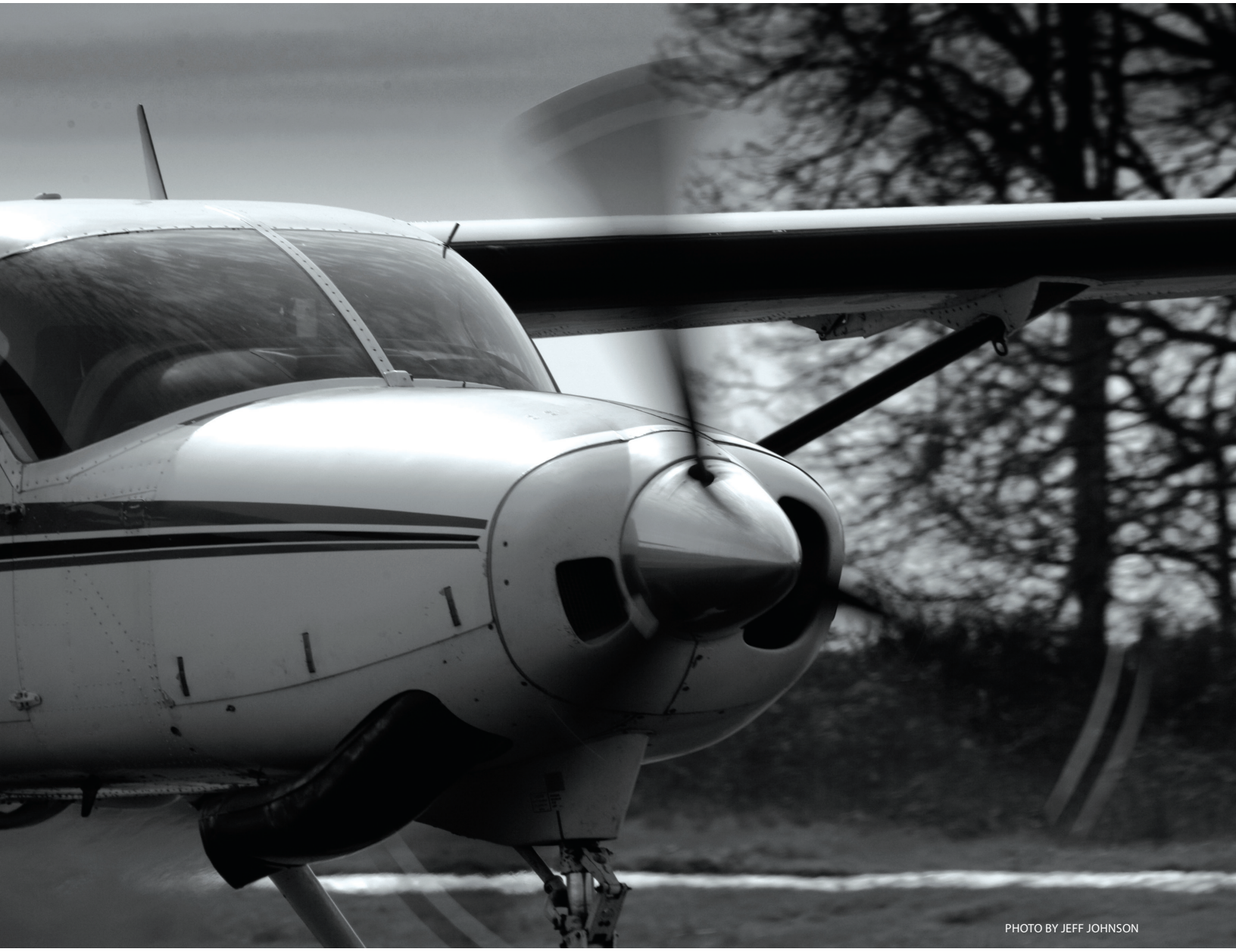
Skydiving Aircraft
OPERATIONS MANUAL



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U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., SW.,
Washington, DC 20591

Mr. Ed Scott
Executive Director
United States Parachute Association
5401 Southpoint Centre Boulevard
Fredericksburg, VA 22407

Dear Mr. Scott:

Thank you for allowing the FAA to review the 2011 version of the United States Parachute Association's (USPA) Skydiving Aircraft Operations Manual. The manual contains operating procedures and practices that will benefit skydiving aircraft operators and their pilots.

