

Chapter 2

AIRCRAFT PROCEDURES



LESSON PLAN OUTLINE

PROGRAM: SMOKEJUMPER

LESSON: AIRCRAFT PROCEDURES

OBJECTIVES: Upon completion of this lesson, the trainee will be able to describe the general sequence of events occurring aboard smokejumper aircraft during smokejumper missions; learn and apply the prescribed procedures for responding to fire calls, loading aboard aircraft, takeoff, enroute flights, jumping and cargo operations over the fire, emergency procedures and landing; learn and apply specific aircraft procedures pertaining to each approved smokejumper aircraft utilized.

INTRODUCTION: This unit is intended to stress the importance of utilizing correct aircraft procedures for personal safety and the efficiency in accomplishing smokejumper mission. Minor differences may apply to the various bases; however correct aircraft procedures are essential to the safety of smokejumper operations.

- I. GENERAL SEQUENCE OF EVENTS FOR SMOKEJUMPER FIRE MISSIONS.**
 - A. Jumplist and local base readiness procedure established.**
 - B. Smokejumper fire call occurs.**
 - C. Designated load of smokejumpers suit up.**
 - D. Parachutes are put on.**
 - E. Parachute numbers are recorded by spotter or assistant spotter.**
 - F. PRE-JUMP EQUIPMENT CHECK made by a qualified Forest Service smokejumper.**

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Note: Qualified smokejumper = Jumper has been tested and certified by a FS Check Spotter annually, to do prejump equipment checks.

1. **Must be performed on all jumpers prior to jumping to ensure smokejumper gear is in safe condition and correctly worn.**
2. **Will be completed by a qualified Forest Service smokejumper prior to boarding the aircraft.**
3. **Procedure including the proper sequence and items to be inspected in completion of the pre-jump equipment check for the FS-14 parachute system is as follows:**
 - a. **Boots and Ankle Braces**-- on and snug.
 - b. **Stirrup Straps**—and ankle brace straps tight and beneath insteps. No loose ends.
 - c. **Leg Pockets**-- securely closed with tightener and cord ends stowed. Let down rope in right leg pocket?
 - d. **Harness Leg Straps**-- straight (no twists) and snaps securely fastened to V-rings without material caught in snap. Excess strap stowed in holders.
 - e. **PG-Bag Attachments**—Harness-to-PG bag fastex are the proper size and not broken.
 - f. **Reserve**-- parachute secured correctly to D-rings, snap pins seated correctly, Proper fastex attachments have been made, fastex not broken. Container closing pins seated properly in loops, safety tie is not broken. Reserve handle is correctly positioned, reserve is in date. Reserve knife has cutting edge facing out and properly stowed.
 - g. **Pack Tray Belt**-- is properly fastened and snug.
 - h. **Chest Strap**-- of harness is correctly routed through buckle and seated to Velcro.
 - i. **Capewells**—both completely seated. Open capewell covers, visually and physically make sure the slider is

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present and seated, ears are seated and the thumb-release cable is correctly positioned when the covers are closed.

- j. **Risers**-- of main parachute are not twisted (check canopy size and verify with jumper).
- k. **Harness**-- shoulder straps on properly (look for X on (back)).
- l. **Main Container**-- break tape properly tied and secured through all four flaps with static line route in correct position and main is in date.
- m. **Static Line**-- free of knots with excess stowed and routed properly.
- n. **Static Line Snap**-- functioning properly with safety pin attached.
- o. **Helmet**-- with Chinstrap.
- p. **Gloves**—Nomex flight gloves
- q. **Check for:**
 - (1) PG bag -- with no protruding items which could catch on door or interfere with reserve deployment.
 - (2) Pack-Out Bag.
 - (3) Let Down Rope.
 - (4). Other appropriate gear (Nomex, wind indicator, hardhat, fire shelter.)

