Chapter 7

Skiplane Operations

SKIPLANE OPERATIONS

This chapter introduces pilots to the procedures required in the operation of skiplanes. Since most skiplane operations and training are conducted in single-engine airplanes with a conventional gear (tailwheel) configuration, this information is based on operating skiplanes of this type. [Figure 7-1]

Figure 7-1. Skiplane.

A skiplane configuration affects the overall operation and performance of an airplane in several different ways, including ground handling, takeoff, landing, and flight operations. Some manufacturers provide recommended procedures and performance data in the Airplane Flight Manual (AFM) and/or Pilot's Operating Handbook (POH).

Title 14 of the Code of Federal Regulations (14 CFR) part 61 does not require specific pilot training and authorization to operate skiplanes; however, it is important to train with a qualified skiplane flight instructor.

Since most skiplanes operate in a wide variety of conditions, such as landing on frozen or snow-covered lakes and sloping glaciers, with varying qualities of snow, it is important to know how performance is affected. Use the performance data provided by the manufacturer.

CONSTRUCTION AND MAINTENANCE

Modern airplane ski designs are a compromise for the various forms and conditions of snow and ice. For example, a long, wide ski is best for new fallen, powdery, light snow, whereas a sharp, thin blade is best for hard-packed snow or smooth ice. Many ski designs feature a wide, flat ski with aluminum or steel runners on the bottom. Airplane skis may be made from composites, wood, or aluminum, and some have a polyethylene plastic sheathing bonded or riveted to the bottom surfaces. Ski designs fall into two main categories: plain and combination. Plain skis can only be used on snow and ice, while combination skis also allow the wheels to be used to land on runways.

PLAIN SKI TYPES

- **Wheel Replacement—**Wheels are removed and ski boards are substituted. [Figure 7-2]
- **Clamp-On—**Skis that attach to the tires and benefit from the additional shock absorbing qualities of the tires.
- **Roll-On or Full Board—**Similar to the clamp-on type except the tires are bypassed and do not carry side or torque loads. Only the tire cushioning effect is retained with this installation.

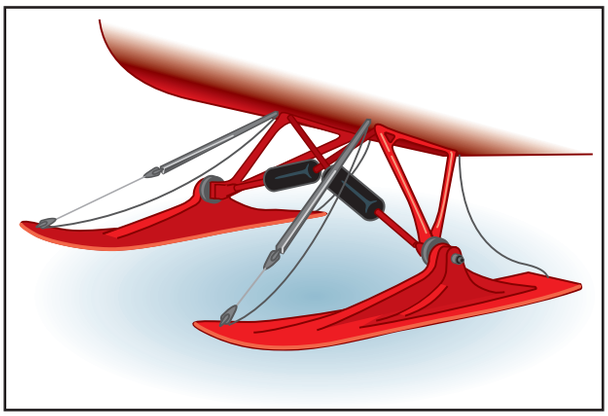

Figure 7-2. Wheel replacement ski.

COMBINATION SKI TYPES

- **Retractable Ski—**Can be extended into place for snow operations or retracted for non-snow operations. This is accomplished by either a hydraulic pump or crank.

- **Penetration Ski—**The wheel extends down partially below the ski, allowing the skiplane to operate from both snow and non-snow surfaces. This type of ski gives poor ground clearance on non-snow surfaces and causes extra drag when on snow. [Figure 7-3]

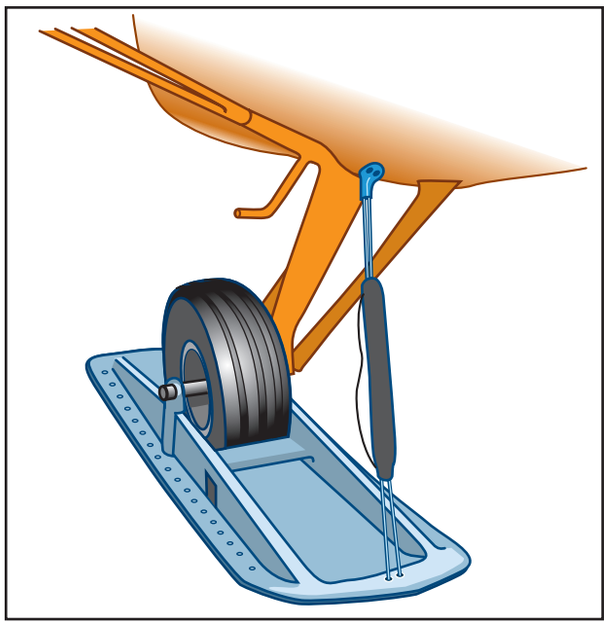

Figure 7-3. Penetration ski.

