CHAPTER 5

5 JUMPMASTER TRAINING

The jumpmaster is the senior-qualified free-fall parachutist on board the aircraft, or his designated representative, and must be qualified by special training and free-fall experience to perform his duties.

There is only one Army jumpmaster in any one aircraft. He has command authority over, and responsibility for, all airborne personnel in the aircraft regardless of rank. He is responsible for inspection of the aircraft and personnel, the enplaning and safe jumping of personnel, and the dropping of air delivery containers. The jumpmaster's responsibility includes insuring that all free-fall parachutists aboard the aircraft observe flight safety regulations and comply with instructions from the pilot.

The jumpmaster's duties and responsibilities begin immediately upon notification that he is to be jumpmaster, and terminate only after all personnel and equipment are returned to the control of the unit commander upon completion or cancellation of the airborne operation. He may designate as many personnel as he deems necessary to assist him in the conduct of the airborne operation, and may assign any task he deems appropriate to those designated personnel. While the jumpmaster may delegate the necessary authority to those personnel, he assumes full responsibility for their actions.

Generally, the jumpmaster's duties fall into four major areas: in the unit area, at the departure airfield, during flight, and on the drop zone.

DUTIES IN THE UNIT AREA

The jumpmaster's first duty in the unit area is to **obtain the manifest and conduct manifest call.** The manifest (DA Form 1306) will list each jumper's name, rank, social security account number, and parent unit. It will also state the date, type of jump, type of aircraft, location of drop zone, and altitude. The jumpmaster's full name, grade, and social security account number will appear in the appropriate block.

Check each jumper's name against the manifest list. If a jumper is to be added to the manifest, fill out the appropriate information on all copies of the form and continue the entry count. If a jumper is to be deleted from the manifest, draw a line through the entire entry and initial the line.

Check the manifest for accuracy. After the MACO briefing, close the manifest out by drawing a line under the last entry, and sign all copies.

Sign the following statement which must be typed or overprinted on DA Form 1306 or attached to it: "I certify that all passengers listed on this manifest have been inspected, and no unauthorized weapons and explosives were found."

Draw any additional air items necessary for the jump. You will normally sign for all of these items, which may include aerial delivery containers to be rigged. If an oxygen jump is scheduled, the jumpers must draw bailout bottles, and you will need to take the oxygen consoles and the accompanying oxygen bottles. Insure that all bailout bottles are serviceable and that masks are properly fitted and in good condition. Inspect all equipment to insure serviceability, and replace defective equipment if necessary.

The FF-2 Automatic Opening Device should be

1. Inspect the body, cable housing, cable, and locking pin V-ring for obvious damage.

2. Insure that the arming pin is inserted and locked.

3. Check the RESET INDICATOR window to insure that the indicator marks are aligned. If they are not aligned,

   - Remove the arming pin.
   - Remove screw from reset access hole.
   - Insert reset key in access hole and wind in direction of arrow approximately one turn.
   - Remove reset key. Reset indicator should align.

NOTE:

If indicators do not align on the first attempt, five more attempts may be made to align them. If, after six attempts to align the reset indicator, alignment is not satisfactory, reject the automatic ripcord release as unserviceable.

Check the millibar window.

Check the slotted adjustment screw on the millibar window for ease of operation.

Check the stowage pocket for obvious damage.

Using the cocking stirrup with arming pin insert, insure that the automatic ripcord release is cocked.

Rucksacks should be properly rigged, and each jumper should know how to properly rig any weapons which he may carry when jumping. Insure that each jumper is in the proper uniform with all the equipment he will need for that particular jump—oxygen apparatus, helmet, goggles, gloves, altimeter, etc.

The MACO briefing should be given in accordance with Airborne SOP/regulations after the inspection is completed. Local regulations and SOP's will state precisely what information must be covered in a military free-fall MACO briefing. Normally, you will be given the elevations of the drop zone and the departure airfield during the MACO briefing, and from this you can derive altimeter settings.

Conduct pre-jump training to include a review of the characteristics of the type of aircraft to be jumped, the type of exit (door or ramp) and the seating arrangements. Review the procedure signals and jump commands, describing each and explaining the required actions for each. Keep in mind that all signals and commands on an oxygen jump must be visual. Explain emergency procedures on board the aircraft, during free fall, and under canopy, including accidental activation of the main or reserve parachute in or near an open door or ramp, cutaway procedures, and activation of the reserve parachute in case of a malfunction of the main parachute. Each jumper should also make a minimum of two PLF's, one forward and one to the rear.

Report to the DACO (Departure Air Control Officer) at the departure airfield for any changes in the status of the jump. Make sure that the necessary transportation is there or arranged, and that communications are available between the DACO and the DZSO (Drop Zone Safety Officer).

Obtain or update your information on barometric pressure on the drop zone, and data on wind velocity and direction over the drop zone at 1,000-foot intervals from the ground to opening altitude and at 2,000-foot intervals from release altitude to opening altitude. From the barometric pressure you may derive the setting for the automatic ripcord releases, and from the wind data you can calculate the desired release point as in appendix B.

The pilot briefing is normally conducted by S3/G3 section to insure that the jumpmaster and the pilot and other involved personnel all understand when, where, and what is to be done. The pilot briefing could be several days in advance of the operation, hours prior to the flight, or just prior to boarding.

The jumpmaster/pilot checklist provides a ready reference for items to be covered and understood by both the pilot and jumpmaster. The following items should be discussed with the pilot prior to conducting a military free-fall operation. Depending on the mission, additions and/or deletions may be necessary.

SAMPLE

SAMPLE JUMPMASTER/PILOT CHECKLIST

a. Desired drop altitude (AGL). _____ ☐
b. Drop zone being utilized. _____ ☐
c. Desired direction of flight. _____ ☐
d. *Proposed release point. _____ ☐
e. Number of passes over drop zone. _____ ☐
f. Number of jumpers per pass. _____ ☐
g. Drop zone wind velocity obtained from DZ prior to drop. _____ ☐
h. Type of exit (door or ramp). _____ ☐
i. *Door being utilized for spotting. _____ ☐
j Desired altitude of aircraft on final approach (i.e., aircraft level, compensate for drift of aircraft, etc.). _____ ☐
k. Discuss time warnings, 20-min, 10-min, 6-min (you may request additional time warnings as an aid). _____ ☐
l. Give pilot a copy of the manifest with the total number of jumpers. _____ ☐
m *Explain corrections for guiding aircraft. _____ ☐
n *Explain strike report. Have pilot relay strike report to jumpmaster after each pass. _____ ☐
o Discuss ground to air radio frequency and/or visual signals. _____ ☐
p. Discuss the use of caution/jump lights. _____ ☐

*Visual jumpmaster release only.