- 4. **NOTE: If sequence is interrupted, begin again. If a problem is found, it should be corrected and the sequence can be restarted at the step immediately preceding the one uncovering the problem.**
- 5. **Pre-jump safety check on jumpers utilizing the Ram-Air system is done only by a qualified Ram-Air system spotter or jumper.**

****Instructor Note: This section is taught by a demonstration of a prejump equipment check by the instructor; then by having the trainee go through the routine. The instructor should insure that several subtle problems exist in the equipment that the trainee will be required to identify and correct.**

G. Loading aboard designated aircraft.

1. Rear-loading aircraft.
 - a. Load by reverse order, i.e., last jumper first.
 - b. Each jumper boarding should sit as far forward as possible.
2. Front-loading aircraft.
 - a. Do not board the aircraft unless the propeller on the loading side is completely stopped.
 - b. Load in actual jump order.
 - c. Move to the rear of the aircraft enough to provide sufficient room for all boarding jumpers to sit down. Adjust toward the front of the aircraft so that everyone is sitting as far forward as possible.

H. Take-off and landing.

1. Seat belts will be worn by all jumpers and spotters.
2. Smokejumpers must wear their protective jump suit, gloves, and helmet with mask down on take-offs, landings, and during low level cargo drops.
3. Do not move around inside the aircraft during take-offs, landings, and low level patterns. Changes in CG (center of gravity) can adversely affect pilot's control of the aircraft.
4. **No smoking is allowed.**

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I. Flight to fire.

1. Avoid unnecessary movement.
2. Know the location of airsick bags and take them at the first indication of nausea.
3. Know the location of the emergency exits and fire extinguishers.
4. Exercise caution near aircraft windows. Avoid putting pressure on them with boots, helmets, or other gear.
5. Stay away from an open door unless the spotter has given and static line is hooked up.
6. Protect your reserve. Be especially aware of your reserve handle and protect it from the possibility of getting snagged or caught and opening inadvertently. (Pilot chutes now packed in reserves make inadvertent openings extremely hazardous.)
7. Do not remove parachute or un-suit unless specifically instructed to do so by the spotter.

J. Over the fire.

1. Dropping the smokejumpers.
 - a. The spotter selects the jump spot (the jumper in charge should be involved in selection) and determines the wind drift.
 - b. During observation and streamer passes, pay particular attention to jump spot location and relationship to fire location, alternate spots, ground hazards, terrain features, water sources, and fire behavior.
 - c. If possible, watch the streamers (and other jumpers dropped before you) to get an indication of wind direction and amount of drift. Do not bunch up at the rear of the aircraft.

2. **The Interagency Spotter Commands.** **Note:** When dropping jumpers, the spotter should request from pilot any noticeable wind variances at streamer/drop elevations. Streamers are dropped from 1500'. Spotter signals to the jumpers the number in the stick.

a. **“ARE YOU READY?” & “LEG STRAPS TIGHT?”.**

These two questions are asked of the first jumper in each stick, who answers for the entire stick. “being ready” means you have been checked, PG bag is hooked-up, and helmet is on. The jumper should protect the reserve handle when moving around especially back by the door.

b. **“HOOK UP”.**

This command is given to the entire stick. Roundjumpers hook-up to the appropriate cable (horizontal/vertical/floor). Ram-airs hook-up to the appropriate extender handed them by the spotter. Hook up is done by each jumper, safety pins should be inserted downward and need to be bent.

PREJUMP BRIEFING.

Should include as a minimum: jump spot confirmation, jump spot hazard identification (if any), estimated streamer drift, type of drop pattern, jump spot elevation, and pertinent wind info at jump elevation. End the briefing by asking if the jumper has any questions.

c. **“GET IN THE DOOR”.**

This command given before or after pre-jump briefing, to the first jumper in the stick. This command also prompts the ram-air jumper’s four point check. All ram-air exits will be sitting; round exits will be using the step or standing, depending on the type of aircraft.

d. **“TURNING FINAL, 1500’, STATIC LINE(S) CLEAR”.**

Confirmation given so that each jumper in the stick can hear. The spotter may have notified the jumper that their static line is clear previously, but this is a final check. (Pilot confirms “on final, 1500’ with spotter. This is minimum drop altitude.

e. **“GET READY”**

Command given just prior to slapping first jumper out the door. Forest Service jumpers will only receive a slap to the first jumper of each stick.

