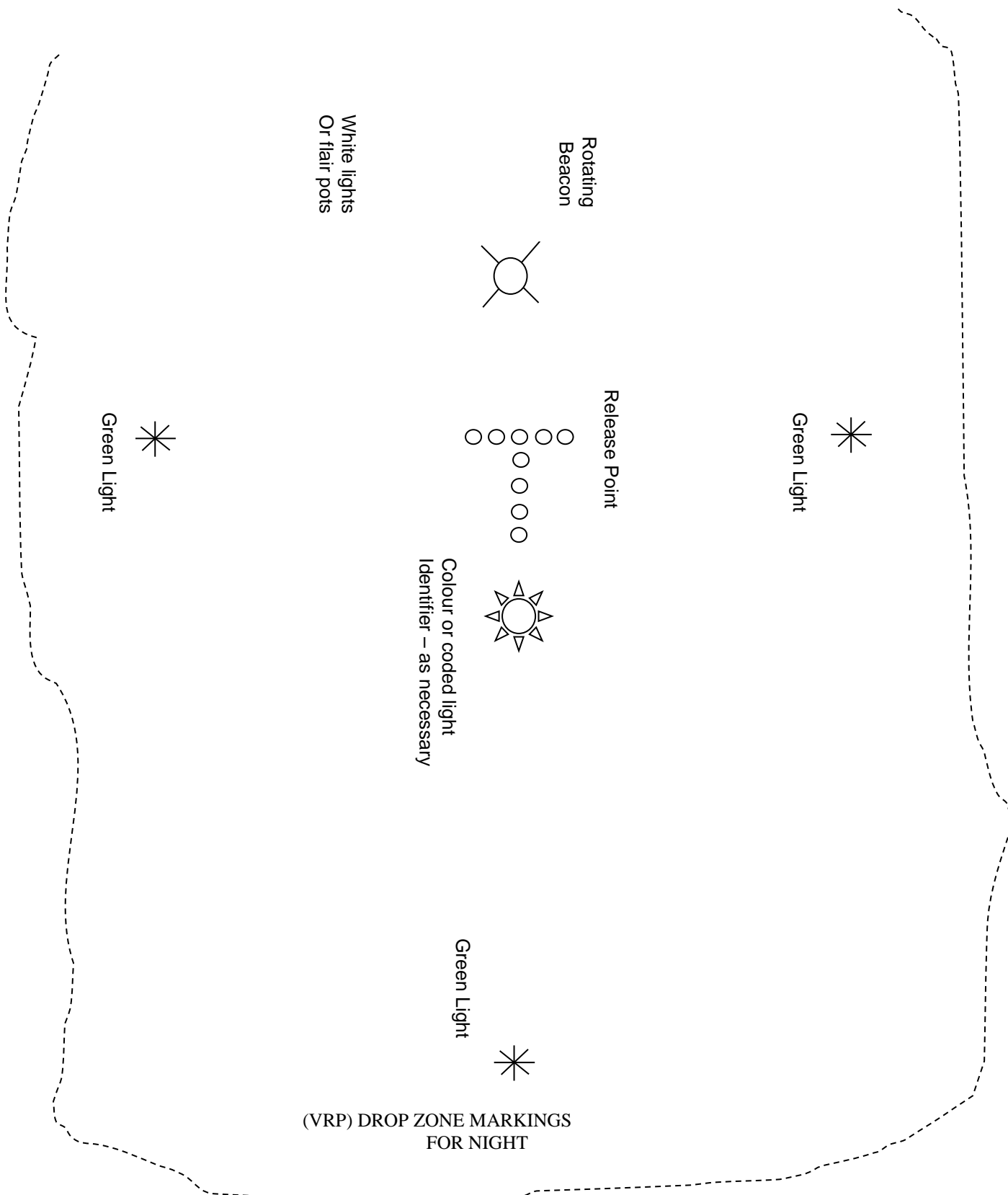


Fig : Drop Zone Area Route Procedure(Example)