During **the pilot/jumpmaster briefing,** all concerned must understand how the AWADS method of jumping and the visual spotting method will be conducted. Especially significant is the visual spotting method wherein the jumpmaster directs the aircraft over the release point. Understanding the relationship of the proposed release point, the door being used for spotting, signals and corrections for guiding the aircraft to the release point, and the use of the caution/jump lights is necessary for a satisfactory exit from the aircraft.

The FF-2 automatic ripcord release, unlike its predecessors, may be set by the jumper and checked by the jumpmaster. It may be set prior to boarding or during a flight, but it must be set prior to the removal of the arming pin.

To compute the millibar setting for the FF-2, the jumpmaster must know the barometric pressure to within one-tenth of an inch on the intended drop zone. The barometric pressure may be obtained from any weather reporting facility capable of determining the barometric pressure in the desired area.

Using the **computer,** align the index with the drop zone barometric pressure to the closest one-tenth of an inch. Align the movable index on the arm of the computer with the desired automatic ripcord release activation altitude. Normally, the automatic ripcord release activation altitude will be 500 feet below the planned manual activation altitude, but it may be used as the primary means of main parachute activation, especially for equipment drops, by computing the activation for the planned opening altitude. Read the millibar setting below the movable index. Recompute to verify the setting. After verifying the millibar setting, have the jumpers set the millibar setting on the automatic ripcord release by turning the slotted adjustment screw. Computations and settings are determined to the closest one millibar.

> WARNING: THE SAFE TO ARM ALTITUDE FOR THE FF-2 AUTOMATIC RIPCORD RELEASE IS 2,500 FEET ABOVE THE SET ACTIVATION ALTITUDE.

Insure that jumpers set the automatic ripcord release. Using the difference in altitude between the drop zone and the airfield, calculate the settings for the altimeters. If the drop zone altitude is 500 feet, for example, and the airfield altitude is 200 feet, the altimeter should be set at minus 300 feet to correspond to zero on the drop zone. If the airfield is 200 feet higher than the drop zone, altimeters should be set at plus 200 feet.

Next, **conduct** the aircraft inspection in accordance with appendix C. While you inspect the aircraft, the assistant jumpmaster can have the troops don their parachutes and equipment and prepare for the jumpmaster personnel inspection.

Check with the pilot and crew for any changes that may have occurred since the pilot briefing. Select a recognizable terrain feature close to the computed release point on your map. This terrain feature will mark the actual release point. Describe that point to the pilot so he can visually align the aircraft from the cockpit. The desired track to the release point should be into the wind if possible. This will reduce ground speed and the pilot will not have to crab the aircraft to maintain the track.

If you are going to oxygen altitude, you will **supervise the loading of the oxygen and oxygen consoles** at this time.

After you have completed your aircraft inspection, the jumpers should be ready for your personnel inspection in accordance with appendix A. Remember that you must inspect each jumper and his equipment, and, if you are to jump, you and your equipment must be inspected. Since it takes approximately 1 minute per jumper for inspection, judge your time accordingly so that you will be sure to make your station time.

A plane-side briefing is given just prior to loading or may be given immediately after loading. Update the personnel on any changes, and cover all actions from the 20-minute warning through assembly on the drop zone. If you did not do so during the MACO briefing, brief the parachutists, in detail, on the possibility of an abort. Establish the exit order and tell the jumpers whether they will exit on the green light or on your command.

The pilot will assemble all personnel who will be aboard the aircraft during the flight and will give his safety briefing. He will outline and describe emergency procedures, the rules in force aboard his aircraft, and will indicate what actions and activities are permissible among the jumpers. Part of your duties is to see that he is obeyed.

Station time is that time when all jumpers and equipment are seated aboard the aircraft with seat belts fastened, helmets on, ready for takeoff. You must insure that station time is made. Once aboard the aircraft, your next duty area is during flight.

Insure that you have communications with the pilot and/or navigator, either by intercom or through the loadmaster. You must have communications if you are going to jump on visual release.

Orientation during flight is one of the jumpmaster's most important duties. Coordinate with the navigator to map out your checkpoints utilizing the navigator's planned route, and have him relay the checkpoints to you as the aircraft crosses them.

Keep the jumpers informed of the location of the aircraft at all times. If the aircraft were to go down or if you had to make an emergency exit on an operational mission, accomplishing the mission could depend on your knowledge of your location.

Timely and proper issuance of the procedure signals and jump commands, accompanied by correct reactions by the parachutists, allows the jumpmaster to maintain complete control and assures successful execution of the airborne operation. Give good, distinct visual signals.

The first procedure signal, "DON HELMETS" is given approximately 1 minute prior to takeoff, but may also be given at any time it becomes necessary during flight. The jumpers will secure their helmets, check to insure seat belts are fastened, and prepare for takeoff or landing.

Give the next signal, "UNFASTEN SEAT BELTS" after the aircraft has reached an altitude of 1,000 feet. This signal allows the jumpers to remove their seat belts and relax. The pilot will have informed you if the jumpers are to be allowed to eat or smoke on the flight.

At the "20-minute warning," make sure the jumpers don any equipment they may have removed. This equipment must be rerigged and inspected. Any additional equipment will be rigged on the jumper and inspected.

At the "10-minute warning" or as soon as the cabin has been depressurized to at least 2,500 feet above the set opening altitude, you will give the signal to "ARM MAIN PARACHUTE." Upon receipt of your signal, the jumpers will remove the arming pins from their automatic ripcord releases and hold the pins up in front of them to allow you or your assistant to check them. Count the pins and assist any jumper who has difficulties. After you have checked the arming pins, the jumpers will secure them in pockets until after the jump or until you give the signal to "REINSERT ARMING PINS."