The spotter (and assistant spotter if present) will make a final visual check of each jumper prior to the exit. All jumpers should also be making a visual check of each other. Exit the aircraft only when signaled by the spotter. If the spotter discovers a safety problem and the pass is aborted, a “NO EXIT” signal will be given by the spotter to the jumper in the door and reinforced by a verbal command not to jump. The “NO EXIT” signal is the spotter’s arm blocking the door in front of the jumper’s face or spotter placing his hand over the jumper’s face mask.

K. IMPORTANT PROCEDURES TO REMEMBER.

1. Do not get in the door if the door strap is still in place. It should be removed during jumping and cargo dropping operations. It is the spotter’s responsibility to remove the door strap at the appropriate time.
2. On final, spotter directs jumpers to assume exit position. Exit positions vary according to the aircraft type and are covered later in specific aircraft procedures section and exit lesson plans.
3. Procedures from hooking up to exit continue until the specific number of jumpers have been dropped. When the first stick lands, one of the jumpers will radio up to the aircraft prior to the second stick going out the door. This is done to verify that conditions are as the spotter identified in the briefing. Also, one of the jumpers will hold up a streamer to assist the following jumpers identify the wind direction close to the ground for final approach.

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4. Cargo dropping (with jumpers on board.)
 - a. Remain as far forward as possible during cargo dropping operations and avoid unnecessary movement.
 - b. Stay away from the open door. Do not try to help move cargo while fully suited to lessen the chance of an inadvertent opening of the reserve.
 - c. All jumpers must wear helmets, gloves, protective suits, and seat belts during the cargo drops.
5. Return flight to base; again do not un-chute/un-suit unless instructed to do so by the spotter. All appropriate equipment will be worn for landings as designated previously.
6. Unloading from aircraft, do not leave the aircraft until the spotter or assistant spotter has given the approval to do so.

II. SPECIFIC AIRCRAFT PROCEDURES

Note to instructor: After informal discussion with trainees covering general sequence of events and local SOP's, trainees should suit up and be talked through specific procedures for each aircraft utilized at the base. A mock-up of the aircraft should be utilized to practice correct procedures. Actual jumper aircraft can be utilized after unit training to show specific features such as location of emergency exits, fire extinguishers, cargo configurations, etc. Characteristics of aircraft given are approximate and for comparative purposes only.

NOTE: Make information available on specific aircraft performance characteristics and capacities.

A. DeHavilland Twin Otter 300 Series

1. Characteristics
 - 3,000 pound payload (8-10 jumpers with 2 1/2 hrs. useable fuel).
 - Single or Two Pilots
 - Cruise speed 150 knots
 - Excellent STOL characteristics
 - Spotter position aft of jump door
 - Assistant spotter used at most bases

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- Vertical main cable
- Step mounted on fuselage
- Most widely used jumpship

NOTE: 200 series Otter is slower (140 knots) and has reduced payload (2500 pounds, 6-8 jumpers)

2. Procedures specific to Twin Otter.
 - a. Spotter denotes size of stick to jumpers (2) jumper sticks standard) and gives hook-up command.
 - b. Jumpers in stick will then hook up their static line snaps to the jump cable (in succession) and attach safety pins. Some bases have second jumper go thru a rubber band (if only one spotter).
 - c. Spotter or assistant spotter, if used, will check hook-up; scan the jumpers to insure proper routing of static line. The spotter will then instruct the first jumper to get in the door.
 - d. Jumpers should assume first and second positions outlined in standard small door exit procedures.
 - e. First jumper may have to shift forward in door to give spotter visibility. Make sure reserve handles are protected.
 - f. Spotter will signal first jumper to exit with a sharp slap on the left shoulder. Second jumper should move into first jumper exit position as soon as the door is vacated. Second jumper will exit aircraft without a slap from the spotter after a slight hesitation.
 - g. Care must be taken by second jumper to “find” the step with the left foot prior to applying weight to that foot to insure a good exit.

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B. Turbine DC-3

1. Characteristics

- 4,500 pound payload (12-16 jumpers with 3 hours useable fuel).
- Pilot and copilot required for all operations.
- Cruise speed 180 knots.
- Spotter and assistant spotter required.
- Asst. spotter position to the side of spotter.
- Overhead main cable.