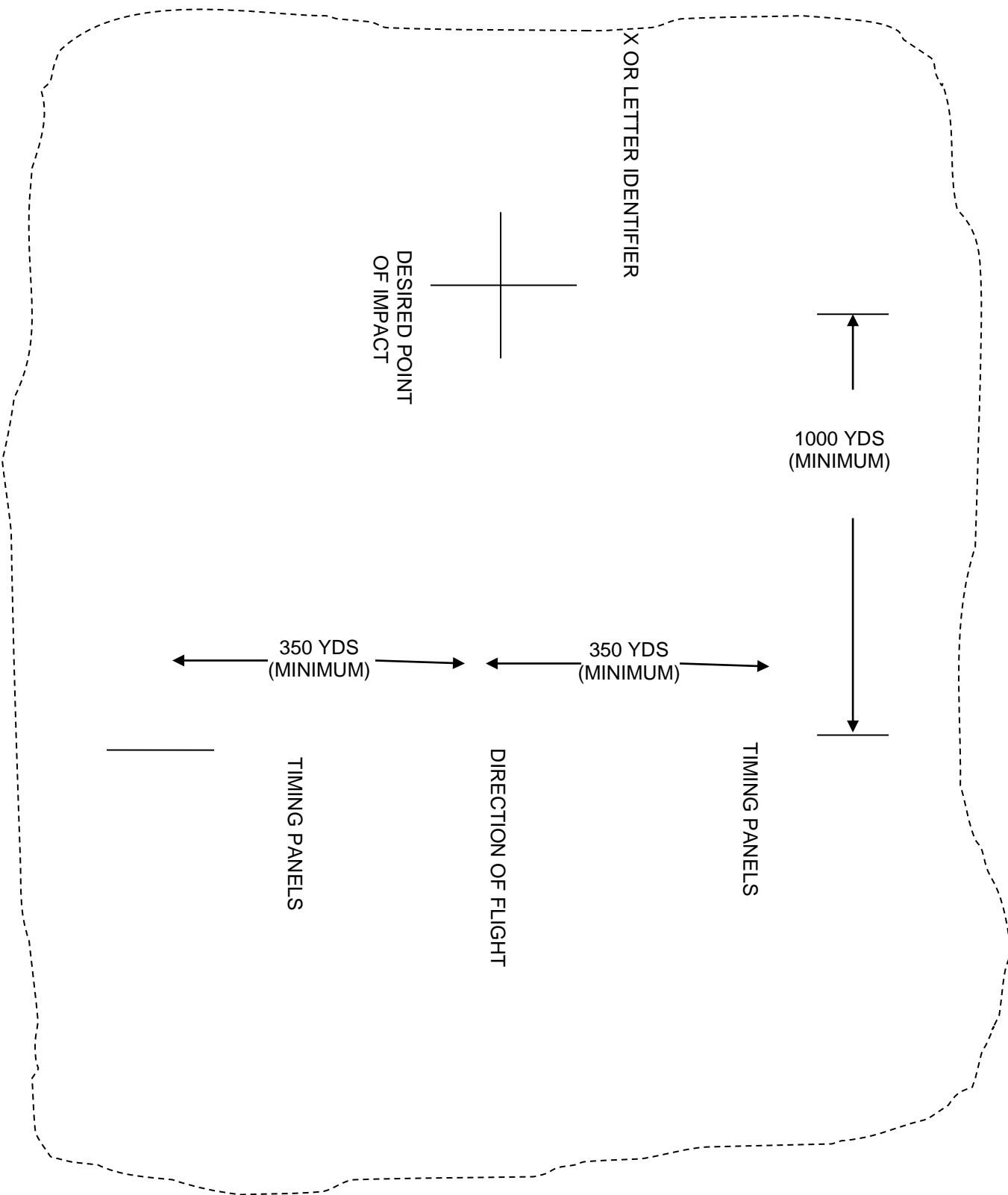
RESTRICTED
DROP ZONE MARKINGS
VISUAL RELEASE POINT SYSTEM (VRP)
DAY
USING WHITE OR COLOURED PANEL