If at any time the aircraft descends below the safe-to-arm altitude for any reason, give the signal to "REINSERT ARMING PINS." Simply reverse the "ARM MAIN PARACHUTES" signal. Insure that each jumper has reinserted his arming pin and assist if necessary.

"Ground Winds" signals are generally relayed accompanying the "6-minute warning."

When it becomes necessary to stop smoking, give the signal to "EXTINGUISH SMOKES." Insure that all cigarettes and flame-producing items are completely extinguished. This signal will also be given prior to activating any on-board oxygen supply.

There will be additional signals for jumps from oxygen altitudes. Prior to bringing the cabin pressure above 1,000 feet, or at the time pre-breathing is to start, make sure that the oxygen safety man has activated the oxygen supply and give the signal to "MASK." Insure that each jumper's mask is fitted and functioning properly and assist if anyone has difficulties.

Make an "Oxygen Check" immediately upon masking, at the 20-, 10-, and 6-minute warnings, prior to cabin pressure being raised above 10,000 feet, and whenever else you believe it to be necessary. Do not hesitate to order additional oxygen checks. If the individual jumper is not having oxygen problems, he will return your signal and hold it until you have completed your oxygen check. If problems occur, the individual in difficulty will place his hand over the console with his palm facing down. Have him assisted immediately. At the end of the oxygen check, make the oxygen check signal *again* to indicate to the jumpers that *you* are having no difficulties with oxygen.

If you must use a nonstandard signal to meet a specific requirement, keep it simple and make sure the desired reaction is clearly indicated.

The 20-minute, 10-minute, and 6-minute time warnings are standard. You may request additional time warnings from the pilot if you believe them to be necessary or helpful to you. Normally, a 2-minute, 1-minute, and 10-second warning will be relayed from the pilot, but it is not necessary for you to relay these warnings to the jumpers. Each of these warnings has specific requirements of you, whether the release is to be AWADS or visual spotting. You must coordinate with the pilot to establish when he will turn the green light on and under what circumstances he should turn the red light back on.

Normally, on a visual spotting release, the green light should be turned on at the 2-minute warning if all conditions for the jump are satisfactory at that time. If conditions become unsatisfactory for any reason, the pilot will turn the red light back on to indicate a no-drop condition.

On an AWADS jump, the red light will remain on until actual exit time. The activation of the green light will be the signal to exit, but you must still give the necessary commands from the 2-minute warning on.

At about the 2-minute warning, move to the door selected for spotting. Choose a door which will enable you to observe both the drop zone and release point while aligning the aircraft. Of the two, however, it is more important for you to be able to see the release point than the drop zone. Take up a stable position which will give you good perspective so that you will be able to determine the position of the aircraft by looking straight down. By learning to maintain the same position in the door, you will develop a technique for selecting good reference points to assist you in guiding the aircraft to the release point. In addition to good perspective, your door position must be stable enough for you to remain fairly comfortable in it as long as necessary to align the aircraft.

Check the aircraft's position by looking straight down. Do not try to look down the side of the aircraft to align it with the release point. If the pilot is crabbing to maintain the track, your perspective will be thrown off. The aircraft should be as level as possible.

Give the first jump command, "STAND UP." The parachutists will stand up, check the attachment and adjustment of their equipment, check the bottom locking pin of the individual directly in front of them, and place their goggles in position.

Determine your location and store that reference point in your mind. Locate and identify the drop zone and the release point. By dividing in half the distance from where you were at the 2-minute warning to the release point, you can determine your position at the 1-minute warning. Construct an imaginary line through your present position and your position at the 2-minute warning, and extend it toward the release point. This will be the actual track. Imagine another line from your present position directly to the release point.

LEFT CORRECTION

This is the desired track. If there is a difference of more than 50° in the two tracks, correct the aircraft's track by giving the pilot a correction. Corrections are made in increments of 5° and should be approximated to the closest increment in the desired direction. The correction, LEFT, TEN, for example, would tell the pilot to correct his course ten degrees to the left. You want the pilot to correct the heading and return to level flight aligned with the release point as quickly as possible. Check the alignment further and make any subsequent corrections.

RIGHT CORRECTION

At the 1-minute warning, give the second jump command, "MOVE TO THE REAR." All jumpers who are to exit on that pass will move to the vicinity of the selected exit. If oxygen is being used, the jumpers will activate their bailout bottles and disconnect from the on-board oxygen source before moving to the exit. They will continue to watch you for the next jump command. Occasionally, because of aircraft configuration, seating arrangements, or number of jumpers, "move to the rear" may be omitted, but if so, jumpers should be thoroughly briefed in advance.

Continue spotting, giving corrections as may be necessary. When you are given the 10-second warning, give the command to "STAND BY." Get to your feet if you kneel to spot, so that you will be in a position to command "GO." The lead jumpers will position themselves within 3 feet of the edge of the exit being used and watch the jumpmaster and jump light as instructed in the MACO or plane-side briefing. If the electronic release is being used, the jumpers should watch the light and glance at the jumpmaster approximately every 5 seconds for either the "GO" or abort signal. During visual release, it is the jumpmaster who determines whether the situation is "GO" or abort.

If a pass is aborted, face the front of the aircraft and walk slowly forward, shaking your head from side to side. DO NOT MOVE YOUR HANDS OR ATTEMPT TO ATTRACT THE JUMPERS' ATTENTION WITH YOUR HANDS. If your hand should happen to be raised in preparation for the command "GO," do not bring it down. LEAVE IT IN THE AIR AS YOU WALK FORWARD, or the jumpers may mistake your motion for the "GO" signal and exit. **Any hand or arm motion** you make may be misinterpreted as the "GO" signal at this point.

The last jump command is "GO," given in conjunction with the green light when using electronic release, or when the jumpmaster determines that he is over the release point when visual release is used. It is extremely difficult to direct the aircraft directly over the release point at high altitudes, but make every possible effort to do it.

In the event you have someone who refuses to jump, move him forward in the aircraft and seat him. Have him fasten his seat belt and wait for airlanding or the return to the departure airfield. At no time should you attempt to force an individual out of an aircraft. When time permits, you may try to calm him down by talking to him. If a jumper becomes ill on an

administrative jump, have someone land with him. If a jumper should suffer from oxygen sickness, the circumstances will dictate the proper procedures to be followed.