The plastic polyethylene sheathing on the bottoms of the skis may be punctured by sharp objects, including ice. It also may shatter from impacts in extremely cold temperatures. Replacing the bonded type sheathing is very difficult in the field. If the sheathing is riveted, machine screws may be used to secure loose sheathing, but the screw holes must provide for expansion and contraction. Follow the manufacturer's recommendations for patching limited sheathing damage. If damage is extensive, the entire ski bottom may need new covering.

Shock cord bungees used in ski rigging deteriorate rapidly when left under tension. When parking the skiplane overnight, detach the bungees at the lower fitting and allow them to hang free. Reattaching the bungees normally requires two or more people.

Hydraulic ski retracting mechanisms usually function well in cold environments, but the small, abrupt change of ski attitude occurring at touchdown imposes a severe load on the external hydraulic lines leading to the skis. These lines are a more prevalent source of trouble than the internal parts.

Use low temperature oils and greases to lubricate friction points. For lubrication requirements, see the AFM/POH or the ski manufacturer's manual.

The condition of the limiting cables and their fastenings is important to safety in flight. Be sure there is no fraying, kinking, rusting, or other defective condition before each flight.

OPERATIONAL CONSIDERATIONS

In the air, skiplane flight characteristics are similar to those of airplanes with standard landing gear, except for a slight reduction in cruising speed and range. Leaving the skis in the extended position in flight produces no adverse effect on trim, but may cause a slight loss of speed. Consult the operator's manual for skiplane performance data, and weight and center of gravity considerations.

The AFM/POH skiplane supplement may provide limitations including limiting airspeeds for operation with skis in flight and for other wheel/ski configurations. These speeds may be different from the wheel-type landing gear configuration, depending on the type of ski and the tension of the springs or bungees holding the fronts of the skis up.

Understand both the limitations and advantages of the ski equipment. Compared to the standard wheel equipped airplane that incorporates individual brakes for steering, skis are clumsy and the airplane is less maneuverable while on the ground. Like a floatplane, a skiplane has a tendency to weathervane with the wind and needs considerable space to maneuver. Maneuvering on the ground and parking require special techniques which are acquired only through practice.

TYPES OF SNOW

- **Powder Snow—**Dry snow in which the water content and ambient temperature are low.
- **Wet Snow—**Contains high moisture and is associated with warmer temperatures near the freezing point.
- **Granular Snow—**Wet snow that has had a temperature drop causing the snow to ball up and/or crust.

TYPES OF ICE

- **Glaze Ice—**Snow that has been packed down and frozen to a solid ice pack, or frozen snow.
- **Glare Ice—**A smooth sheet of ice that is exceedingly slippery with no deformities, cracks, or other irregularities in the surface. This ice lacks any kind of traction, with a coefficient of friction near zero.
- **Clear Ice—**Ice that forms smoothly over a surface and has a transparent appearance.

SURFACE ENVIRONMENTS

- **Glaciers—**Sloping snow or ice packs.
- **Frozen Lakes—**Frozen bodies of water with or without snow cover.
- **Tundra—**A large area of grass clumps supporting snow cover.

PREFLIGHT

Before departing on any trip, it is important to do proper preflight planning. A good preflight should include a review of the proposed route as well as possible alternate routes; terrain; local, en route, and destination weather; fuel requirements; facilities available at the destination; weight and balance; and takeoff and landing distance requirements.

Obtain a complete weather briefing for each leg, and file a flight plan with appropriate remarks. For local flights, always inform someone at home of the area of operation and the expected time of return if a flight plan is not filed.

Include good Aeronautical Decision Making (ADM) procedures, such as running a personal minimums checklist, and think PAVE (Pilot, Aircraft, Environment, and External Pressures) during the preflight phase.