RESTRICTED
DROP ZONE MARKINGS
VISUAL RELEASE POINT SYSTEM (VRP)
NIGHT

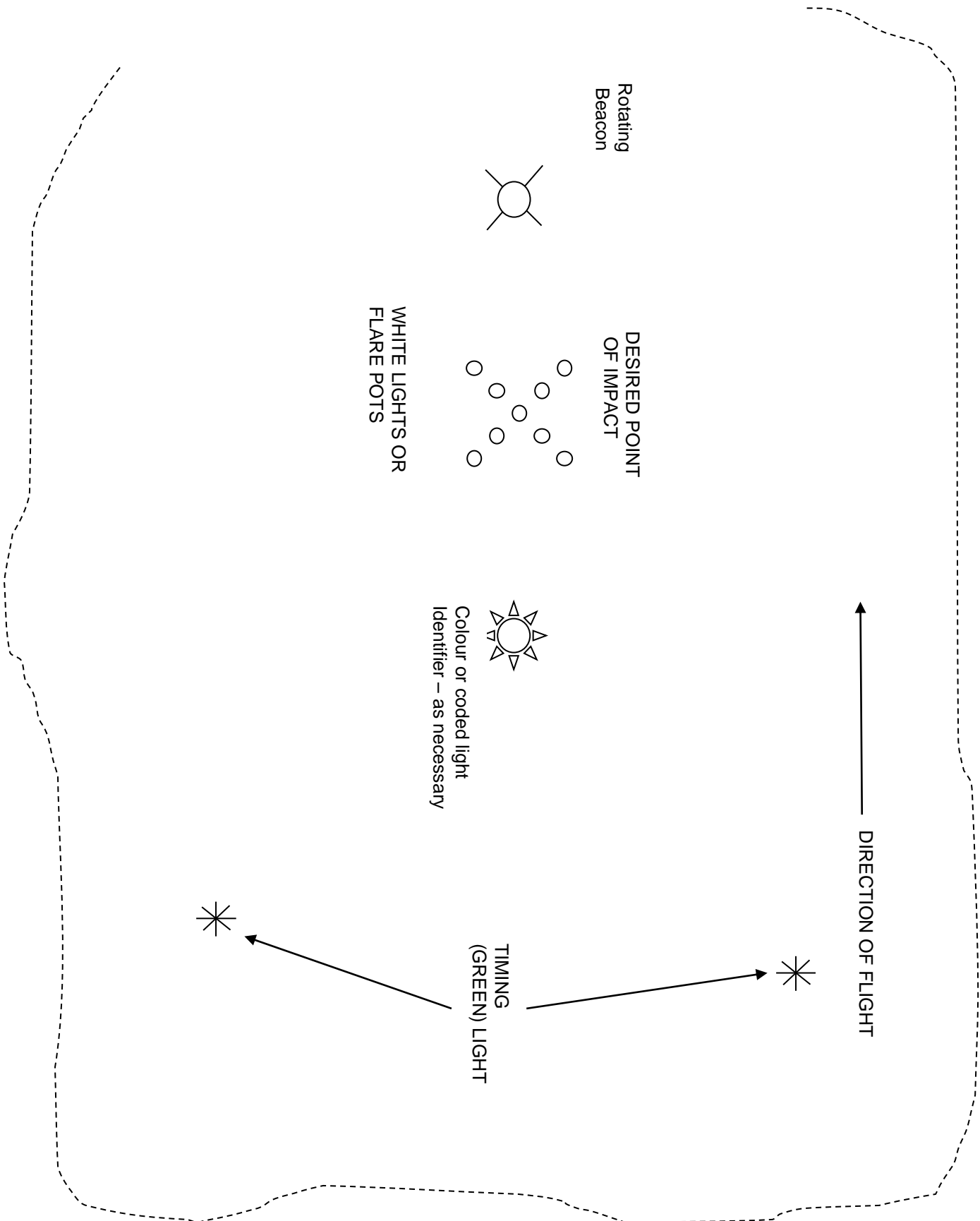


RESTRICTED
DROP ZONE MARKINGS
FOR COMPUTED AIR RELEASE POINT SYSTEM (CARP)
DAY



RESTRICTED
DROP ZONE MARKINGS

FOR COMPUTED AIR RELEASE POINT SYSTEM (CARP)
NIGHT



CHAPTER - 12

CASEVAC MISSIONS

General

1. CASEVAC mission in L 410 UVP-E20 AIRCRAFT are to be carried out for transportation of patients, wounded persons and deceased. A max no of 06 patients in stretchers along with three med asst can be carried:

- a. On standard stretchers
- b. On troopers seats
- c. On stretcher & troopers seat

Purpose

2. CASEVAC missions are to be undertaken for the following purpose:

- a. Evac of friendly forces from battle fields
- b. Assist in natural/ accidental disasters.
- c. Training of air crew.

Authority

3. All missions are to be carry out with the approval of Air HQ s (Dte of Air Operations), Except for sub Para 2(c).

Crew qualification

4. All operations air crew must have min Cat "C" except for Para 2(c).

Facilities Required For The Mission

5. Whenever any such missions undertaken the aircraft is to be fitted with required no of posts, straps, safety belts and medical attendant's table. Beside this, following items as required are to be collected from the local MI room:

- a. Tanks with disinfectant fluid.
- b. Urinal and bed pan.
- c. Medicine.
- d. Oxygen cylinder
- e. Waste tank.

- f. Doctor/ medical assistant.
- g. Fumigation/disinfections medicine, ground sheet (in case deceased is carried) etc.

Emplanement

6. The priority of emplanment and accommodation of the wounded in the air plane are determined by the captain and attendant.

Accommodation

7. Accommodation of the wounded is to be done in the following no:
- a. Head forward in the direct of flight. .
 - b. Heavy weight stretcher cases in the lower, If it does not contradict with medical recommendation.
 - c. The wounded who need special care must be kept in the middle of the rear section.

Deplanement

8. Before deplanement load master is to check that the ambulance are really to receive the wounded and indicate the place and order of driving to the air plane. When deplaning the stretcher cases, the patient's legs are to forward. The order deplanement of the walking wounded is determined by the med attendant.

NOTE: 1. Special flight plan requiring priority in landing is to be submitted for the mission.

2. Flight is to be conducted avoiding turbulence as per as possible and shortest possible route to be chosen to minimize time in air.

CHAPTER - 13

SEARCH AND RESCUE MISSIONS

Introduction

1. L 410 UVP-E20 aircraft is capable of carrying out limited search and rescue mission over the land and sea. SAR missions are to be carried out for training, exercise or operational requirements.

Authority

2. All missions are to be carried out with the approval of air HQ (Dte of air operations) except the approved training syllabus.

Mission Requirement

3. In case of SAR mission, in addition to the normal preparation and requirements given in AP-3456 the followings are to be included in the mission requirements:

a. **Land search.**

- (1) VHF communication.
- (2) Observe with binoculars.
- (3) Portable camera.
- (4) Signaling equipments.
- (5) First aid kits.

b. **Sea search.**

- (1) VHF communications.
- (2) Observe with binoculars.
- (3) Portable camera.
- (4) Dinghies.
- (5) Mae West.
- (6) Personal survival packs.
- (7) Signaling equipments.
- (8) Food and water.

- (9) First aid kits.

Crew qualification

4. All operating crews must have valid category 'c' except for the U/T crew in case the mission is undertaken for the purpose of training.

Weather

5. Min weather conditions during SAR mission:
- a. Surface visibility must be more than three KM.
 - b. Cloud not more than 2 octas below operating height.

Fuel

6. Aircraft is to be refueled to its full capacity unless otherwise specified.

Operating Height

7. Minimum operating height under the above mentioned weather is restricted to 1000 ft AGL/MSL. In case of no cloud below the operating height the minimum height over the land and sea are restricted to 500 ft AGL and 700 ft MSL respectively.

Operating hours

8. SAR missions are to be undertaken only during the period commencing from half an hour after official sunrise to half an hour before official sunset.