Strike Reports

Assuming that there will be multiple passes, the drop zone safety NCO or officer must give the jumpmaster a **strike report** by radio. The strike report includes the distance and direction from the desired impact point to the point where the center of the mass of jumpers landed. Measure the distance in meters. To give the direction, the DZSO must know the direction of the aircraft's track, and must convert the direction to the closest hour by the clock method. Twelve o'clock is located on the aircraft's track in the direction of flight with 6 o'clock 180° to the track.

The DZSO forms his strike report by combining the direction of the closest hour (within 15°) and the distance in meters. It will be given in a form such as "200 meters at 2 o'clock."

When you receive the strike report from the ground, write it down. If the hour part of the strike report is smaller than 6 o'clock, add 6 hours to it. If it is larger than 6 o'clock, subtract 6 hours from it. This procedure is basically the same as finding the back azimuth in map reading, but "hours" are used instead of "degrees."

After plotting the actual release point on your map, draw a line through it parallel to the track of the aircraft. Plot the corrected release point from the actual release point by moving the release point in the converted direction for the given distance. It is not necessary to allow for forward throw again. After you have plotted the new release point, use it on the next pass.

After the last jumper has exited and the last equipment bundle has been dropped, you will exit the aircraft. Your duties in the aircraft are completed.

Your first drop zone duty will be after assembly. You must account for all personnel and equipment, to include all air items, personal gear, weapons, and combat equipment. Conduct a manifest call to determine that all personnel are present. In the event that a jumper is missing, notify the DZSO and the organization; the DZSO will conduct a search for the missing jumper in accordance with unit SOP and/or regulations.

If there are any malfunctions, the jumper (except when injured) will remain with the gear. He will in no way tamper with or move it until a qualified rigger has inspected it. The rigger will state the disposition of the equipment after he has inspected it. It is also your responsibility to see that all injured personnel receive proper medical attention as soon as possible.

Once you have turned over all personnel and equipment to their unit commander, your duties and responsibilities as jumpmaster are ended. During tactical operations, however, your duties end when the last man exits the aircraft. The tactical commander assumes command after the personnel land.

A student jumpmaster will be a previously qualified military free-fall parachutist. He will attend classroom instruction on jumpmaster duties and procedures; familiarization with military free-fall equipment; preparation of parachutists and equipment for free-fall operations; inspection of military free-fall personnel, equipment, and aircraft; supervision of movement in the aircraft, preparation for exit, and exit from the aircraft; and aligning the aircraft over the proper release point.

Practical exercises will be conducted in which the student jumpmaster applies his classroom knowledge and prior jump experience. Half the students in a class will act as jumpmasters, giving commands to their "jump buddies." Both the jumpmaster and his buddy will exit on the jumpmaster's spot; they will alternate roles on each jump. In the usual size class (18 students) this constitutes nine passes per sortie.

If the AWADS system is used, the jumpmaster students will issue jump commands and exit on the green light. After exit, students are required to stay close to each other while falling and land within 25 meters of each other. The jumps are scheduled normally as two per day or one day and one night jump. Altitudes will begin at 10,000 feet AGL and progress to 20,000 feet AGL (jumps may be conducted at altitudes up to 40,000 feet). Oxygen will be used when jumping from altitudes higher than 10,000 feet.

APPENDIX

A JUMPMASTER PERSONNEL INSPECTION

Prior to each military free-fall jump, the jumpmaster must conduct a systematic inspection of each parachutist to insure that all equipment is properly worn and attached.

With the jumper facing the jumpmaster, the jumpmaster begins the inspection with the helmet and works down to the last item. The jumper then faces about and is inspected from the rear in the same manner. The jumpmaster coordinates the progression of his hands and eyes, so that he visually inspects each item as he touches it. The particular hand not involved remains on the last item inspected to aid in keeping the inspection in sequence. Comparison inspection of like items improves the accuracy of the inspection significantly.

The jumpmaster personnel inspection can usually be conducted at the rate of one jumper per minute for planning purposes, but **SAFETY AND ACCURACY ARE NEVER SACRIFICED FOR SPEED.** If a deficiency is detected in a piece of equipment, consult a rigger or replace the piece of equipment.

WARNING: AN IMPROPER OR INCOMPLETE INSPECTION CAN RESULT IN SERIOUS INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

NOTE: ALL EQUIPMENT TO BE JUMPED OR AIRDROPPED MUST RECEIVE A JUMPMASTER PERSONNEL INSPECTION.

The following is a proven method of jumpmaster personnel inspection:

With the jumper facing you, place both hands on each side of the helmet and inspect the retainer strap on the goggles to insure that it is in serviceable condition and is attached to the sides or rear of the helmet. Inspect the lens to insure that it is of the clear type and has no cracks or severe scratches to obscure vision.

Check the adjustable chin strap on the helmet to insure that the snaps are functional and that the strap is serviceable. Insure that the oxygen mask is properly secured to the helmet and that it releases properly, allowing rapid removal in the event of an oxygen malfunction.

Check the oxygen mask for proper fitting and cleanliness. Insure that both inhalation valves are pointed down and that the exhalation valve is properly secured. Insure that the oxygen hose is secured to the oxygen mask with a clamp. Trace the hose to insure that it is not misrouted, that it is free of cracks, and that the mask connector is properly inserted and seated in the connection block assembly mounting plate. Check to insure that the mounting plate is attached to the left main lift web of the parachute harness assembly. Insure that the male connecting portion for the bailout bottle assembly hose is located to the parachutist's left side. Insure that there is an O-ring attached to the male connecting portion of the oxygen mask-to-regulator connector. Check the bayonet connector of the MC-1 oxygen cylinder assembly for proper seating and insure that it is in the "locked" position.

Move to the risers. Place both hands, palms up, as close to the packtray as possible. Grasp the risers with your thumbs on top of tha risers. Applying pressure upward and moving one hand at a time toward tha canopy release assembly, check for twisted or misrouted risers, and insure that the fitting of the male to the female portion of the canopy release assembly is secured.

