

GO TO HULL

Steve Reep

The Gospel According to Saint Stephen



Second Edition
2004

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This Second Edition has been altered from the First Edition primarily in format. With very few exceptions, the content of the Second Edition has not been updated or its meaning altered from the First Edition. Thus the reader is hereby warned that the content herein may or may not represent current practices, information, or regulations.

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I can never thank any of these friends and family enough.

- Steve Reep

Introduction

This book has been written from the viewpoint of a Certified Lake Factory Instructor who also owned his own Lake for a number of years. Lake Aircraft neither recommends nor condemns these opinions. If the reader has no Lake Amphibian experience, understand the writer is God and this bible is to be taken as gospel. However, if the reader has over ten hours of flying in a Lake, consider the writer may have feet of clay and the book is to be judged as having possible errors. If you have a better way of approaching a problem, have at it. The writer is a retired airline pilot and flew with hundreds of other pilots either as captain or copilot. Each pilot had his own techniques, and much could be learned from them. Sometimes it was, "I think that was a good idea. I'll do it like that." Other times it was, "How did he get hired? I'll never make a mistake like that."

So if you have a system that works for you and it differs from what you read here, stick with it. The writer won't know, so you won't hurt his feelings.

Different instructors use different techniques in teaching flying the Lake. Some opinions may differ. However, all instructors have the same goal of teaching you to be a competent safe seaplane pilot. If you get a conflict of teaching, choose the one that seems best for you (or the easiest, if you're lazy).

This book is not written as a primary training manual for the non-pilot, but is directed at pilots who would like to upgrade to a seaplane rating or already have a seaplane rating and would like to refresh their knowledge or find a kernel of information they have forgotten or missed. In other words, this book may give you an opportunity to expand your knowledge on flying a Lake Aircraft. Whether or not you buy all of the ideas presented here, go to hull.

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Chapter 1: History

Did you know that the 270 Turbo Lake holds four altitude records for amphibians? It has been to 27,300 feet. The 270T also holds the record of 27,100 feet for a world record for maximum altitude in horizontal flight. The airplane also holds two records with two crew members aboard. It is certified to 20,000 feet. At 20,000 feet, it will cruise at 155 KTS (176 MPH). Use those figures on the next Mooney driver that tries to make fun of you. You might check on how many water takeoffs he's made in his Mooney, while you smirk.

Let's look at the genealogy of this thoroughbred. During WWII, the dream of all the manufacturers of warplanes was to switch to the construction of civilian airplanes. Every family would have its own hangar. Grumman Aircraft Corporation, being experienced with amphibians, dreamed of the same hangars and every family going to the beach in their airplanes.

So, Grumman assigned two of their engineers, Herb Linblad and Dave Thurston, to design a light amphibian airplane. They became the parents of the Tadpole. It wasn't the sleekest airplane ever designed. In fact, it lived up to its name.

The war ended, but so did the dream of untold numbers of light airplanes. The Tadpole was flown and then dismantled.

Linblad and Thurston had poured their talents into the project and didn't want a stillborn, so they bought their plans from Grumman and brought forth a healthy baby. The airplane was redesigned and named the Colonial Skimmer. The C-1 was 150 HP and twenty-five of these were built. C-1 S/N 15 and 21 were modified into C-2 models. These two serial numbers were then prefixed with 1 (one) to become C-2 S/N 115 and 121. The next model was the C-2 with 180 HP. There were eighteen of these built. A unique feature of the Skimmer's was that the nose gear protruded a few inches and became a pier bumper in the retracted position. Other than the 30 HP increase in power, the main differences between the C-1 and C-2 were design improvements. For instance, the C-1 had a control wheel on a pedestal like a WWII bomber. The C-2 had the control wheel coming out of the panel, as all Lakes have.

In the later models, the nose gear remained in the same position. The nose grew, so the nose gear is now well back from the front of the bow. The rubber pier bumper was then added to protect the airplane. An interesting aside is there were two Skimmer fuselages left over at changeover time to the Lake line. So two LA-4s were built with short fuselages.

The model to follow the Skimmer was the LA-4 with 180 HP. The LA-4 showed that the airplane now had seating for four people. Bat wings aided the liftoff, but a carb heat

control was still on the overhead panel. A few LA-4's had an aftermarket Ray Jay turbo charger. This airplane did what it was supposed to. It flew on and off the land and water; however, there were owners that lusted for a little more.