Operating speed and Duration of mission

9. Normal operating speed for SAR mission is 140 Kts. Nevertheless the operating speed may vary within 135-150 kts (IAS) in case of changed mission profiles. SAR missions are to be discontinued whenever fuel quantity drops to the fuel required for RIGHTB plus 300 kgs.

Use of Radar

10. Airborne radar of the L 410 UVP-E20 aircraft may be used for detecting the distressed ships.

Search area

11. The search area over the sea is limited by the followings co-ordinates 2030N, 9220E, 7030N, 9200E, 2100N, 9115E, 2100N, 8930E, 2140N, 8905E.

12. For training search mission over the sea, the distance from the coast is limited up to 15 NM.

13. Search pattern remains as of AP 3456 J, part-3, Sec 1, chap 2. Type of search pattern will depend on the weather, terrain and mission requirements.

Co-ordination with Navy

14. All exercises and operational missions over the sea are to be carried out in co-ordination with Bangladesh Navy. During the execution of search mission the naval ships are to be positioned in and around the search area. Both ways R/T communications between the search and the naval ship is to be maintained.

Crew duties

15. Prior to any search missions under mentioned procedures are to be followed:

a. **Captain is to.**

- (1) Obtain detail information about the incident/accident from the OC Operations wing/SAR coordinators.
- (2) Determine the area of search and specify the search pattern in consultation with the navigator.
- (3) Finally brief the SAR crew about the incident, object of search and total plan of actions.

b. **Co-Pilot is to.**

- (1) Collect the Met report/weather forecast of the base and the area of incident; and in case of sea search collect the pre hand sea state information (wind speed & direction etc) through the SAR coordinator.
- (2) Collect large scale map with search area of location of incident drawn in it.
- (3) Collect the latest NOTAM available for the areas around the search point.
- (4) Brief about the weather conditions & area & pattern of search
- (5) Ensure the readiness of SAR aircraft and aircrew along with mission requisites.
- (6) Collect specific SAR/radar frequency for easy communication between SAR aircraft and rescue unit.
- (7) Incase of sea SAR missions; ensure that proper liaison is made with naval ships and units along with the coast line.

d. **Load Master.** Load master is to check availability of the mission requisites physically and ensures its positioning in the aircraft.

e. **Observer.** Following are the duties:

- (1) To search/locate the missing objects/survivors
- (2) To pin point the object in reference to Clock code for direction and approximate distance.

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- (3) To keep a sharp look out for enemy or intruder in a patrol mission.
- (4) To help the captain by giving the name and color of the ship whenever possible.
- (5) To ensure the essential search requisites are on board.

Emergencies

16. The possible emergencies during a SAR mission may be as following:

- a. **One Engine failure.** Take actions as per the check list. Discontinue the search and RIGHTB.
- b. **Both Engine failure.** If over land force land as per set procedure. If over sea considering the high tans distance from the shore a quick decision must be taken whether to make a force landing on the sea shore or ditching in the sea.
- c. **Ditching.** In case of ditching the actions are as per the check list and the flight manual.
- d. **Unsure of position.** In case of unsure of position discontinue search & climb up to safety height, determine the position with the help of the navigator aids. Once sure of position the captain is to decide whether to resume search or discontinue depending on the situation. Otherwise contact BAF radar/SAR coordinator and follow their instructions.
- e. **Survival at sea.** The instructions of sea survival booklet must be followed. The load master must check availability of the book in survival kits.

NOTE:

- 1. No sea and mountain search is to be carried out at night.
- 2. Radio altimeter is to be kept on to the minimum operating height during the mission.
- 3. All persons on board are to wear mea west over the sea.
- 4. Through out the mission a positive R/T contact has to be ensured with other SAR agencies.
- 5. From the beginning of the mission a positive radar contact has to be made and time to time cross checking of positions are to be ensured.
- 6. After the mission, a after mission report has to be raised and submitted to Air HQ (Dte of Air Operations)

CHAPTER - 14

RECCE MISSION

Introduction

1. L 410 UVP-E20 aircraft is a computer aircraft designed to perform transportation of passengers and limit loads. However, due its low level flying capability and availability resources for accurate navigation, the aircraft may be best utilized for limited scale visual recce missions with observer on board. The recce mission would be carried out within 100 NM around the departure airfield with full fuel. Recce missions are to be carried out for training, exercise or operational requirements.

Authority

2. All missions are to be carried out with the approval of Air HQ (Dte of Air Operations) except the approved training syllabus.

Mission Requirement

3. In case of Recce mission, in addition to the normal preparation and requirements given in AP-3456 the followings are to be included in the mission requirements:

a. **Land Recce**

- (1) VHF communication.
- (2) Observed with binoculars.
- (3) Portable camera.
- (4) Signaling equipments.

b. **Sea Recce**

- (1) VHF communications.
- (2) Observe with binoculars.
- (3) Portable camera.
- (4) Mae West (in case of Sea Recce).
- (5) Personal survival packs.
- (6) Signaling equipments.

Crew qualification

4. All operating crews must have valid category 'C' except for the U/T crew in case the mission is undertaken for the purpose of training. The observers must be briefed prior to the mission about possible targets and scenario.

Weather

5. Min weather conditions during SAR mission:
- a. Surface visibility must be more than 3 KM.
 - b. Cloud not more than 2 octas below operating height.