Cold weather is implicit in flying a skiplane, so preflight planning must also include preparations for possible contingencies unique to cold weather operations. This is especially important for flights in bush country, where facilities are scarce and emergency assistance may be limited or nonexistent.

Evaluate all passengers' clothing for suitability in the conditions expected. Consider the passenger when making this evaluation. Children and older people need more protection from the environment than a middle-aged person in good health. Every occupant should be dressed for a long walk, including adequate boots or rubber-bottomed shoes and an arctic parka. Sunglasses are highly recommended, even on cloudy days. Pilots can be blinded by the brightness of the snow, and glare can destroy depth perception.

Survival equipment is required by some states and countries, and many areas require specific items for even the shortest local flights. The requirements usually vary between winter and summer months. Be sure to check the current requirements for the particular jurisdiction. Beyond the minimum requirements, use good judgment to select and carry any other equipment that could help occupants survive an unplanned stay in the specific terrain and environmental conditions along the route of flight. Always consider means of providing warmth, shelter, water, and food; methods of attracting attention and signaling for help in both daylight and darkness; and treatment of injuries. Obtain appropriate survival training and know how to make effective use of the equipment. Whether the cause is a forced landing or an engine that fails to restart after landing at a remote location, the survival gear and clothing should keep the pilot and passengers alive until help arrives.

When planning for an overnight stay away from an airport, or if the skiplane is routinely parked outside, other items may be added to the equipment carried on the skiplane. These might include portable tiedowns, a flashlight, a shovel, and a broom. Wing and fuselage covers can prevent the buildup of frost and snow, simplifying the preflight. In temperatures below 0° F, an engine cover and a catalytic heater may be necessary to preheat the engine compartment. If the pilot carries appropriate hand tools and a bucket, the crankcase oil can be drained from the engine and kept indoors. It may also be helpful to remove the battery and keep it in a warmer location. Many pilots carry burlap sacks, plastic garbage bags, or wooden slats to place under the skis to prevent them from freezing to the surface. Some carry a can of non-stick cooking spray to use on the bottom of the ski to avoid sticking or freezing to the surface. Depending on the needs of the skiplane, it may be necessary to carry extra engine oil, hydraulic fluid, or deicer fluid. Markers such as red rags, colored flags, or glow sticks may come in handy, as well as 50 feet of nylon rope, and an ice pick or ice drill. Select equipment according to the situation, and know how to use it.

If a skiplane has been sitting outside overnight, the most important preflight issues are to ensure that the airframe is free of snow, ice, and frost and that the skis are not frozen to the ground. Often, while sitting on the ground, precipitation may fall and cover the skiplane. Temperatures on the ground may be slightly colder than in the air from which the precipitation falls. When liquid precipitation contacts the colder aircraft structure, it can freeze into a coating of clear ice, which must be removed completely before flight. Wing and tail surfaces must be completely frost free. Any frost, ice, or snow destroys lift and also can cause aileron or elevator flutter. Aerodynamic flutter is extremely dangerous and can cause loss of control or structural failure.

The preflight inspection consists of the standard aircraft inspection and includes additional items associated with the skis. The AFM or POH contains the appropriate supplements and additional inspection criteria. Typical inspection criteria include:

- **Skis—**Examine the skis for damage, delamination, sheathing security, and overall condition.

- **Hardware—**Inspect the condition and security of the clamping bolts, cotter keys, diaper pins, limiting cables, and bungees. Be sure cables and bungees are adjusted properly.
- **Retracting Mechanism—**(if equipped)—Check the hydraulic fluid level and examine the hydraulic lines for leaks. Inspect all cables for fraying and check cable ends for security. Do not cycle the retracting mechanism while on the ground.
- **Ski Freedom—**Be sure the skis are free to move and are not frozen to the surface. If the ambient temperature approaches the melting point, the skis can be freed easily. Gentle swinging of the tail at the rear fuselage, or rocking the airplane at the struts may free the skis. If this does not work, dig the skis out.
- **Tire Pressure—**Check the tire pressure when using skis that depend on the tires for shock absorption, as well as for combination skis. This is especially important if moving a skiplane from a warm hangar to cold temperatures outdoors, as tires typically lose one pound of pressure for every ten-degree drop in ambient temperature.
- **Tailwheel—**Check the tailwheel spring and tail ski for security, cracks, and signs of failure. Without a tail ski, the entire tailwheel and rudder assembly can be easily damaged.
- **Fuel Sump—**During fuel sump checks, sometimes moisture can freeze a drain valve open, allowing fuel to continue to drain. Ice inside the fuel tank could break loose in flight and block fuel lines causing fuel starvation. If the manufacturer recommends the use of anti-icing additives for the fuel system during cold weather operations, follow the ratio and mixing instructions exactly.
- **Survival Equipment—**Check that all required survival equipment is on board and in good condition.