2. Procedures specific to Turbine DC-3.

- a. Spotter denotes size of stick (2 jumper sticks standard and 3 jumper sticks may be utilized. Spotter begins standard commands.
- b. Jumpers in stick will then hook up their static lines to the overhead cable (in succession) and attach safety wires.
- c. Spotter or assistant spotter will check hook-up and spotter will instruct first jumper to get in the door. Assistant spotter will scan each jumper to insure proper routing of static line.
- d. Jumpers should assume first, second, and third positions according to large door exit procedures. As a safety precaution, survey the jumper in front of you to check correct static line routing.
- e. Spotter will signal first jumper to exit with a sharp p slap on the left calf. Second jumper will move into the first jumper position after the door is clear and then exit without a slap, after a slight hesitation.
- f. If a third jumper is exiting, the procedure is to assume the second jumper position as the jumper exits, and then move into the first jumper position, exiting without a slap after a slight hesitation to allow some separation between jumpers.

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C. **Beech B-99, 99A**

1. Characteristics

- 2,400 pound payload (6 jumpers with 3 hours useable fuel)
- Single pilot and spotter.
- Cruise speed 200 knots.
- Spotter position aft of jump door.
- Vertical main cable.
- Step mounted on fuselage.

2. Procedures specific to Beech 99, 99A

- a. Due to cramped conditions, movement inside the aircraft is best accomplished in kneeling position.
- b. Spotter initiates standard spotter commands.
- c. Jumpers hook-up to vertical cable attaching safety wire.
- d. Second jumper will go thru rubber band and then hook-up.
- e. Jumpers will use small door exit procedures. First jumper will be positioned forward in the door for maximum spotter visibility.
- f. After first jumper has exited, the second jumper will assume the first jumper position and exit. It is important to find the step with the left foot before applying weight to that foot to ensure good exits.

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D. King Air 200

1. Characteristics

- 2,400 pound payload (6 jumpers with 3 hours useable fuel).
- Single pilot and spotter.
- Cruise speed 200 knots.
- Spotter position aft of jump door.
- Floor mounted main cable (possible overhead track in 1994).
- T Tail
- Step exit.

NOTE: King Air Model 90 is also an approved smoke-jumper aircraft. It differs from the Model 200 in that it is somewhat slower, does not have a T tail, and has a payload of 1,800 pounds or 4 jumpers with 3 hours useable fuel.

2. Procedures specific to King Air.

- a. Due to cramped conditions, movement inside the aircraft is best done in a kneeling position.
- b. Two jumper sticks are standard. After spotter denotes size of stick and initiates standard commands, each jumper in succession hands their static line to the spotter. If jumpers use the overhead track, they will hook up and pin their own static line snap and the spotter will re-stow any excess line.
- c. Spotter hooks snap to cable and attaches safety wire. Spotter then routes static line through carabineer mounted on floor cable assembly.
- d. The remaining procedures thru exit are standard small door exits making sure that the second jumper finds the step with the left foot before putting weight on that foot.

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E. Casa 212

1. Characteristics

- 100 Series payload 3,300 pounds (8 jumpers with 3 hours useable fuel).
- 200 Series payload 5,000 pounds (8 jumpers with 4+ hours useable fuel).
- Pilot and Co-pilot required.
- Spotter and assistant spotter utilized. Single spotter can be used if only using single stick exits.
- Cruise speed 190 knots.
- Excellent STOL characteristics.
- Spotter position forward of jump door.
- Assistant spotter position aft of jump door.
- In-flight door plug available.
- Rear ramp/door aft of main cabin utilized for dropping larger quantities of cargo (side door used for dropping standard amounts of cargo).
- Main cable mount is short vertical stand. Emergency cable is overhead.

2. Procedures specific to Casa.

- a. Spotter will be positioned forward of the jump door. 2 jumper sticks are standard, although 3 jumper sticks are used on occasion.
- b. Spotter will initiate standard commands. The assistant spotter will make sure that each static line routing is clean on each jumper and signal the spotter.
- c. Standard large door exits, although the slap from the spotter will be on the right calf.

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F. **Bandeirante (Bandit)**

1. Characteristics

- 3,000 pound payload (8 jumpers with 3 hours useable fuel).
- Single pilot and spotter.
- Cruise speed 200 knots.
- In-flight door.
- Step mounted on floor w/small ramp.
- Spotter position aft of jump door.
- Vertical main cable.
- Front loading aircraft via door on left side forward of the turbine engine.