Fuel

6. Aircraft is to be refueled to its full capacity unless otherwise specified.

Operating Height

7. Minimum operating height under the above mentioned weather is restricted to 1000 ft AGL/MSL. In case of no cloud below the operating height the minimum height over the land and sea are restricted to 500 ft AGL and 700 ft MSL respectively.

Operating hours

8. Recce missions are to be undertaken only during the period commencing from half an hour after official sunrise to half an hour before official sunset.

Operating speed and Duration of mission.

9. Normal operating speed for Recce mission is 140 Kts. Nevertheless the operating speed may vary within 135-150 kts (IAS) in case of changed mission profiles. Recce missions are to be discontinued whenever fuel quantity drops to the fuel required for RTB fuel plus 300 kgs.

Use of TCAS

10. TCAS of the L 410 UVP-E20 aircraft may be used for detecting the airborne targets if feasible.

Recce Area

11. For training Recce mission over the sea, the distance from the coast is limited up to 15 NM.

12. Recce pattern remains as search pattern of AP 3456 J, part-3, Sec 1, chap 2. Type of pattern will depend on the weather, terrain and mission requirements.

Co-ordination with other Agencies

13. All exercises and operational missions are to be carried out in co-ordination with ACOC/ASOC/ Bangladesh Navy/Bangladesh Army. During the execution of recce mission the Avon troops position are to be available in and around the recce area. Both ways R/T communications between the own troops/coordinating forces are to be maintained.

Crew duties

14. Prior to any search missions under mentioned procedures are to be followed:

a. **Captain is to**

- (1) Obtain detail information about the scenarios from the OC Operations wing/Recce coordinators.
- (2) Determine the area of Recce and specify the Recce pattern in consultation with the coordinator agency.
- (3) Finally brief the Recce crew about the incident, target and total plan of actions.

b. **Co-Pilot is to.**

- (1) Collect the Met report/weather forecast of the base and the area of incident; and in case of sea recce collect the pre hand sea state information (wind speed & direction etc) through the Recce coordinator.
- (2) Collect large scale map with recce area drawn in it.
- (3) Collect the latest NOTAM available for the areas around the recce point.
- (4) Brief about the weather conditions, area and pattern of recce.
- (5) Ensure the readiness of recce aircraft and aircrew along with mission requisites.
- (6) Collect specific Recce/radar frequency for easy communication between recce aircraft and rescue unit.
- (7) Incase of sea Recce missions; ensure that proper liaison is made with naval ships and units along with the coast line.

d. **Load Master.** Load master is to check availability of the mission requisites physically and ensures its positioning in the aircraft.

e. **Observer.** Following are the duties:

- (1) To recce/locate the missing objects/targets/enemy forces.
- (2) To pin point the object in reference to Clock code for direction and approximate distance.
- (3) To keep a sharp look out for enemy or intruder in a patrol mission.

- (4) To help the captain by giving the name and color of the ship whenever possible.
- (5) To ensure the essential recce requisites are on board.

Emergencies

15. The possible emergencies during a Recce mission may be as following:

- a. **One Engine failure.** Take actions as per the check list. Discontinue the recce and RTB.
- b. **Both Engine failure.** If over land, force land as per set procedure. If over sea considering the high tans distance from the shore a quick decision must be taken whether to make a force landing on the sea shore or ditching in the sea.
- c. **Ditching.** In case of ditching the actions are as per the check list and the flight manual.
- d. **Unsure of position.** In case of unsure of position discontinue recce & climb up to safety height, determine the position with the help of the navigator aids. Once sure of position the captain is to decide whether to resume recce or discontinue depending on the situation. Otherwise contact BAF radar/recce coordinator and follow their instructions.
- e. **Survival at sea.** The instructions of land/sea survival booklet must be followed. The load master must check availability of the book in survival kits.

NOTE: 1. No sea and mountain Recce is to be carried out at night.

- 2. Radio altimeter is to be kept on to the minimum operating height during the mission.
- 3. All persons on board are to wear mea west over the sea.
- 4. Throughout the mission a positive R/T contact has to be ensured with other Recce agencies.
- 5. From the beginning of the mission a positive radar contact has to be made and time to time cross checking of positions are to be ensured.
- 6. After the mission, a after mission report has to be raised and submitted to Air HQ (Dte of Air Operations)

CHAPTER-15

DUTIES OF AIRCREW

RESPONSIBILITIES OF AIRCRAFT CAPTAIN: L 410 UVP-E20 AIRCRAFT

1. The captain of an aircraft is the head of the team of operating aircrew for the duration of the flight. He is responsible for the overall safe conduct of the flight. All aircrew and passenger will be under his disposal for that period. In L 410 UVP-E20 aircraft the captain is to occupy the left seat except acting as instructor. His duties and responsibilities are:

- a. Piloting the airplane, monitoring the airplane flight conditions and attitude.
- b. Management and supervision of crew member's actions.
- c. Establishing and maintaining communications with other aircraft or ground radio stations.
- d. Checking that the flight is properly authorized; briefing all his crew about the mission; and signing all relevant documents after checking for accuracy.
- e. Ensuring welfare and discipline of all crew members regardless of seniority at all time after first reporting for the duty for the task until the task is completed.
- f. Looking after the welfare of the passengers, on board and at non BAF airfields, commensurate with normal service practice, local conditions and the passenger's rank.
- g. Ensuring the safety, security and serviceability of his aircraft at non BAF airfield where there is no BAF servicing organization.
- h. Ensuring adherence to proper safety regulations during loading and unloading of cargos.
- j. When engaged on transport support operations or exercises:
 - (1) Ensuring that his crews are briefed on the nature of the mission, the operational conditions under which the mission is to be flown and the latest known battle situations.
 - (2) Consulting with the troop commander, area commander, dispatch team leader, as appropriate, on the plane of the flight and procedures to be followed.
 - (3) Making himself conversant with the general nature of the operation or exercise, assessing the likelihood of changes in plan or hostile actions which might require other actions on his part or from his crew and briefing his crew accordingly.
 - (4) Ascertaining that all items of equipment and stores required for the mission are on ground.