STARTING

Adequately preheat the engine, battery, and the cockpit instruments before startup and departure. Sometimes engine oil may require heating separately. Check the manufacturer's recommendation for starting the engine when ambient temperatures are below freezing.

Batteries require special consideration. In cold climates a strong, fully charged battery is needed. With just a little cold-soaking, the engine may require three times the usual amperage to crank the engine.

Another consideration is the electrolyte freezing point. A fully charged battery can withstand temperatures of -60 to -90° F since the electrolyte's specific gravity is at a proper level. Conversely, the electrolyte in a weak or discharged battery may freeze at temperatures near 32° F. If a fully charged battery is depleted by an unsuccessful start, it may freeze as it cools to ambient temperature. Later, when the engine is started and the battery is receiving a charge, it could explode.

After start, a proper warmup should be completed prior to a runup and high power settings. Perform the warmup according to the engine manufacturer's recommendations. Some manufacturers recommend a minimum of 1,000 r.p.m. to ensure adequate lubrication.

If the skiplane is parked on heavily crusted snow or glaze ice with the skis frozen to the surface, it may be possible to start the engine and perform the runup in the parking area. Be sure the area behind the skiplane is clear, so as not to cause damage with the propeller wash. If a ski should become unstuck during the runup, reduce power immediately. Then use one of the following procedures to secure the airplane.

Tie down or chock the skiplane prior to engine start, warmup, and runup. Keep all ropes, bags, etc., clear of the propeller. After warmup is complete, and if no assistance is available, shut down the engine to untie and unchock the skiplane, then restart as quickly as possible. If a post, tree, boulder, or other suitable object is available, tie a rope to an accessible structural component in the cockpit, take the end around the anchor object, bring it back to the cockpit, and tie it off with a quick-release knot. When the warmup and runup are complete, release the knot and pull the rope into the cockpit as the skiplane begins to taxi.

If tiedowns or chocks are not available, build small mounds of snow in front of each ski. The mounds must be large enough to prevent the skiplane from taxiing over them during engine start and warmup, but small enough to allow taxiing when power is applied after the warmup is complete. If tiedowns or means to block the skis are not available, the runup can be accomplished while taxiing when clear of obstacles or other hazards. [Figure 7-4]

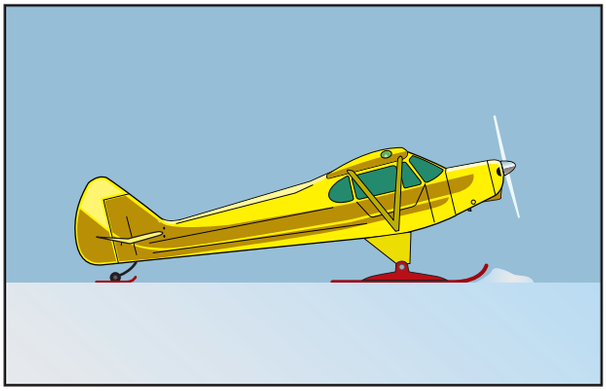

Figure 7-4. Engine warmup.

TAXIING

Taxiing a skiplane on snow and ice presents some unusual challenges. With little or no brakes for stopping or turning, and the ability to skid sideways, a skiplane normally requires more maneuvering room and space to turn than an airplane with wheels.

The tailwheel ski provides marginal directional control on ice and hard packed snow. In such conditions, directional control comes from airflow over the rudder. Adding power and forward elevator control pressure can often help turn the skiplane. The goal is to lighten the tail to help the turn without putting the skiplane on its nose.

Taxiing in strong crosswinds can be difficult. Skiplanes tend to weathervane into the wind. Drifting sideways in the direction of the wind is also commonplace. Taxi in a skid or let the skiplane weathervane partly into the wind during crosswind operations to compensate. [Figure 7-5] A short blast of power may be required to turn the skiplane from upwind to downwind. It is normal to drift sideways in turns. Preplan the taxi track so as to remain clear of drifts, ridges, or other obstructions.