With your right hand on the last item inspected, place your left hand on the parachutist's right canopy release assembly. Grasp the canopy release cover and check for spring tension. With your left hand on the canopy release cover, inspect the left canopy release cover using the same procedures. Grasp the entire right canopy release assembly with your left hand and rotate the assembly one-quarter turn outwards and visually inspect the seating of the male and female portions of the assembly. Repeat the same procedures with the parachutist's left canopy release assembly.

Grasp the ripcord handle with your left hand. Place your right hand firmly around the ripcord grip pocket, and apply pressure to insure that it is properly seated. Check the tacking and routing of the ripcord cable housing with your left hand.

Inspect the chest strap routing and attachment. Place your left hand on the short chest strap V-ring attached to the right main lift web. With your right hand, trace the chest strap from the attaching point on the left main lift web to the quick-ejector snap fastener. Insure that the strap is attached to the V-ring of the short chest strap. Apply pressure on the release lever of the quick-ejector snap fastener to insure that it is locked.

Move to the reserve parachute assembly and place your hands on each end of the reserve, palms facing toward the center of the reserve. Starting on the parachutist's right side, check to insure that the right carrying handle is secured and a safety wire is attached. Looking to the right, use your right hand to check the left carrying handle to see that it is not secured.

Then grasp the reserve assembly with both hands and raise it upward and away from the parachutist to relieve tension from the snap fastener guard. Place the index fingers of each hand on the outer edge of the snap fastener guard. Visually inspect to make sure that the snap fasteners are attached to the harness assembly D-rings. Check the snap fastener guards for spring tension. With your left hand, trace the reserve tie-down strap on the parachutist's right side to insure that it is properly secured to the backpack retainer strap. With your right hand, check the left side reserve retainer strap for proper routing and secure attachment. Moving your left hand, fingers closed and palm facing toward the reserve, to the front of the reserve parachute, insert your fingers with a downward motion between the packtray and ripcord grip to insure that the pack opening band is not over the ripcord grip. Insert the index finger of your left hand into the ripcord grip pocket to insure that no foreign material is present and that the ripcord swage ball is intact. Insert both index fingers under the ripcord protector flap, and apply pressure away from the container to release the snap fasteners. Starting on the parachutist's right side of the ripcord cable, visually and with your left hand insure that the grommet of the right end flap is on top of the pack-releasing cone. Check the first and second pins in sequence to insure that they are not bent, are fully seated, and that the holes of the pack-releasing cone are free of foreign matter. Check the grommet of the left end flap to insure that it is on top of the pack-releasing cone. Secure the flap back in the closed position. Check the proper routing and attaching of the pack opening bands. Grasp the pull tab of the right end pack opening band with your left hand and apply pressure to the pull tab to insure that it is attached. Grasp the left pull tab with your right hand and check it in the same manner. Move both hands to the bottom pull tabs and check them one at a time.

The oxygen cylinder bag is secured by the pack opening bands on the bottom of the reserve packtray. Check proper routing of the pack opening bands. Open the bag flap with your right hand and check the oxygen cylinder for an 1800 to 2200 psi reading indicated on the gauge. Trace and inspect the hose from its connection on the bailout bottle assembly to its attachment on the connector. Move both hands to the top of the reserve and insure that the routing of both the top pack opening bands secure the altimeter mount. Pull on the tabs to insure they are secured.

Next, check the altimeter for proper setting, adjustment operation, and securing to the altimeter mount.

Raise the reserve and instruct the jumper to "hold the reserve and squat."

Place both hands on the leg straps as far back toward the saddle as possible. With your fingers facing down, trace the leg straps back toward the V-ring, insuring that there are no twists or misrouting, and that the quick-ejector snap fastener is properly locked. Always insure that one leg strap, either left or right, is routed through at least one of the carrying handles of the kit bag, which is placed under both the leg straps.

Moving to the parachutist's left side, start at the top. Insure that the weapon, if carried, is slung over the parachutist's left shoulder, muzzle down and pistol grip to the rear. Insure that the weapon is riding as low as possible with the butt as close to shoulder level as possible. Insure that the sling is routed over the left shoulder and under the left main lift web, and that the chest strap is routed through the sling. The reserve restraint strap should be routed over the sling and upper handguard and secured to the backstrap V-ring.

Move to the Automatic Opening Device (AOD). Check to insure that the arming pin is properly inserted into the body of the AOD. Visually inspect the reset indicator to check the proper alignment of the white reset indicators. Check the millibar setting through the access hole on the side of the pocket, and insure that it is correct. Trace the power cable housing to the mounting plate and insure that it is properly attached. Inspect the power cable and withdrawal hook for proper routing and attachment to the top locking pin.

Moving to the rear of the parachutist, check the goggles' retainer strap on the helmet for proper attachment.

Place both hands, fingers up, under the risers as close to the canopy release assembly as possible. Trace the routing, one riser at a time, back toward the packtray assembly, checking to insure proper mounting and that the risers are not twisted. Inspect the ripcord housing cable to insure that it is properly secured to the ripcord housing clamp. Raise the ripcord protector flap and inspect the ripcord cable for frays and insure that no pins are bent. Starting from the top pin, physically check the routing and pins, and close and snap the ripcord protector flap. Inspect the pack opening bands on each side, one at a time, to insure that they are secured to the packtray.

Next, check the left side packtray slide fastener to insure that it is secured. Inspect the right packtray slide fastener in the same manner. Instruct the parachutist to lean forward so that you can check the saddle for twists.

After the jumpmaster personnel check is completed, have the parachutists don any equipment with which they will be jumping. Inspect the equipment container starting from the front of the jumper.

Between the parachutist's legs you will see the equipment lowering line. Check its attachment to the equipment container harness. Check the container harness leg straps for routing through the keepers and insure that they are not twisted. Continue checking the routing up to the quick-release adjustable buckle attached to the harness D-ring. Insure that a safety wire is inserted in the snap hook on the right side.

Move to the right side of the parachutist and check to insure that the quick-release snap fastener on the lowering line is attached to the equipment ring on the right side of the main lift web. Move to the rear of the parachutist and check the proper stowing and routing of the lowering line on the equipment container. Insure that all loose straps are properly stowed.