2. Procedures specific to Bandeirante.

- a. 2-jumper sticks are standard. The spotter will initiate standard commands.
- b. If the in-flight door is used, the spotter will tell everyone that the door is coming open. Make sure the reserve is protected. There will be no strap on the door so movement around the door should be limited.
- c. Standard small door exit procedures are to be followed. The signal to exit will be a sharp slap on the left shoulder.
- d. The second jumper will assume the first jumper position and then exit. Caution should be exercised to avoid tripping on the slightly raised ramp and to make sure the left foot is properly planted on the step.
- e. Since the Bandit is a front-loading aircraft (air stair on left side between cockpit and wing), jumpers will not load or unload while the left propeller is turning.

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G. Shorts Sherpa C-23A

1. Characteristics

- Twin turbine
- 4,850 pound payload (12 jumpers with 2 ½ hours useable fuel).
- Pilot and co-pilot and two spotters. Single spotter can be used if using single stick exits.
- Two jumper sticks are standard.
- Cruise speed 170 knots.
- Spotter position is aft of jump door.
- Assistant spotter position to the side of spotter.
- Vertical main cable on short stand.

2. Procedures specific to Sherpa

- a. Spotter will initiate standard commands. Assistant spotter will monitor static lines and check each jumper for proper routing/hook-up.
- b. Standard large door exit procedures are followed.
- c. Exit command will be a sharp slap on the left calf of the first jumper. Exit should be vigorous.
- d. This aircraft is roomy so movement around the interior should be limited and reserve handles need to be monitored.

H. Dornier 228

1. Characteristics

- Twin turbine
- 3,500 pound payload (8 jumpers with 3 hours useable useable fuel).
- 1 pilot and 1 or 2 spotters (base preference).
- two jumper stick is standard.
- cruise speed is 200 knots.
- spotter position is aft of jump door.
- vertical main cable.
- jump step with in-flight door.

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2. Procedures specific to the Dornier.
 - a. Small door exit with step. Normally two jumpers per stick.
 - b. Hand rail on right side of door sits back inside airplane and it is very important to use the rail and not put right hand on the inflight door to push-off from.
 - c. Second jumper needs to make sure to see the step prior to putting weight on the left foot.
 - d. Exit signal will be a slap on the left shoulder. Second jumper will swing into first jumper position and exit without receiving a slap from the spotter.

- I. **Other aircraft.**
 1. Shorts, SC-7 Skyvan-approved aircraft, not currently utilized.
 2. DeHavilland Caribou, DHC-4A-approved, not currently utilized.
 3. Cessna 208, Grand Caravan-approved, not currently utilized.

III. GENERAL AIRCRAFT SAFETY

A. Propellers

1. Always avoid the aircraft propellers, even when they are motionless. Treat them as if they are always turning.
2. Maintain propeller awareness. Know where it is and keep a safe distance away from it.

B. Approaching or leaving aircraft.

Note: Refer to 5709.11, specifically 43.12 and June 6, 1997 WO letter “Smokejumper Operations, Jumpers Boarding With an Engine Running.”

1. Always approach or leave aircraft on a path that takes you away from the propellers.
2. Do not take shortcuts close to the nose or under the wings of an aircraft.
3. Rear-loading aircraft. Approach from the rear.
4. Forward-loading aircraft...Approach from the front. Do not approach or attempt to leave if prop on the loading door side is still running. Wait until it stops.

C. Smoking.

1. No smoking allowed on any F.S. aircraft.
2. Do not smoke in close proximity to aircraft while parked. Spilled fuels could be ignited.

D Fueling Operations.

1. No smoking allowed within 50 feet of the aircraft while it is being fueled or within 50 feet of fuel tanks at any time.
2. No one is allowed on board the aircraft during fueling operations.

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E. General Considerations.

1. Stay clear of instrument sensors and antennae that may be attached to the fuselage or wings.
2. Avoid contact with control surfaces of the aircraft.
3. The pilot(s) and spotter(s) are a team. They are the final authority on matters pertaining to normal operating procedures aboard that aircraft. The spotter is responsible for making sure smokejumpers assigned to the load follow established procedures. It is the individual smokejumper's responsibility, however, to know and apply those procedures in accordance with the spotter's instructions.
4. It is advisable to wear ear protection, particularly in turbine aircraft.
5. Always follow procedures for use of simula seats utilizing proper equipment for specific configured aircraft.