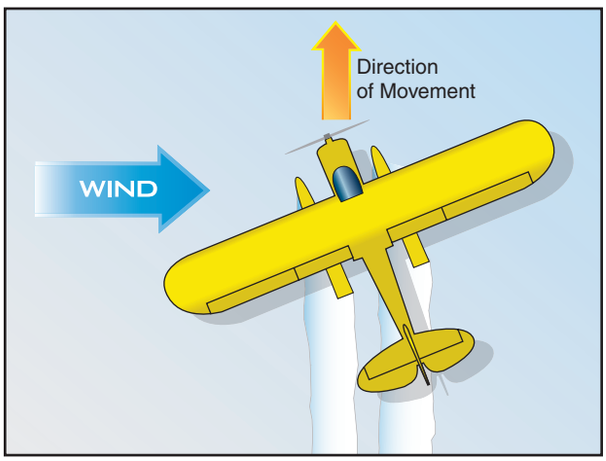

Figure 7-5. Crosswind taxi.

When taxiing in crosswinds on glare ice, get a helper at each wingtip to help with turns and aligning the skiplane for takeoff.

As a general rule, power settings and taxi speeds should be kept as low as possible on ice or crusted snow. On loose or powder snow, add enough power to maintain forward motion and keep the skis on top of the snow. The skiplane may even be step-taxied in a manner similar to a floatplane, staying below takeoff speed. If the skiplane is allowed to sink into soft snow, it may stop moving and become stuck. When the snow is wet and sticky, work the rudder and elevator to get the skiplane moving and maintain forward motion to prevent the skis from sticking again. If the skis are freed during preflight, but stick again before starting the engine and beginning to taxi, free the skis again and pull the skiplane onto tree branches, leaves, or anything that will prevent the skis from sticking. Burlap bags can be used by tying a line to the bags and pulling them into the cockpit after the skiplane has taxied forward. Keep all ropes, bags, etc., clear of the propeller. Rapid rudder movement will usually break the skis free if they begin to stick during a slow taxi. Use a short blast of power to create more airflow over the tail. A thin coat of engine oil or non-stick cooking spray also prevents sticking if the bottoms of the skis are easily accessed.

At some snow-covered airports, airport managers or fixed base operators spray red or purple dye onto taxi routes and snow banks as visual aids. They may even imbed pine boughs in the snow at regular intervals to help define taxiways and runways or mark hazardous areas. These helpful aids simplify ground operations and improve safety.

TAKEOFFS

Since skiplanes operate from a variety of surfaces, it is important to remember that many takeoff areas can contain unforeseen hazards; therefore, it is important to always plan for the unexpected.

If the condition of the takeoff path is unknown, walk or taxi the full length of the takeoff area and back to check the surface for hazards and help pack the snow. It is better to discover any irregularities before attempting a takeoff than to encounter them at high speeds during takeoff.

Most takeoff distances are greater on snow than for wheel-equipped airplanes on cleared runways and other hard surfaces. On wet or powder snow, two or three times the normal distance may be required. Be sure to remove any frost or crusted snow from the skis before takeoff. Such accumulations increase drag and weight, resulting in a greater takeoff distance.

Select a takeoff direction that provides an adequate distance to lift off and clear any obstructions. Use headwinds or a downhill slope for takeoff when possible to ensure best performance. When turning into the wind, keep moving and turn in a wide arc. Trying to turn too sharply can cause a ski to dig in, resulting in a groundloop or noseover.

Plan and configure for a soft-field takeoff. Soft-field procedures are recommended because the lack of contrast and surface detail or glare off snow or ice may hide possible hazards. Undetected drifts or soft sticky spots can cause sudden deceleration and even a possible noseover.

When lining up to depart, have the skiplane configured properly and keep moving. Do not stop before adding takeoff power because the skiplane may settle into soft snow and limit acceleration. If this happens, it may be necessary to taxi the takeoff path again to pack the snow.

Crosswind takeoffs require the standard procedures and techniques. Be aware that the skiplane may be sliding in a crab during takeoff acceleration. On glaze ice an increase in lateral drift may be seen on takeoff.