Parachutists made over 3 million jumps last year. The FAA's Advisory Circular 105-2, Sport Parachuting, provides information on how to comply with Title 14, Code of Federal Regulations part 105. Your manual, coupled with this information, will help parachutists perform safely.

I applaud your safety efforts and look forward to a continued relationship with USPA to promote the safety of skydiving aircraft operations.

Sincerely,

Melvin O. Cintron
Manager, General Aviation and Commercial Division

SECTION 1:

General Information

Introduction

The sport of skydiving is defined as exiting an aircraft in flight, falling free and descending under a canopy.

Although this is what skydivers do, it is not exclusively what the skydiving industry is all about. Skydiving operations include not only the jumping itself, but all the other activities involved in making a safe jump possible.

Since skydiving began, the individual jumper has focused his attention on preparing for the jump, experiencing the challenge and the thrill, and getting ready to do it all again.

Most jumpers recognize that this process involves risk, but that risk is not limited to the jump itself. It also involves boarding an aircraft and riding to exit altitude. While aircraft accidents involving skydivers are rare, they do occur and are almost always preventable.

If the Federal Aviation Regulations (FARs) had been followed, almost none of the past accidents would have occurred. FAR Parts 65, 91, 105 and 119, along with the Aeronautical Information Manual (AIM) and the USPA Skydiver's Information Manual (SIM), contain sufficient requirements and guidelines to keep skydiving and its aircraft operations safe. When safety is jeopardized it is generally because of lack of compliance or a misunderstanding on how to apply the rules and guidelines to the unique environment of skydiving operations.

Purpose

The purpose of this manual is to provide drop zone operators, pilots, aviation support personnel, skydivers and others who might be involved in aircraft operations with the additional and clarifying procedures and practices which supplement, but do not supplant, existing rules and guidelines.

Scope

The focus of this manual is on safety. However, it is also about other operating procedures and practices which have proven useful industry-wide. Clearly, there are requirements upon aircraft and upon aviation personnel which are unique to the sport. For example, what is considered an aerobatic maneuver by a pilot flying a Boeing 757 with passengers might be considered a routine maneuver to quickly lose altitude in an empty jump aircraft in order to pick up the next load of jumpers waiting on the ramp.

Each drop zone operator (DZO) must develop their own aviation procedures, which while complying with the FARs, meets that DZO's own requirements. However, it is in the best interest of the sport and the industry as a whole to identify common procedures for individual drop zone practices.

Standard procedures can promote the creation of a safe operating environment and instill in skydivers a sense of confidence in the aircraft in which they ride and in the pilot with whom they fly.

This manual fully recognizes and appreciates that skydivers and their aircraft must share the airspace and often airports with others in aviation. It facilitates that sharing by standardizing skydiving aircraft operations, which in turn enhances trust and confidence in skydiving by other aeronautical users. Locally developed additions and supplements to this document are encouraged.

Disclaimer

Nothing in this manual is designed or intended to supersede or replace existing regulations or advisories provided by federal, state or local regulatory bodies. It is the users' responsibility to comply with statutes and regulations that govern their particular activities. The ultimate responsibility for safety lies with the DZO and their staff, and not with the USPA. Any conflict between the material in this manual and other rules, advisories and common sense should be reported to USPA Headquarters.

SECTION 2:

Organization and Responsibilities

It is recognized that drop zone management is free to organize the skydiving operation to best support its needs and those of its skydivers. However, at least the following duties must be performed, even if by one person, as is common in smaller operations:

DZ Operator/Manager

Whether the skydiving operation is a commercial center or a club, one person must be designated as the on-site official responsible for the day-to-day operations. For the purpose of this manual, that person will be referred to as the DZ operator (DZO). The operator may or may not be the owner.