APPENDIX

B RELEASE POINT COMPUTATION

Wind is the uncontrollable factor with which all parachutists must contend. The effects of wind will confront the free-fall parachutist both in free fall and after canopy opening, and must be taken into consideration when computing a release point.

The primary source of wind information is the military weather services. Any Air Force base or meteorological section in an artillery unit has the equipment and capability to provide information on wind direction and velocity at various altitudes. Wind information is also available from civilian weather services usually found at municipal airports or from any branch of the US Weather Bureau. It is also possible to obtain wind data while aboard the aircraft by arranging for the air crew to give you wind readings at different altitudes.

Properly recorded wind data will eliminate confusion in making release point computations. The wind reading, velocity, and direction are taken every 2,000 feet in free-fall altitudes and every 1,000 feet in under-canopy altitudes.

It is important that you understand the steps and sequences used in the computation of release points. Always work from the desired impact point (DIP) back up to the aircraft, the first leg being from the "DIP" to the opening point, the second leg from the opening point to the preliminary release point, and the third from the preliminary to the computed release point, to compensate for the forward throw from the aircraft.

The formula for determining drift is D= KAV, both for deployed wind effect and free-fall drift effect. In each case, "D", the drift in meters, is the unknown. "K" is a constant, the drift in meters per 1,000-foot loss in altitude in a 1-knot wind; "A" represents altitude in thousands of feet; and "V" indicates average wind velocity in knots.

To determine deployed wind effect, "K" will be 25, based on the fact that a parachute will drift 25 meters for every 1,000-foot loss in altitude in a 1-knot wind. If deployment altitude is 3,000 feet, for example, "A", the altitude in thousands of feet, will be "3"; if opening altitude is 2,000 feet, "A" will be "2". To determine "V", the average wind velocity, add the wind velocities at 1,000-foot intervals and divide by the number of velocities. If opening altitude is 3,000 feet, obtain the value of "V" by adding the wind velocities at 3,000, 2,000, and 1,000 feet, and divide the total by 3. Disregard surface winds in your computations.

$$D = KAV$$

"K", the constant ..... = 25

"A", altitude in thousands of feet ..... = 3

"V", average wind velocity, (14 knots + 12 knots + 10 knots divided by 3) ..... = 12

Therefore, D=KAV is 25 x 3 x 12 = 900 meters.

The next step is to determine wind direction. Both the wind velocities and directions are received at each altitude. Wind directions are given from true north. Normally, to figure the average direction, total the azimuths and divide by the number of azimuths. Because you will be working with the full 360° range, you will receive wind readings where the directional change is less than 90° but the numerical difference is greater than 180°, such as 355° and 005°. A numerical average in this case will be erroneous for your purpose. If you add 360° to the smaller numerical reading, you will arrive at a true average wind direction. This phenomenon, not to be confused with a "dog leg," will occur only when one or more of your wind readings fall between 001° and 090°. In all other cases when the numerical difference is greater than 180°, the directional change will be greater than 90°, and you will have to compute a "dog leg," or two average wind directions.

A dog leg calculation requires two or more complete and separate computations to obtain the drift. Using the formula D=KAV, compute the drift from

the DIP to the point where the wind direction shifts, averaging azimuths to obtain the direction. Then make another set of computations with the same formula to determine drift and direction from the windshift to the opening point. If there is more than one windshift, make extra computations to compute drift and direction from one windshift to another, and finally from the last windshift to the opening point. Next, convert true azimuths to grid azimuths.

The next step in the computation process is the computation of the free-fall wind effect. The same formula (D=KAV) used for the deployed wind effect is used again, but the values differ.

"D" is again the drift in meters; "K", the constant, is 3 for free-fall wind effect, determined by the premise that a body in free fall will drift 3 meters per 1,000 feet of drop in altitude in a 1-knot wind. "A" is the difference in thousands of feet between drop and opening altitudes. If, for example, drop altitude is 12,000 feet and the opening altitude is 3,000 feet, the "A" would be "9", representing 9,000 feet of free fall. "V" is again the average wind velocity in knots, but the velocities are taken at 2,000-foot intervals instead of the 1,000-foot intervals for deployed vector. (Do not use the wind velocity at opening altitude when figuring free-fall wind effect.) Average the wind velocities and directions in the same manner as for figuring deployed wind effect. Be careful to recognize "dog legs" and to calculate in the same manner as for deployed wind effect. Convert the true azimuths to grid azimuths.

After you have computed the deployed and free-fall wind effects, recheck to insure that you have converted all true azimuths to grid azimuths. Then check to insure that you have plotted the desired impact point correctly on your map. Take a protractor and place the index over the DIP, insuring that the zero on the scale is pointing to grid north and that the numbers increase to the right. Move to the average direction of canopy drift as you have determined it, and place a tick mark on the map. Draw a straight line from the DIP to the tick mark. Then measure off the drift distance on the line, starting from the DIP, and mark the line at the calculated distance. The mark will indicate the opening point if there is no "dog leg," or the windshift point if there is. If there are "dog legs," continue to mark direction and distance from the last mark made by placing the index of the protractor on the last mark and realigning the zero on the scale with grid north and repeating the procedure until you have reached the opening point.

Move the protractor along the line and place the index over the opening point mark. Realign the zero on the scale with grid north, and plot the set of drift and direction figures for free-fall wind effect in the same manner. Mark off distance and direction for all "dog legs" which may occur. The last mark you have made will indicate the preliminary release point.

The final step is to determine your computed release point. The initial vector is the ground distance which the parachutist will travel before reaching terminal vertical velocity. Although there may be variations in the initial vector, 300 meters is used for calculation purposes. Depending upon winds and direction of flight, this figure may not be correct, but compensation can easily be made.

Beginning at the preliminary release point marked on your plotted map, measure 300 meters back into the line of the aircraft's flight, and mark that point. This marked point will be your computed release point. Select a recognizable terrain feature close to this point for actual release. You may want to select another recognizable terrain feature approximately 1,000 to 1,500 meters back from the release point along the aircraft's track. This will give you a reference point for your "STAND BY" command.