F. Regulations.

1. Specific regulations pertaining to aircraft safety are found in FSH 5709.11 Fixed Wing Handbook and BLM Manual 9430 as well as FAA and DOT publications. Also, the manufacture's flight handbooks.
2. Waivers have been granted for some DOT and FAA regulations pertaining to use of aircraft in emergency and other specified flight situations including smokejumper missions.

G. Emergency Aircraft Procedures.

1. **Non-critical emergency** (safe flight of aircraft is not compromised).
 - a. Jumper-related.
 - (1) Inadvertent opening of reserve inside aircraft.
 - (a) Try to contain, gather and cover canopy.

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(b) If part of the canopy catches air out the door, jumper will follow it out, exiting quickly.

(2) Jumper-in-tow.

(a) If OK and able to deploy reserve, jumper should place hands on top of helmet.

(b) The spotter will make an effort to pull the jumper back into the airplane.

(c) If this effort is unsuccessful and the jumper has given the OK signal, the spotter will cut the jumper away. After being cut loose, the jumper should assume basic exit position, LOOK at the reserve handle and deploy the reserve. DO NOT PULL RESERVE PREMATURELY.

2. Critical in-flight emergency (safe flight of the aircraft compromised—bad fuel, landing gear stuck up, onboard fire, etc.)

NOTE: All in-flight emergency procedures will be signaled with the use of the bell inside the cabin. This will be done by the pilot. The pilot and spotter will communicate and decisions will be made as to the course of action. At the sound of the bell, all jumpers will look at the spotter and await direction.

a. If there is a fire in main cabin, locate fire extinguisher and attempt to put fire out. Advise pilot immediately.

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- b. Maintaining order is important. Remain seated and wait spotter's directions. Make sure you have at least your reserve on. (In Alaska, reserves should be put on if not already done. If mains are not on, there will generally not be time to do so.
- c. Emergency bailout command.
 - (1) Spotter or asst. spotter (whoever is closest to door) will open in-flight door and secure step (if applicable).
 - (2) If in-flight door is not utilized, spotter/assistant will remove door-strap from the door.
 - (3) A standard command of **Bailout**, **Bailout, Bailout** should be used, accompanied by a hand signal which will mean the same thing to jumpers and spotter; consisting of patting or pointing to the belly (reserve area) meaning bailout on your reserve, or grasping and shaking the overhead cable meaning bailout on your main canopy.
 - (4) In orderly fashion, move to rear of aircraft one at a time, hook static line clip to static line anchor cable (no time to use safety pin), assume exit position and exit. No delays.
 - (5) If it is necessary to use reserve, assume proper exit position, exit the aircraft, look at reserve handle, reach, and pull following procedures.

3. Crash Procedures.

- a. Helmets and gloves on.
- b. Restrict unnecessary movement within aircraft.
- c. Fasten seatbelts.
- d. Check location of emergency exits and emergency equipment.

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- e. After the crash, vacate the aircraft quickly, assist injured personnel and move clear of crash site.

IV. PRACTICAL TRAINING

- A. Successful completion of the Aircraft Procedures Unit will be demonstrated by practical training.
- B. After an informal lecture covering the lesson plan at the units, each jumper will be required to successfully and correctly complete all procedural steps for aircraft utilized at the respective jump base as outlined in this lesson. This practical training will be accomplished on mock-ups at the training units for refreshing jumpers. It is recommended that inexperienced jumpers also undergo practical training on actual parked aircraft.
- C. The practical training will consist of drills with jumpers fully suited.
 - 1. Timely response to spotter commands.
 - 2. Proper hook-up procedure.
 - 3. Proper positioning for first, second, and third (if applicable) positions in jumper stick in preparation for exit. Each jumper must demonstrate correct body position for each position in stick.
 - 4. Timely exit from mock-up in first, second, and third jumper positions.
 - 5. Exhibit correct emergency bailout procedure.
- D. Jumpers will be required to demonstrate aircraft procedure drills with 100 % accuracy before making live parachute jumps.