OFF-AIRPORT LANDING SITES

Landings on unprepared areas can be accomplished safely if the proper precautions are followed. Evaluating each new landing site thoroughly, obtaining advice from well-qualified pilots already familiar with the area, and staying within the limitations of personal skill and experience can all contribute to safety and reduce risks.

GLACIERS

There are a number of factors that must be considered when operating from glaciers. There can be many hidden hazards.

The first consideration is the condition of the snow and its suitability for landing. To evaluate a new area, fly downhill with the skis on the surface, just touching the snow, as slowly as possible above stall speed. This helps determine the snow condition. If unsure of the quality of the snowpack, look for a gentle slope and land up the slope or hill. This situation will allow the airplane to accelerate easily on a downslope takeoff.

If the slope angle of the landing area is very steep, always evaluate the area for the possibility of an avalanche. Avoid landing near the bottom of a valley because ice falls may exist and provide rough and unusable terrain.

Glaciers are very deceptive. It is advisable to train with an experienced glacier pilot and become comfortable before departing alone. Use extreme caution, as just a few clouds overhead can totally change the picture of the intended landing area.

LAKES AND RIVERS

Snow-covered frozen lakes and rivers can provide a number of obstacles. Wind causes snow to form into ripple-shaped wind drifts. Wind also breaks snow into smaller particles, which bond quickly together to form solid ridges. These ridges can be so rough that they can damage or destroy the landing gear and skiplane. The best plan is to land parallel to ridge rows, even if there is a slight crosswind. Another option is to find a lee area (protected area), where there are no wind drifts and land in this area.

Other problems that may be encountered are beaver dams, houses, or other hidden obstructions that have been covered with snow and have become invisible, especially in flat lighting situations.

A condition known as “overflow” can present problems on landing and takeoff. The overflow is water, in a liquid state, that is cooled below its freezing point. The moment a ski or any other part of the skiplane touches this supercooled water, it freezes solid. As the water freezes, it will provide a rapid deceleration. Overflow may exist on frozen lakes and rivers with or without snow cover. Thin ice also creates a problem because it is not always obvious. It may be thick enough to support a layer of snow or other material, but not a skiplane.

It is easier to see obstacles on lakes and rivers that are frozen without snow cover. Spider holes are ports formed by escaping air from under the ice, forming a weak area or bubble at the surface. These may or may not support the skiplane. Avoid running over spider holes.

Clear ice, under certain conditions, can be extremely slick and will not allow directional control once the aerodynamic controls become ineffective due to the loss of airflow. This becomes critical in crosswind landing conditions.

Avoid landing near the shoreline where rivers or sewer lines empty into lakes. The ice is likely to be very thin in those areas.

TUNDRA

Tundra is probably the least desirable landing surface since most of the above hazards can exist. Tundra is typically composed of small clumps of grass that can support snow and make ridge lines invisible. They also hide obstacles and obscure holes that may be too weak to support skiplanes. Avoid tundra unless the area is well known. [Figure 7-6]

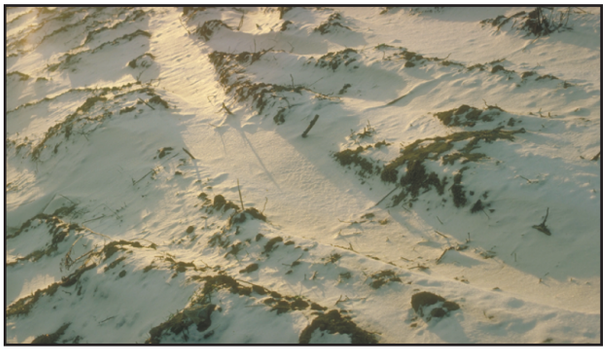

Figure 7-6. Tundra.

LIGHTING

Pilots routinely encounter three general lighting conditions when flying skiplanes. They are flat lighting, whiteout, and nighttime. The implications

of nighttime are obvious, and in the interest of safety, night operations from unlighted airstrips are not recommended.

Flat lighting is due to an overcast or broken sky condition with intermittent sunlight. Hills, valleys, and snow mounds take on varying shades of white, and may appear taller, shorter, or wider than they really are. This indirect lighting alters depth perception. The pilot may not realize that depth perception has been compromised, and this can cause serious consequences when operating skiplanes near hilly terrain. When flat lighting is encountered, avoid or discontinue flight operations, especially at an unfamiliar strip.