- (5) Briefing his crew on the actions they are to take in the event of operational emergencies or crew casualties.

DUTIES OF CO-PILOTS : L 410 UVP-E20 AIRCRAFT

2. To action as co-pilot he has to complete a conversion course. He is to be currently categorized on type and hold an instructor rating on type. Co-pilot is the second in command among the crew irrespective of his seniority. His duties are:

- a. to assist the first pilot in all checks and cockpit drills. Read the check list as applicable.
- b. Ascertain V1 and T/Off power required before T/off.
- c. Arrange for the mission briefing covering Met ATC and NAVIGATOR information's and other details of the mission to be undertaken
- d. He is to supervise loading, unloading and ensure accuracy of trim sheet prepared by the LOAD MASTER; also to check the associated documents and counter sign it.
- e. To ensure that the authorization book and F-781 is properly filled and sign by the Captain of the aircraft before the commencement of each flight.
- f. To briefing and attain the passengers as ordered by the Captain.
- g. To assist the first pilot by operating the controls in accordance with SOP or as ordered by the Captain.
- h. To action as relief pilot when required to do so by the first pilot.
- j. To operate the communication equipments in accordance with current communication procedure and regulations.
- k. On out stations, he is responsible for admin arrangements and in carrying out the duties of purser, including holding the flight imprest when required and paying bills.
- l. To assist the Captain in navigating the aircraft in co-operations with the navigator whenever situation warrants.
- m. To ensure all instrument flying regulations and clearances etc are strictly adhered to during instrument flight.
- n. He is to call out V1, Vr and V2 and app speed during T/O and landing in addition to following the captain on controls. He is to operate landing gears, flaps and engine controls as desired by the captain.
- p. He is to monitor closely all alt setting procedures and strict compliance with ATC instructions regarding heights and flight level during the entire flights.
- q. During app and landing the co-pilot is to:

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- (1) Ensure that in IMC the correct instrument approach procedures are followed and the minima are never violated.
- (2) Call out the air speed and height should it deviate below the acceptable limit.
- (3) Carry out cockpit drill ordered by the 1st pilot, checking that the under carriage is down and locked and that the systems pressures are satisfactory, and operating any other aircraft systems as ordered.
- (4) He is to the 1st pilot attention to any abnormal tendencies of air speed and rate of descent.

DUTIES OF LOAD MASTER : L 410 UVP-E20 AIRCRAFT

3. A qualified loadmaster should have completed a conversion course on type and be currently categorized. The loadmaster's duties are:

- a. The loadmaster's duties are loading, unloading and lashing of cargoes within the allowed C of G limits of the aircraft.
- b. Preparing the trim sheet and inform the captain about the C of G and AUW.
- c. Checking the passengers and cargo manifest and accordingly plan for the loading of the aircraft.
- d. Once loaded he is to take charge of all.
- e. Carryout preflight checks in accordance with flight reference cards.
- f. Check passengers seat belts are secure prior to take-off or landing.
- g. In the absence of air Steward he is to carry out Air Stewards duties during the flight.
- h. Checks of cargo security after take-off, at intervals during the flight and prior to descent and landing.
- j. Supervision of passengers in case of emergency and supervising the use of passenger's oxygen and safety systems (In absence of the Air Steward).
- k. He is to ensure that there is no damage in the cargo-compartment either by freight or passenger's negligent handling.
- l. Para dropping and Para trooping under captain's command.
- m. Deplaning and handing over passengers to air movement's staffs.
- n. Passing load documents to the duty air movement officer and informing him of any special instructions the load including where applicable, the number of seats available on the next stage to be flown.

- p. He is to carry the following:
- (1) Blank Passenger and freight Manifests.
 - (2) Spare paper and pencil.
 - (3) Clip Board.

DUTIES OF AIR STEWARD: L 410 UVP-E20 AIRCRAFT

4. A qualified air steward is a person trained to operate galley equipments and provide in-flight refreshments/ meals. He is also trained for passenger handling during normal and emergency situation. His duties are:

- a. Checking the aircraft cabin, toilets and galley for cleanliness and serviceability.
- b. Checking the provision and / or checking of catering supplies.
- c. Reception and briefing of passengers.
- d. Submission of catering requirements.
- e. Assisting passengers in emplaning.
- f. Removing pins and stowing thing before start up.
- g. Preparation of meals and refreshments for passengers and crew.
- h. Waiter service of meals and refreshments.
- j. Helping passengers in distress.
- k. Operating of emergency life support equipments, if required.
- l. Other such emergency duties as are given by the captain or loadmaster.
- m. After switch off assistance to the passengers in deplaning.