So, the LA-4-200 became the latest member in a growing family of amphibians. This airplane had a fuel injected 200 HP engine and twenty more horses pawing around over your head. Every little bit helps. In the moist domain of the Buccaneer, carb heat was no longer a concern. But the unbalanced engine did mean paying attention to the reduced power settings.

The improvements were moving along and water flying was getting more fun as the improvements showed up; however, the LA-4-200 was basically a three-place airplane on the water. It did fine from land as a four-place. So, a Ray Jay Turbo charger was added to some owners' airplanes. Now, with 28.4 inches of manifold pressure, it took four people off the water as the sales department had always said it would. Actually, legally, the Ray Jay was to give sea level performance on takeoff at above sea level lakes and airports. The biggest enemy of engines is heat. The turbo charger did produce heat. The best procedure is to only use the turbo when needed and fly the airplane as a normally aspirated engine when the extra power is not needed. Also, the turbo is manually controlled and care must be taken so as not to exceed the thirty inches used on takeoff. From land, use the engine at normal aspirated power. Don't use the turbo unless the strip is very short or the airplane is at a high altitude airport. The proper term is turbo normalized. This means to produce sea level power, not excess or power-over twenty-nine to thirty inches. Actually, it takes about three to four inches of manifold pressure to run the turbo. One theory is that thirty-four inches can be used when needed. This might be considered creative reasoning by Lycoming. In general, it is recommended to start using the Ray Jay at three thousand five hundred feet, if needed.

Most of the normally aspirated (no turbo charger) engines should be leaned at five thousand feet at the latest. The engine can be leaned at any altitude when below 75% power.

Back in the 1950's, the Colonial Company realized they did a better job of building airplanes than selling them. So the Aerofab Corporation became the builder in an old mill in Sanford, Maine. The sales organization of Lake Aircraft was formed and sold off as a separate business.

They remained separated until the early 1990's when the Rivard family, who owned Lake Aircraft for many years, also bought Aerofab. They still are separate companies but with a common owner.

In 1982, Aerofab experimented with a reverse propeller. They extended the prop shaft seven inches. The reverse prop didn't work out, but performance improved with the balanced 200 HP engine (no yellow arc anymore). They zipped up the pants on the engine. The cowling was extended around the rear of the engine. This brought the air around the engine to the extended prop shaft and with the spinner for streamlining, the air flow was now used by all of the prop. With this improved design in efficiency, still with 200 HP, the airplane easily got off the water with four people on a hot day. This explains why an EP goes for \$30,000 more than a Buccaneer on the used plane market.

The factory first called it the EP because it stood for extended prop, but the sales department got a hold of it and said EP stood for extra performance. So, that's the rest of the story.

The EP sold well until Aerofab came out with a quantum leap and produced the Renegade. It became the amphibian of choice and the last few EP's off the line languished on the lot as discriminating buyers went after the LA250. This airplane was now three feet nine inches longer, somewhat faster, and carried more fuel and four, five or six people depending on the configuration. Besides the length, and the more visible, deeper "V" of

the hull (more stability on side motion of the airplane), the 250 Series has a huskier look. Also, the large dorsal fin on the tail provided strength and aerodynamically stabilized the extra thrust from the larger engine. This tail is the determining factor for the airspeed red lines. The yellow arc is determined as a percentage of the red line. The amazing thing is that this airplane, one of the strongest and slowest built, has never had an in-flight structural failure.

Most people prefer the four-seat configuration and use the back seat space for extra baggage. The rear (third) seat has a weight limit of two hundred pounds. A single rear seat can be put in sideways for more leg room. The bench seat in back is tight, but is ideal for the family with two smaller children in back and two teenagers in the middle seat. The parents will be in the front two seats with their sound suppressing headsets.

Lake Aircraft, not one to sit on its laurels, next came up with the 270T. This turbo airplane with its 270 HP engine has been the record setter. Its wastegate (the valve that opens and prevents the manifold pressure from exceeding thirty-eight inches) is automatic, so a busy (or clumsy) pilot won't over-boost the MAP and harm the engine.

There is also a salt water version of this airplane with ceramic coated parts, special skin protection and lifting rings on the airplane for loading above a sea wall or on a tender ship. This airplane is the Sea Fury and is the top of the line. It will cost an extra \$28,000 to buy this ocean-use airplane.