The DZO is responsible for managing and overseeing the entire operation, to include both the skydiving and the supporting aircraft operations. Although the aircraft and pilots might be transient (contractual) support, the ultimate responsibility for the safety of the DZ operation resides with the DZO. Specific duties (not all inclusive) are as follows:

a. Supervise all skydiving-related activities.

b. Ensure compliance with all FARs, USPA Basic Safety Requirements (BSRs) and other federal, state and local rules and regulations.

c. Coordinate with the USPA Safety & Training Advisor (S&TA) on matters pertaining to skydiving safety and training.

d. Coordinate DZ activities with other aeronautical users, facility managers and community officials and leaders, as appropriate.

e. In coordination with the airport manager, establish a parachute landing area and discuss airport traffic patterns.

f. Provide the relevant air traffic control facility with written notification for the calendar year.

g. Develop and maintain Standard Operating Procedures (SOPs) specific to the local skydiving operations, and add additional DZ-specific procedures to this manual as an addendum.

Chief Pilot

Even if there is only one aircraft and one pilot, one individual should be appointed as the chief of aircraft operations. That person must be a licensed pilot, whether or not he is actively flying jumpers on any given day.

The chief pilot should hold at least a commercial pilot certificate and be familiar with the type aircraft being used.

The chief pilot must meet all the requirements of the jump pilots, as listed under the "Jump Pilot" section. Duties and responsibilities of the chief pilot include:

a. Serve as chief of aircraft operations for the DZO.

b. Ensure that all aircraft under the control of the jump operation are airworthy and that they comply with all appropriate STCs and field approvals.

c. Ensure that all pilots under the control of the jump operation hold currently valid pilot's certificates and medical certificates.

d. Coordinate scheduling of aircraft maintenance or verify that maintenance has been performed on transient/leased aircraft.

e. Schedule flight crew members and aircraft.

f. Coordinate all training, both initial and recurrent, of flight crew members to ensure that jump pilots are qualified in procedures for flying skydivers.

g. Prepare and maintain pilot records, training records, flight schedules and correspondence pertaining to flight operations.

h. Maintain current aircraft checklists.

i. Establish procedures and maintain quality control of fuel storage and fueling operations.

j. Maintain current library of all rules pertinent to skydiving flight operations.

k. Develop a system which enables the pilot-in-command to compute weight and balance on every flight.

l. Develop training points (for new skydivers) and orientation points (for visiting skydivers), to include aircraft emergency procedures. Consider placards on these points for display in the aircraft.

Jump Pilot

The jump pilot reports directly to the chief pilot and is responsible for the safe and efficient operation of the aircraft. The legal responsibilities of the pilot, in regard to the operation of the aircraft, are defined in the FARs, especially Parts 61, 91, 105 and 119. Of great importance is FAR 91.3(a): "The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft." It should also be understood that a jump pilot can fly totally cost-efficiently and still abide by all regulations and safety procedures. Specific duties include:

a. Operate aircraft in accordance with all federal, state and local regulations including the aircraft flight manual.

b. Properly pre-flight aircraft before each flight.

c. Perform proper loading and distribution of occupants and/or equipment and ensure that each flight is conducted within weight and balance limits.

d. Ensure that each occupant properly uses a seat belt during ground movement, takeoff and landing.

e. Maintain proficiency as a currently rated commercial pilot in each aircraft flown.

f. Before each flight, know the current sky and wind conditions and forecast.

Maintenance Supervisor/Mechanic

In most cases, the maintenance supervisor will be the chief mechanic who is a currently rated airframe & powerplant (A&P) mechanic. However, in some operations, all or most maintenance is performed by contractual support and often at separate locations. Regardless, maintenance not specifically allowed to be performed by the pilot must be performed by an A&P mechanic. Specific duties include:

a. Ensure that all aircraft and records are maintained in accordance with applicable federal regulations.

b. Maintain or have ready access to current maintenance library.

c. Maintain proficiency as a currently rated A&P mechanic.