DUTIES OF SQUADRON OPERATIONS OFFICERS: L 410 UVP-E20 AIRCRAFT

5. The Squadron operations officer is to co-ordinate the operations of the Squadron. His duties are:

- a. To liaise with Flight Commander (Operations) and take out the daily flying program.
- b. In case of any change in the flying program to inform relevant agencies.
- c. To detail crew, arrange transport and inform, all agencies concerned if any commitment is given after working hours/holidays.

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- d. To ensure that all laid down Sops are followed.
- e. To ensure the proper use of Flight Authorization Book and Flying Order Book.
- f. To arrange all flying briefings, transportations and other admin facilities for the crew.

DUTIES OF DROP ZONE CONTROLLER

6. The drop zone controller is to arrange and ensure the preparation of the drop zone. His duties are:

- a. Inform LSEW, ATC, L 410 UVP-E20 Flight Line and Maintenance Control about the mission detail.
- b. Arrange transport for the movement to drop zone.
- c. Ensure security coverage and medical facilities available at the drop zone.
- d. Arrange the following items:
 - (1) Wind socks with accessories - 1 each
 - (2) PA system/ Mega phone - 1 each
 - (3) Compass - 1 each
 - (4) Binocular - 1 each
 - (5) VHF set and walkie talkie - 1 each
 - (6) One Theodolite, 2 balloons along with 2 Met assistants.
 - (7) Tents - 2 each
 - (8) Orange flags (4' X 3') AND POLES (12') - 12 each
 - (9) Panel 'T' (6m X 5m) - 1 each
 - (10) Drop cancel panel (5m X 5m) - 1 each
 - (11) Smoke generating materials.
 - (12) Lascar - 8 each
- e. Activate the drop zone one hour prior to dropping and prepare the drop zone:

Standard size : (1 km X 1 km)
Min size : (600m X 600m)
- f. Established both way R/T contact with ATC and the aircraft.
- g. Inform the "T" direction to ATC and the captain of the aircraft.
- h. Assist the pilot for alignment with the 'T'.
- j. Report to the aircraft about the latest surface wind, time of passing over head, deployment of the parachute, position of dropping and time taken to fall.
- q. Ensure the safety and security of the troopers.
- r. After dropping mission is over, supervise and ensure all things are brought back to the base and deposited to the respective agencies.

- s. Debrief about the mission.

CHAPTER - 16

OPERATIONARETION IN WIND SHEAR AND MICROBRUST ACTIVITY

General

1. Wind Shear and Microburst activity are particularly dangerous during the approach and take-off phase of flight and it is therefore essential that all aircrew are aware of what is meant by these terms.

Definitions

2. a. **Wind Shear**. It is said to short when rapid and significant changes to the horizontal wind speed occur over small changes of altitude.
- b. **Microburst Activity**. It is a short period event which creates very strong wind gust with large variations in direction and speed both Horizontal and vertical and particularly hazardous Microburst activity exists as a result of thunderstorm activity.

Conditions

3. All the pilots of L 410 UVP-E20 aircraft should be aware of the geographical and meteorological conditions that can cause wind shear and microburst activity, in order that they can best cope with them:

- a. Thunderstorm activity in the airfield vicinity is most likely to produce wind shear and microburst activity. The significant storms can cause this activity upto a distance of 5 NM from the airfield.
- b. Frontal activity in the vicinity of an airfield can produce dangerous shear conditions; specially in the case of warm fronts. When a temperature difference of 10° C or exists across the front and its speed is 30 kts or more, there is an excellent potential for low level shear.
- c. Temperature inversions may be conducive to the development of wind shear conditions.
- d. The airfield location may be conducive to the development of wind shear conditions. For example, runways that are near a coast line; are near a coast line ; are in mountain valleys , have severe drop-off at one or both ends; or which are protected by the trees or buildings , have an Increased potential for shear.

Alerts

4. The flight crew may be alerted to the possibility of shear by one of the following:
- a. Pilot reports, weather received directly or through an ATC function, will alert the crew to anticipate shear. Reports which give airspeed gain / less are of greatest value.
- b. Comparison of reported surface wind velocity with wind being encountered on approach, if this information is available. Doppler can be used to find out the wind on approach.

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c. Visual evidence such as rain shafts from high based cumuliform clouds in the vicinity of high altitude airports; blowing dust; rings of dust ; dust divides; trees blowing in several directions ; and other ground blown Deloris.

Recovery:

- a. Retain the control column forward drift and pull of tuck-under energetically pull the control column to effect the dive recovery.
- b. Immediately reduce the flap angle to 18 deg to restore the aircraft longitudinal controllability.
- c. Reduce the Engine power to flight idle.
- d. Check the Ice protection system of wing and empennage whether those were on or not.
- e. Go-round after recovery from dive.

CHAPTER – 17

TAXI TEST PROCEDURE

L 410 UVP-E20 AIRCRAFT

Purpose

1. Taxi Tests of L 410 UVP-E20 aircraft are carried out on the following occasions:
 - a. **Taxi Test in General**. When the aircraft remains idle on ground for 07 days or more. In such case the taxi test can be combined with the normal mission.
 - b. **Taxi Test for New Brake Unit** After the installation of new brake units or after the replacement of individual plats.