Then there's the one you can't buy. The Sea Wolf is a government-use airplane only. It is a multi-mission amphibian (MMA). It has a higher gross weight than a civilian version. The radar is on the nose of the engine and the stores compartments under the wings are quite distinguishing. The hard points for armament or fuel tanks or rescue equipment prevent the airplane from being sold to anyone except governments that are in favor with the US Government. This airplane can be used for reconnaissance, rescue work and drug interdiction, along with many other special missions and tasks.

What does the future hold for Lake? The possibilities are great. There could be push-pull multi-engine airplanes. The prop jet engines are available. Fiberglass airplanes allow freedom of form. Pressurization is feasible. The limit is only man's imagination. Literally, the sky's the limit. For those of you who love the Lake product, I can only urge you to support the Lake Company for if they fail due to lack of support, Aerofab's baby will become an orphan and you may have to donate your baby to a museum.

Chapter 2: Preflight

Let's start with the preflight. Untie the airplane. It will taxi easier with all the ropes off of it. Preflight as you wish, but do make it thorough. Use a checklist or, as you become familiar with the Lake, use a consistent pattern so that nothing will be missed.

Unlock the canopies. Never fly with one canopy locked. They cannot be unlocked from the inside. They must be unlocked by key from the outside. If an emergency required exiting the airplane out of a locked canopy, it could spoil your whole day.

Take off the control locks. This will aid in checking flight control movements while doing your walk around.

If it is a night flight, turn on the master switch and check the lights. If there is a possibility of ice, turn on the pitot heat and see that the pitot blade warms up. A few of the older Lakes have pitot tubes. If you're curious as to whether the bilge pump is working, have someone hold the manual position "on" with the bilge pump switch. Put your ear against the fuselage on the outside of the airplane opposite the rear seat. If it's pumping, you should hear it; however, this only guarantees the pump motor is working. It will take water in the bilge pumping out to prove that the pump is effective.

Most preflight lists start at one point and cover everything while walking around the airplane. There is no right way or wrong way, so long as a system suits you and nothing is missed in a preflight.

One small problem I have with this system is there are so many separate categories that are being covered, that a plug or a fuel drain line could be missed.

To prevent that from happening, I do the complete fuel system first. Then if fuel is needed, I can call for the fuel truck and continue with the preflight while I wait for it.

There are many versions of the Lake and while they all have the main forty-gallon fuel tank in the fuselage under the engine, later models have more tanks.

Some Buccaneers have aux fuel tanks taking up part of the interior of the sponsons. These can be checked for fuel by removing the cap and putting in a couple of fingers. There is no gauge for these tanks. Some purists have graduated marked ropes with a weight on them to drop in the tank. Another way is to have a graduated marked plastic tube dipped into the tank. Put a finger over the end and withdraw the tube. See how much shows in the tube. The aux fuel tanks are placarded at seven gallons (I've never been able to put in more than six and one-half gallons, so figure that as useable). On the basis of only seven gallons per tank, it would probably be advisable to fill the tanks full or if an unknown partial tank is available, don't figure the fuel in your burn. Gently banging the fuel cap on the filler opening and listening to the echo will give you a clue if there is

some fuel in the tank. Bottom line, either fill the aux tanks or don't count on any quantity in the tanks.

If you want to know if the auxiliary pumps are working, there is a check that can be done. The blue lights at the auxiliary tank switch (or CB) only show there is power to the pumps. But if the main gas cap is removed and the switch is turned on, gas will be pumping in if the system is working correctly. Another way to check that the auxiliary fuel tank pumps are working is to open the fuel sump drain in the wheel well for the aux fuel line. Then turn on the aux fuel pump switch and confirm fuel is moving and coming out the drain.

If the tanks are left full after a flight, there is little likelihood of condensation accumulating in the fuel tanks.

The auxiliary tanks are vented to the atmosphere by a line that protrudes from the upper trailing edge of the sponson near the rear attachment bolt. Additionally, all fuel caps are vented including the main fuel cap.

Some Lakes have an after-market set of aux fuel tanks made of fiberglass that hold fifteen gallons each and are filled either from the top of the wing or at the top leading edge of the sponson. With a total of thirty gallons of aux fuel, it would well pay to make up a dipstick with gallon markings on it.