Loadmaster

In cases where a loadmaster is employed and he does not accompany the load on the jump, he will perform, as a minimum, the following functions:

a. Ensure all spectators are safely clear of the aircraft before engines are started.

b. Ensure all occupants are seated properly with safety belts in proper use.

c. Ensure that all occupants are properly equipped for the jump before boarding the aircraft.

d. Assist jump aircraft as necessary when it taxis away from loading area.

Jumpmaster

(This term describes a person with the aircraft-related responsibilities below; it no longer describes a person who assists skydiving students.)

Regardless of the experience level of the jumpers on board, one individual—usually the most experienced person on the load—should be designated the jumpmaster. The pilot and jumpmaster should work as a team for the safety and enjoyment of the skydivers. Specific duties include:

a. Identify himself as the jumpmaster to all aircraft occupants.

b. Ensure the safe approach to and loading of the aircraft, especially if an engine is running, unless there is a loadmaster to perform this function.

c. Ensure that all parachutists on board have been properly trained and are adequately equipped for the jump before the aircraft taxis for takeoff. All harnesses must be on and buckled, ready to jump, prior to boarding the plane. No occupant will be permitted to remove his harness when there is an open aircraft door.

d. Ensure all parachutists have been properly briefed in the procedures to be followed in the event of an aircraft emergency.

e. Spot each parachute drop or designate a spotter for each separate pass.

f. Assists in maintaining aircraft within weight and balance limits throughout flight.

g. Ensure all USPA Basic Safety Requirements are followed.

h. In coordination with and at the direction of the pilot, determine and take appropriate action in case of an aircraft emergency.

SECTION 3:

Operating Procedures

Standard operating procedures are based on the concept that safety is paramount. Essential elements of safety include properly maintained equipment, thorough training and motivation of staff, devoted attention to detail, good judgment, sound operational planning and efficient use of available resources. General appearance of the skydiving operation, including exterior and interior of the jump aircraft, is also important as it portrays an image of professionalism. All staff members should be conscious of the image portrayed by the skydiving community and should make an effort to present the best appearance.

Ground Operations:

a. A method for tracking the flight activity should be developed for use by manifest personnel, the operation manager and the jump pilot. For every flight, there must be a manifest, one copy of which is not carried in the aircraft during the flight, which must contain the names of those on board. Either as part of the manifest or on a separate document, the weight of each skydiver (with equipment) must be recorded and available to the pilots.

b. At least one hour before skydiving is to begin, a call to the nearest FAA Flight Service Station (FSS) should be made to obtain NOTAM and winds aloft forecasts, and to ensure that the NOTAM for skydiving has been filed for the day's activity.

c. A complete pre-flight of the jump aircraft, according to the owner's flight manual, must be conducted before the first flight.

d. Aircraft fueling must be in accordance with industry standards and no flight will begin with less than sufficient fuel on board for the intended flight plus 30 minutes reserve fuel for daytime operations and 45 minutes for nighttime operations.

e. Care must be taken and control exercised to limit access to the flight line and aircraft loading area by spectators.

f. All aircraft occupants will properly use a safety belt or other approved restraint during aircraft taxi, takeoff and landing.

g. Aircraft will be loaded in accordance with the flight manual and the pilot-in-command must ensure that each flight is conducted within weight and balance limits.

h. Before the aircraft engines are started, special care must be taken to ensure all spectators are safely clear of the aircraft.

i. If two or more jump aircraft are expected to be operating at the same time, especially in formation, it is the responsibility of all pilots and jumpmasters, as directed by the chief pilot, to coordinate each plane's activity as it relates to the jump operation. Specific procedures for formation flight, including descent, should be developed by the chief pilot and included as an addendum to this publication.

j. All pilots and staff will fully cooperate with the FAA and USPA during official visits.

k. Procedures for handling spectators/observers disembarking the aircraft after landing must be developed.