Procedure

2. On both the occasions, Captain of the aircraft is to brief all crewmembers and carry out following additional checks with other normal checks as lay down in the checklist.
 - a. **Before Start Up**: Check that compressed air is available at the aircraft Parking Area.
 - b. **After Start Checks**:
 - (1) Check Hydraulic quantity and press.
 - (2) Check parking brake press 40+5 kg/sq cm.
 - c. **Taxi Checks (parking area to lineup point)**:
 - (1) Obtain ATC clearance for Taxi Test.
 - (2) During taxing check main brakes system.
 - (3) After entering the runway check emergency brakes.
 - d. **Line Up Checks**:
 - (1) Flaps – Zero/18
 - (2) Nose wheel steering- Pedal, Pedal Light check ON.
 - (3) Heating and Air Condition System - Off.
 - (4) Landing/Taxi Lt - on.
 - (5) AP disengaged button press.

Taxi Test in General

3. a. Brakes - on.
- b. Advance TCL gradually 80% TRQ.
- c. Check.
 - (1) Brake press 40 ± 5 kg/sq cm
 - (2) No movement of aircraft (if aircraft moves at any stage before reaching TCL 80%-90%, bring both the TCL back to Zero and discontinue the taxi test).
- d. Check no Warning Light in the cockpit except pitot heaters.
- e. Release - Brakes.
- f. As aircraft gains speed 60 kts Both TCL back to idle.
- g. Maintain aircraft direction and apply brakes as required to stop the aircraft.
- h. Return to Dispersal.

Taxi Test for New Brake Units

4. At line up point carry out the checks as given below:
 - a. Brakes - On
 - b. Advance TCL gradually 80%-90% Torque
 - c. Check.
 - (1) Brakes press $40 + 5$ kg/sq cm.
 - (2) No movement of aircraft.
 - d. If the aircraft moves at any stage before reaching TCL 80%-90%.
 - (1) Both TCL back to idle
 - (2) Release brakes
 - (3) Discontinue the Taxi Test
 - (4) Return to dispersal.
 - (5) While returning to dispersal, maintain aircraft direction and apply brakes at or below 10 kts (IAS) intermittently to stop the aircraft (check brakes press $40 + 5$ Kg/cm²).

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- e. If the aircraft holds at 80%-90%, follow the procedures mentioned above for Taxi Test in General (para-3).

CAUTIONS

1. Taxi Test is not to be carried out if the Ambient Air Temp is beyond 50°C.
2. "Taxi Test" is not to be carried out when available RUNWAY length is less than 3000ft.
3. "Taxi Test" should not be done between 1200F to 1500F or any time of the day when the ambient or tarmac temp would likely to be above 40°C.
4. While back tracking for line up, TCL should not be advanced from the Idle position for "Taxi Test" with New Brakes Units".
5. After "Taxi Test", if the brakes are found heated up considerably, then immediate cooling is to be done at the parking point by "Compressed Air"

CHAPTER – 18

FLYING IN ADVERSE WEATHER

General

1. Before commencing flight in adverse weather study the radio aids of alt air fields and air fields of destination as well as the minimum descent altitude (MDA) in clouds and minimum horizontal vis at app. Before entering in to weather thoroughly check the flight/navigator equipment for sat condition on proper functioning of ice protection system.

Wind Shield Wipers

2. Wherever the vis from the cockpit is impaired due to rain, drizzle or snow, wind shield wiper is to be used. It is prohibited to actuate the same where the wind shield is dry.

Flying in Icing Conditions

3. Wind shield heating is to be switch to II position from T/O to landing if the ambient temp is +5⁰ C or less. In case of rain, drizzling, mist, snow and intense icing, it is to be put to 'HI' mode. It is to be put to I position for minimum 5 min before taken to II position.

Flying Through Weather

4. As a general rule thick/large Cu or Cb cloud is to be avoided either visually or with the help of radar by at least 15 km or climb at least 1500' over the top of cloud. The distance will depend on the intensity of the cloud, Flight Level of aircraft and the type of return being emanated by the cloud to be avoided. While operation in the vicinity of such clouds, radar should be operation in Weather/Contour mode. If for any reason the cloud is to be penetrated the following guidelines are to be following

- a. Find out the weakest area of the thunderstorm cloud.
- b. Before entering compare the display of the FDI & Gyro horizon with the actual att relative to the natural horizon.
- c. Cross the clouds at the right angles.
- d. Fly on radar.

5. Before taking any decision to fly through a thunderstorm cloud, the pilot is to consult with the Weather Radar image meticulously and formulate the best course of actions. Once in the thunderstorm cloud the pilot not control is to provide the heading and altitude depending on the Weather Radar picture and visual condition. In case of turbulent weather condition, speed should be maintained below 143 Kts.

Flying into a severely Turbulent Area

6. The following actions are to be taken when flying into a severely turbulent area:

- a. Fasten seat belt light-ON
- b. Call tighten seat belts'
- c. Disengage auto-pilot
- d. Maintain speed below 143 kts
- e. Fly the airplane trying to avoid abrupt deflections of elevator and ailerons, and execute turns with a bank not exceeding more than 20°.
- f. During landing maintain 10 - 20 kts higher than the one specified for the landing weight.
- g. Go round immediately if Engine rating Increase upto max continuous power is required to hold the aircraft on the glide slope (GS) down to 300ft.

Radio Alert (RA)

7. Radio Alt is to be kept on at safety altitude or at a pre-selected altitude while flying through adverse weather. Specially over the mountain or sea.