APPENDIX C

AIRCRAFT INSPECTION

US Air Force troop carrier and assault type aircraft are the primary aircraft used in military free-fall operations and in proficiency and qualification training. Any aircraft, however, may be used for free-fall parachuting providing the parachutists can exit without hazard, can clear the aircraft completely, the drop speed is not excessive, and the total number of parachutists does not exceed the weight and space limitations of the specific aircraft.

The aircrew is responsible for preparing the aircraft for air drops and will furnish any special equipment which may be required. The jumpmaster, however, must be familiar with the safety considerations and jump procedures applicable to each aircraft. The items to be checked on an aircraft inspection are:

PROJECTIONS/EDGES	All sharp or protruding edges around or aft of the jump doors should be taped and padded, including door handles. (Doors on pressurized aircraft should NOT be taped.)
JUMP DOORS STOWED/LASHED	C-124 and C-119
JUMP PLATFORMS	optional.
WIND DEFLECTORS	when exiting by troop doors from C-130 and C-141
FLOOR	Clean and not slippery. No projections extending into aisle. Prepared to receive M 2900 console, if used.
INTERCOM	operable.
JUMP LIGHTS, ALARM BELL	operable.

TROOP COMFORT FACILITIES	operable, location known.
SEATS, SEAT BELTS	sufficient and properly installed. Use of outboard seats allows room for mounting oxygen consoles.
LIGHTING	adequate for night flights.
EMERGENCY EXITS	location known.
SICK CUPS.	available.
EQUIPMENT	stowed and lashed.
LIFE VESTS/RAFTS	present for overwater flights.
EMERGENCY EQUIPMENT	present; location known.
FIRST AID KITS	
FIRE EXTINGUISHERS	
FIRE AXES	
SPECIAL EQUIPMENT	oxygen console properly stowed and lashed.

There should be sufficient room allowed for troop exit movement in the aircraft. Two files, for example, may be utilized for door exits, but for ramp exits as many as four parachutists may be placed on a line on the ramp with the remainder of the parachutists in successive ranks.

APPENDIX

D GLOSSARY

Abort - Failure to accomplish the mission for any reason. It may occur at any point from initiation of operation to destination.

Above Ground Level (AGL) - Actual distance of the aircraft above the ground, normally expressed in feet.

Adverse Weather Aerial Delivery System (AWADS) - An electronic release system used when visual siting of the drop zone cannot be accomplished.

Airborne SOP - A locally prepared document regulating the conduct of airborne operations.

Alignment - The heading in relation to the release point.

Altimeter - A device to determine altitude.

Ambient Altitude - The atmosphere at any given altitude.

Anemometer - An instrument used to give wind readings and sometimes wind direction.

Arming Knob - The knob on the FF-2 automatic ripcord release which activates or deactivates the automatic ripcord release by its removal or reinsertion.

Armed Pins - An unsafe condition in which the ripcord pins are retracted from the locking cones to the point that little or no effort results in deployment.

Automatic Ripcord Release - A mechanical device designed to automatically open a parachute at a predesignated altitude.

Automatic Ripcord Release Calculator - A circular slide rule type of instrument used by the jumpmaster to calculate the setting on the FF-2 automatic ripcord release.

Back Slide - A term used to describe a rearward movement of a parachutist during free fall.

Bailout Bottle Assembly - A dual bottle oxygen cylinder system designed to provide oxygen to parachutists during free fall.

Body Stabilization - Attaining and maintaining a stable body position during free fall.

Body Turn - A movement made in free fall to effect a turn by moving the upper torso either to the right or left.

Brakes - A term used in describing the position of the toggles to control the forward speed of the canopy.

Cabin Pressure - The actual altitude pressure inside the aircraft as opposed to the altitude pressure outside the aircraft.

Canopy Control - Maintaining canopy maneuverability in the desired direction.

Canopy Thrust - The inherent forward speed of the canopy.

Center Line - The joined portion of two lines extending from the rear risers to the apex. This line inverts the apex of the canopy and increases glide.

Chamber Flight - A simulated flight in a training pressure chamber, which closely resembles actual flight.

Control Lines - The lines which connect the toggles and turn slots and by which the parachutist may control the action of his canopy.

Correction - Information the jumpmaster gives the pilot in order to assist the pilot in aligning the aircraft over the release point.

Corrected Release Point - The release point determined as a result of corrections after a strike report.

Crabbing - Maneuvering the canopy at an angle to the direction of the wind.

Cross Control - The manipulation of toggles to counteract each other in order to maintain a stable canopy overhead position.

Crown Lines - Twelve continuous lines attached zig-zag fashion to the 24 radial seams at the canopy apex.

Cutaway - A term used for the jettisoning of the main canopy in the event of a malfunction.

D-Ring - A D-shaped metal fitting used to fasten different items to the harness.

Departure Airfield - The actual location where jumpers are loaded on the aircraft and from which the aircraft departs for the drop zone.

Deployed Wind Effect - The wind drift from deployed altitude to the surface in meters.

Desired Impact Point (DIP) - Desired spot for parachute landings on the drop zone.

Disarm Automatic Ripcord Release - Term used to instruct parachutists to reinsert the arming pin into the automatic ripcord release.

Dog Leg - A term used to describe calculations when the directional difference in winds is 90° or more at two consecutive altitudes.

Don Helmets - Put helmet on and fasten chin strap.

Drop Time - The actual time jumpers exit the aircraft.

Drop Zone (DZ) - A terrain feature used as a landing area for parachutists.

Drop Zone Safety Officer (DZSO) - Officer responsible for the conduct of operations on the drop zone.

Early Green Light - Signal which indicates that the aircraft is in jump posture and that the jumpmaster may give the release.

Effective Canopy Range - The maximum distance from which the canopy can be maneuvered to the target area from a given altitude.

Free-Fall Bundle - A bundle used to drop certain items of equipment not carried by jumpers.

Free-Fall Drift Effect - The wind effect in meters from terminal vertical velocity to deployment altitude.

Glide - This position is used to permit forward movement, to prevent collision with other jumpers. Glance down at the top of reserve. Do not break the arch in the back, extend legs slightly.

Grouping - A technique used to enable parachutists to fall together in the air, remain together under canopy, and land as a compact tactical unit.

Heading - Direction of flight.