Whiteout can occur when flying in a valley with both walls obscured by snow or fog. Clear sky conditions can exist, but references cannot be established. Reference to attitude gyro instruments helps when this condition is encountered. Climb out of the valley so additional visual references can be established.

Takeoffs and landings should not be attempted under flat lighting or whiteout conditions.

LANDINGS

Landing a skiplane is easy compared to landing with wheels; however, for off-airport landings, extra precautions are necessary. Be careful in choosing a landing site. Before landing, evaluate the site to be sure a safe departure will be possible.

Upon arriving at a prospective landing site, a pass should be made over the landing area to determine landing direction, and to determine if a safe approach and landing can be completed. A trial landing should be accomplished to determine the best approach, subsequent departure path, and the quality of the surface.

To perform the trial landing, plan and configure for a soft-field landing with a stable approach. Then perform a gentle soft-field touchdown, controlled with power, while remaining near takeoff speed for approximately 600 to 800 feet, and then initiating a go-around.

A trial landing is very helpful in determining the depth and consistency of the snow, evaluating surface conditions, and looking for possible hazards. Be prepared to go around if at any time the landing does not appear normal or if a hazard appears. Do not attempt to land if the ski paths from the trial landing turn black. This indicates “overflow” water beneath the snow wetting the tracks.

When landing on a level surface, and the wind can be determined, make the landing into the wind. If landing on a slope, an uphill landing is recommended. To avoid a hard landing, fly the skiplane all the way to the surface and add some power just before touchdown. Be sure to turn the skiplane crosswise to the slope before it stops. Otherwise it may slide backward down the slope.

When using combination skis to land on solid ice without the benefit of snow, it is better to land with the wheels extended through the skis to improve the ground handling characteristics. Solid or clear ice surfaces require a much greater landing distance due to the lack of friction. The skiplane also needs more area for turns when taxiing. If the surface has little or no friction, consider the possibility of a groundloop, since the center of gravity is typically behind the main skis and the tail ski may not resist side movement. Keep the skiplane straight during the runout, and be ready to use a burst of power to provide airflow over the rudder to maintain directional control.

Under bright sun conditions and without brush or trees for contrast, glare may restrict vision and make it difficult to identify snowdrifts and hazards. Glare can also impair depth perception, so it is usually best to plan a soft-field landing when landing off airports.

After touchdown on soft snow, use additional power to keep the skiplane moving while taxiing to a suitable parking area and turning the skiplane around. Taxi slowly after landing to allow the skis to cool down prior to stopping. Even though they are moving against cold surfaces, skis warm up a few degrees from the friction and pressure against the surface. Warm skis could thaw the snow beneath them when parked, causing the skis to freeze to the surface when they eventually cool.

PARKING/POSTFLIGHT

Skiplanes do not have any parking brakes and will slide on inclines or sloping surfaces. Park perpendicular to the incline and be prepared to block or chock the skis to prevent movement.

When parked directly on ice or snow, skis may freeze to the surface and become very difficult to free. This happens when there is liquid water under the skis that subsequently freezes. If both the surface and the skis are well below freezing, there will be no problem, but if the skis are warm when the airplane stops, they melt the surface slightly, then the surface refreezes as the heat flows into the ground. Similarly, the weight of the skiplane places pressure on the skis, and pressure generates heat. If the ambient temperature goes up to just below freezing, the heat of pressure can melt the surface under the skis. Then as the temperature drops again, the skis become stuck.

If parking for a considerable amount of time, support the skis above the snow to prevent them from sticking or freezing to the surface. Place tree boughs, wood slats, or other materials under the skis to help prevent

them from becoming frozen to the surface. [Figure 7-7] Some pilots apply a coat of non-stick cooking spray or engine oil to the polypropylene ski surface to prevent ice or snow from sticking during the next takeoff.