Takeoff and Climb-Out

Care should be taken to ensure that the aircraft and its occupants are properly loaded and ready for takeoff. Using the proper aircraft checklist, a complete run-up should be made at least before the first flight of the day and after each time the aircraft is fueled. During takeoff and climb-out:

a. The aircraft should always be flown with all gauges kept in the normal operating range.

b. After liftoff, unless the situation dictates otherwise, accelerate the aircraft to and maintain best-rate-of-climb airspeed.

c. Safety belts or other approved restraints should not be unfastened below 1,000 feet AGL except as directed by the pilot.

d. In consideration of the occupants, some of whom may be on their first airplane flight, the airplane should be flown smoothly and steep turns avoided while staying as close to the airport as conditions will allow.

e. In addition to those listed herein and in the FARs, all radio transmissions advised in the AIM should be made for all aircraft operations.

Jump Run and Exits:

a. In accordance with the FARs, the jump pilot must establish radio communication with the nearest FAA facility at least five minutes before any jumping is to begin. In addition, calls in-the-blind on the airport Common Traffic Advisory Frequency (CTAF) announcing skydiving activity should be made at least one minute before jumpers leave the aircraft. ATC must be advised once the last jumper has left the aircraft.

b. Generally, jump runs should begin slightly downwind of the target, slightly below the intended jump altitude, and into the winds aloft with the wings kept straight and level.

c. Before the door is opened, it should be agreed between the pilot and jumpmaster as to how adjustments to the track of the aircraft across the ground are given.

d. The pilot and jumpmaster should coordinate as to when and how the door will be opened, as well as where and when the skydivers will exit.

e. While jumpers are preparing to exit, and during exit, special attention should be paid to the aircraft airspeed and stability. Wings should be kept straight and level and airspeed well above stall speed.

f. The determination of the exit point by electronic navigational equipment in no way relieves the pilot or the jumpers of the responsibility to maintain VFR separation from clouds.

g. Jumpers will visually scan the airspace below to ascertain it is clear prior to exit.

Descent and Landing:

a. Descent attitude and airspeed must remain within the performance envelope of the jump aircraft as determined by the aircraft manufacturer and applicable FARs.

b. Diligence should be exercised in watching for other air traffic. Turns during descent should be kept to a minimum and descent should be as close to the airport as possible.

c. A radio call should be made on the CTAF announcing entry into the traffic pattern, as well as all turns to base and final, as appropriate.

SECTION 4:

Maintenance

Whether a DZ is organized as a club, school, or business; or whether flights are offered to first-jump customers or licensed skydivers, that DZ is engaged in "for hire" operations under FAR Part 91. As a for-hire operation, the DZO must comply with the inspection requirements specified in either FAR 91.409(a) and (b), or (d), or (f)(3), or (f)(4). No jump aircraft is eligible for an annual inspection exclusively.

When an aircraft is manufactured, it receives an FAA Type Certificate (TC). To use some aircraft for jumping, they must be modified. Any modification, including removing a passenger door, must be performed in accordance with an FAA Supplemental Type Certificate (STC) or field approval. Refer to FAA Advisory Circular 105-2E, or as revised.

SECTION 5:

Pilot Training, Certification and Qualifications

Aircraft operators should implement effective initial and recurrent training and examination programs that will address, at minimum, operation- and aircraft-specific weight-and-balance calculations, preflight inspections, emergency procedures and parachutist egress procedures. The aircraft-specific subject of fuel management must also be stressed.

Before the jump pilot flies his first load as pilot-in-command, he should:

a. Have a complete understanding of the aircraft's performance limitations.

b. Know how the local flight patterns may differ from those recommended in the AIM.

c. Ride as a passenger on at least one flight with skydivers in order to experience first-hand how the jump operation is to be conducted.

d. Have demonstrated his ability to fly the jump operation safely and legally.

e. Provide proof of, at minimum, a commercial pilot certificate, and current Second Class medical certificate

The chief pilot, in coordination with the DZ operator, should hold a jump pilot's safety meeting at least once a month to discuss issues pertinent to the DZ operation. The round table discussion should help standardize the jump operation and could help solve common problems.