Holding - Term used when the canopy is pointed directly into the wind (as opposed to crabbing or running).

Hyperventilation - Increased pulmonary ventilation beyond that needed to maintain the blood gases within normal range.

Hyponemic - Indicating a condition of lack of oxygen in the bloodstream.

Hyporic - Showing signs of hypoxia.

Hypoxia - Lack of oxygen.

Impact Point - Point on the ground where the jumper should land.

Initial Vector - The ground distance from exit to terminal vertical velocity. It is plotted in meters in the direction of motion, which is the true heading at moment of release.

Intercommunications System (Intercom) - The communications system on the aircraft whereby the aircrew and the jumpmaster may talk with the pilot and each other.

Jettison - Term used to describe the act of cutting away the main canopy in case of a malfunction.

Jump Commands - Signals given by the jumpmaster to the parachutists on his sortie to control the parachutists' actions between the 2-minute warning and exit.

Jumpmaster - The assigned airborne qualified individual who controls parachutists from the time they enter the aircraft until they exit.

Jumpmaster Personnel Inspection - An inspection by the free-fall jumpmaster similar to that of static line jumpmaster to insure all safety requirements have been met.

Load Time - The actual time the parachutists board the aircraft.

Loadmaster - The Air Force representative who is responsible for securing all loads on the aircraft.

Lowering Line - A cord designed to allow a parachutist to lower a rucksack or a piece of equipment to the ground prior to his own impact.

MACO - Marshalling Area Control Officer.

Malfunction - Any discrepancy in the deployment or inflation of the parachute which can create any faulty, irregular, or abnormal condition increasing the jumper's rate of descent.

Millibars - Unit of measurement of barometric pressure used when setting the FF-2 automatic ripcord release.

Modified Frog Position - A preferred body position for exit and free fall. Back is arched, head back, arm extended horizontally, elbows bent, hands at eye level, knees bent in a relaxed position.

Non-Oxygen Jump - A parachute jump, normally below 10,000 feet, which does not require the use of oxygen equipment.

Non-Oxygen Procedures - Signals given by the jumpmaster to control the action of the jumpers between take-off and the 2-minute time warning when oxygen is not used.

Opening Point - The point on the ground over which the parachutist deploys his canopy.

Out-of-Control - A term used to describe a free-fall parachutist in a condition in which he is not in control of his fall, such as spinning or tumbling.

Oxygen Check - Visual check made by the jumpmaster to see that each jumper is receiving oxygen.

Oxygen Jump - A free-fall parachute jump requiring the use of oxygen, normally at any altitude above 10,000 feet.

Oxygen Mask - A face mask which may be connected to an oxygen supply, allowing parachutists to operate above non-oxygen altitudes.

Oxygen Procedures - Procedures used by jumpers and the jumpmaster when they jump using oxygen equipment.

Oxygen Station - A hose to which one jumper can connect his mask and receive oxygen.

Parachute Landing Fall (PLF) - A controlled method of landing with a parachute to prevent injury.

Partial Malfunction - A situation in which the canopy does not fully deploy.

Physiological Training - Training conducted by the Air Force to enable parachutists to identify oxygen equipment and systems and explain the effects of high altitude physiology, cabin pressurization, and hazardous noise and stress.

Pilot Briefing - A briefing the jumpmaster gives the pilot to clarify any points related to the airborne operation, such as drop signal, time, or alternate DZ.

Power Cable - A cable through which power is transmitted from the FF-2 to the pins, securing parachute opening.

Pre-Breathing Time - That time spent prior to a high altitude drop when the parachutists and jumpmaster breathe 100 percent oxygen.

Preliminary Release Point - The point above the ground at which the initial vector stops and the free-fall drift factor begins.

Premature Deployment - Deployment of a parachute prior to the planned time or altitude.

Pressurization - The introduction of a mechanically produced artificial atmosphere aboard the aircraft.

Reference Point - Any recognizable point on the ground which may aid a jumper in determining his location and orientation.

Release Point - The point over which parachutists exit the aircraft.

Reset Indicator - A window on the FF-2 automatic ripcord release through which the release time-delay mechanism is checked.

Reset Key - A small key used to reset the time-delay mechanism.

Running - Pointing the canopy in the direction of the wind.

Safe-to-Arm-Altitude - An altitude 2,500 feet above that altitude at which the FF-2 is set to activate.

Semi-Delta - A free-fall position in which the jumper can move laterally.

Spotting - A technique used by the jumpmaster to visually align the aircraft and release the jumpers at the proper release point.

Stabilizer Panels - Five panels on each side of the canopy skirt, extending below the skirt and reducing oscillation.

STABO - A method of extracting personnel from areas not suitable for aircraft landings, or the special equipment used for it.

Stall - Stop forward movement of the canopy and increase rate of descent.

Strobe light - A small high-intensity marking light.

Table-Top Stabilization Training - A method where any table top or flat surfaced material can be used to teach a student control of his body during free fall.

Terminal Velocity - The velocity at which a falling object attains its maximum, constant speed, normally about 125 miles per hour for a free-fall parachutist.

Terminal Vertical Velocity - That moment when the parachutist has in essence come to the end of his forward throw (initial vector), usually within 300 meters, and the body is falling vertically.

Time Warnings - Warnings, given in minutes, to alert the jumper to the time remaining before exiting the aircraft.

Toggles - Wooden knobs attached to lines which control the forward speed of the canopy, mounted on the back side of the front risers.

Total Malfunction - A type of malfunction in which the parachute remains in the packtray.

Turn Slots - Slots in each side of the canopy which turn the canopy when the parachutist manipulates the toggles.

Visual Release - A method by which the jumpmaster releases the parachutists according to his own visual observations, as opposed to electronic, or AWADS, release.

Walk-Around Bottle - A large, low-pressure oxygen cylinder which may be used by either the jumpmaster or safety personnel not connected to the oxygen console or the aircraft oxygen system.

Wind Cone - An imaginary area representing the maneuver area of a parachute during descent.

Wind Drift Formula - A formula used to locate the proper release point.

Windline - An imaginary line extending upwind from the target area to the opening point.

Wind Reading - A report of wind speed and direction, given in knots per hour and degrees, respectively.

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