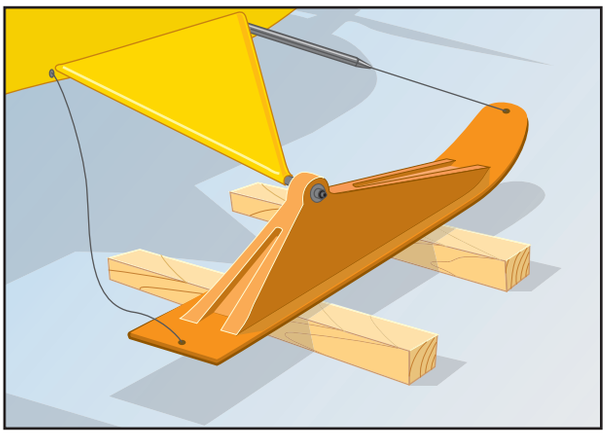

Figure 7-7. Supporting the skis above the surface prevents them from freezing in place.

If the skis are the retractable type and the frozen surface will support the wheels, place the skis in the UP position. Next, dig the snow out from around the skis until ready to depart. This keeps the skis away from the surface. When parking on a hill, pay attention to the position of the fuel selector valve. Typically, the uphill tank should be selected to prevent fuel from transferring to the lower wing and subsequently venting overboard.

EMERGENCY OPERATIONS

When operating a skiplane, carry an adequate survival kit. A good rule of thumb is to carry what is needed to be comfortable. Alaska, Canada, and Sweden provide lists on the internet of the survival equipment required for flights in northern areas. In addition to communicating the current requirements for specific jurisdictions, these lists can help pilots choose additional equipment to meet their needs, beyond the minimum required. Also be sure to check for any restrictions on the carriage of firearms if they are part of your survival kit.

SKI MALFUNCTION

If skis are not rigged properly, or when recommended airspeeds are exceeded, it is possible that a ski will tuck down and give a momentary downward rotation of the nose of the skiplane. This is generally caused by spring or bungee tension not being sufficient to hold ski tips up. The immediate fix is to reduce power and reduce the speed of the skiplane. When the air loads are decreased below the tension of the spring or bungee, the ski will pitch back into place and the control problem will go away. Have a maintenance shop correctly adjust the spring or bungee tension and avoid exceeding the speed limits specified for the skis.

A precautionary landing may be necessary for events such as a broken ski cable or broken hydraulic line. If a ski cable breaks, the front of the ski will tip down. This creates an asymmetrical drag situation, similar to a large speed brake on one side of the skiplane. This condition is controllable; however, it will take skill to maintain control. Not only does the tilted ski create a lot of drag, it also complicates the landing, since the front of the ski will dig in as it contacts the surface, causing abrupt deceleration and severe damage to the landing gear. If efforts to get the ski into a streamlined position fail, a landing should be made as soon as practical.

To attempt to streamline the ski, slow to maneuvering speed or less. It may be possible for a passenger to use a long rod such as a broom handle to push down on the back end of the ski, aligning it with the airflow and making possible a relatively normal landing. If the skis are retractable, try to ensure that they are both in the UP position (for a pavement landing) and land on pavement.

If it is not possible to get the ski to trail correctly, the skiplane must be landed in such a way as to minimize danger to the occupants. This usually means trying to land so that the hanging ski breaks off quickly rather than digging in and possibly destroying the skiplane. Fly to an area where help is available, since damage is virtually inevitable. It is often best to land on a hard surface to increase the chances of the ski breaking away.

With a broken hydraulic line, a condition of one ski up and one ski down may develop. Again, the skiplane is controllable with proper rudder and braking technique.

NIGHT EMERGENCY LANDING

A night landing should never be attempted at an unfamiliar location except in an emergency. To increase the likelihood of a successful landing, perform the checklist appropriate for the emergency, and unlatch the doors prior to landing to prevent jamming due to airframe distortion in the event of a hard landing. If time permits, make distress calls and activate the emergency locator transmitter (ELT).

When selecting a landing area, frozen lakes and rivers are a good choice if the ice is thick enough to support the aircraft. If the ice is thin or the thickness unknown, a landing in an open field would be a better option.

After selecting a landing area, perform a reconnaissance and look for obstructions, field condition, wind direction, and snow conditions if possible. Fly over the landing area in the intended direction of touchdown and drop glow sticks 2 seconds apart along the length of the touchdown zone. Use the glow sticks to aid in depth perception during final approach. Make the touchdown with power, if available, and as slow as possible.