SECTION 6:

Communications and Avionics

The FARs dictate aircraft avionics requirements; however, a system must be developed whereby the DZ operator can establish communications with the jump plane after takeoff.

Situations arise, not necessarily of an emergency nature, when relaying messages or directions to the pilot or jumpmaster enhances safety. Suggestions for establishing contact with the jump aircraft:

a. With two radios, the jump aircraft can monitor the air traffic control frequency simultaneously with the airport CTAF.

b. With one radio, notification and approval must be accomplished prior to leaving ATC frequency. The jump aircraft should remain on the CTAF for several moments after it makes the call-in-the-blind before each jump to answer any questions or to receive local advisories.

c. The DZ operator should have ready access to the air traffic control facility's 24-hour telephone number so that a message can be relayed to the jump aircraft by the controller.

d. The DZ operator should develop a prearranged system of ground-to-air signals, which would indicate a need for the pilot to contact the DZ operations before dropping any jumpers or to abort the jump run.

SECTION 7:

Emergency Procedures

The pilot must have final authority in any aircraft emergency. Although emergency exit procedures may depend on the situation, each DZ operator should establish recommended procedures and brief all jumpmasters and jump pilots. In addition, written emergency procedures should be available to jumpers and posted at manifest or other conspicuous locations. These procedures should indicate actions that should be taken in cases such as:

a. Engine failure (intermittent or total, and for single and dual failure for twins).

b. Loss of aircraft directional control (any and all axes).

c. Deployment of main or reserve canopy in cabin.

d. Premature opening parachute striking or snagging on aircraft.

e. Aircraft fire, engine or otherwise.

f. Emergency landings.

g. To assist emergency personnel, each DZO must maintain a record of each skydiver, crew member and passenger with the names of persons to be notified, in case of an accident.

SECTION 8:

Safety Program

The most important tools for safely and efficiently operating a skydiving operation are communication and education. Although the rules and recommendations for aircraft operating in the system are fairly well known, how skydivers and jump aircraft use the system are not. Therefore, it is the responsibility of the skydiving operation to educate the other users at every opportunity.

Almost every general aviation airport has more than one sport aviation group vying for the runway and surrounding airspace. All participants in the aviation community must understand each other's needs and requirements, realizing all must share the finite real estate and airspace available.

Possible methods by which the DZ operation can educate and be educated by other users of the airport and airspace:

a. Form an "airport user group" and meet regularly to discuss common problems and situations.

b. Produce a newsletter for distribution to all facilities where potential users would frequent, i.e., fixed-base operations, FAA offices, airshows, etc.

c. Produce a brochure, "Facts for Pilots," for distribution as in b., above, stipulating in as much detail as possible the procedures used by the DZ operation.

d. Establish a working relationship with the inspectors, including the Aviation Safety Program Manager, at the local FAA Flight Standards District Office (FSDO). Because they must conduct several safety meetings each year, they can help disseminate the newsletter and the "Facts for Pilots" brochure.

e. Arrange for regular meetings, at least once a year, between the local air traffic control facility and the jump pilots to communicate specific operational procedures.

SECTION 9:

Rapid Refueling

The FAA does not prohibit the rapid (hot) refueling of turbine aircraft. While it is generally discouraged, rapid refueling of turbine-powered aircraft can be accomplished safely in some types of operations if conducted under carefully controlled conditions by properly trained personnel. Some operators elect to use rapid refueling procedures in order to reduce thermal stress, avoid hot-starts, and keep engine cycles and starts to a minimum. Reciprocating engine-powered aircraft fueled with avgas ***SHOULD NEVER*** be rapid refueled because gasoline is highly flammable.

Both the aircraft and the refueling unit should be properly grounded, the pilot must remain at his station, and passengers (skydivers) may not be on the aircraft during rapid refueling operations.

The Parachute Industry Association (PIA) has published PIA TS-122, a technical standard titled Considerations for Developing a Rapid Refueling Manual. It is available for download on the PIA website.