The 250 and 270T Series have wet wings. This means the metal of the wings themselves are the tank. The main forty-gallon tank is a rubber bladder. To check the fuel quantity of the wing tanks, the same dipstick that is used to check the main tank is used, but the graduations are on the other side of the stick.

To check the main tank, the dipstick is put in the filler hole. Now feel for the lowest point in the tank. Do not let the stick sit in the tank too long as it is not varnished and capillary action will show more fuel than is in the tank. The stick cannot be varnished or the varnish could dissolve in the gasoline. Obviously, if you can see the tank is full, there is no need to dip a stick.

To check the wing tank, use the top end of the dipstick to pry open the latch on the cap. It's easier on the fingernails. The reason we use the top end of the stick is that it is possible to shred the wood minutely and we don't want to dip any debris in the tank. To check the wing tank, the dipstick is shoved into the tank and aimed at the fuselage. To get a proper reading, the stick will be pushed into the wing (about two feet) until it hits the end of the tank near the fuselage. A mark on the stick is lined up with the opening of the filler. Put the stick in gently so as to not damage the quantity sender mechanism in the tank. Again, don't let the stick soak for more than a few seconds, then pull it out and read it. Of course, total the readings. Now call the gas person if you need fuel. The 200 HP Series will burn about ten gallons per hour when leaned and the 250 about fourteen gallons per hour when leaned. The 270T will burn about fifteen gallons per hour in normal cruise when leaned out at seventy-five percent power.

The 200 Series with no aux tanks only has two drains on the left side of the fuselage beneath the left wing. The front is the fuel pump fuel system drain. This is the low spot in the fuel system. The rear is from the low spot in the main tank. If you have one that leaks and won't shut off tight, just tell the mechanic if it's the rear or front drain that's leaking. It's generally a grain of sand or a small piece of debris caught on the internal O-ring. Generally, the mechanic will unscrew the drain valve and quickly put in a plug while he cleans out the valve. Normally, it's a quick fix. If you want to clean the fuel drain yourself, put in a hull plug to hold back the fuel while you clean up the drain valve.

There are also two vent holes close together on the left side of the fuselage. The front hole is the fuel pump fuel system drain. The rear hole is from the low spot in the main tank. These are called witness drains.

When the fuel is drained into the fuel sampler of glass or clear plastic, it should be

inspected for water or debris. The glass should be held looking down at it or toward a light surface to check the color. It should be blue for 100LL gasoline. If the container held only water and was held looking at it toward the sky, it would appear blue. If held looking with a light surface behind it, water will appear clear. Don't check fuel color while wearing blue or dark sun glasses. Water shows, if the glass shows a hard line with water (clear on the bottom) and gas (blue) on the upper portion. Then dump it and get another sample. Do this until water or specks of dirt no longer appear. It would be smart to shake the aircraft by the wing if there is suspicion that water may have hung up in a crevice or bend in the system. When dumping the glass, spray it out. This prevents any damage to the grass or asphalt, as would happen, if dumped all in one puddle. Another thing that can be done is to empty the fuel sampler into the scupper. It should run out the drain hole on the left side of the fuselage. If it does not because it is plugged, water also can't get out and spray or rain could collect in the scupper. This can overflow through the gas cap breather and collect in the fuel tank. Leaving the fuel tanks full after flight minimizes condensation forming in the fuel tanks, especially overnight. A full main tank prevents the rubber bladder from drying out and developing dry rot if parked for a long period. Storing the fuel sampler in the bow compartment will minimize the fuel odor in the cockpit. I know these points are belabored, but, hey, just skim or skip the parts you know.

Incidentally, it only costs a few cents more to go first class. When your airplane is getting its annual, request the mechanic wet vacuum the main fuel tank. You might be surprised at what may show up. It beats having an engine stoppage due to a blocked fuel line.

The Lakes that have factory installed aux fuel tanks have four more drain valves. There is one low on the side of each sponson. The fuel pump is in the wing for each sponson and the line goes from the aux tank to the main tank. There is a low spot in the line in each main wheel well. These too must be checked for water. If the aux tanks have been run dry, there is seldom ever gas or water coming out of the wheel well drains.

The Renegade Series has the wing tanks with low spot drains in the tank located under each wing. Some LA-4-200's have wet wings also. So it is possible to have eight fuel drains to be checked in the airplanes. This should include all of the 250 - 270T Series.

Mud daubers love to nest in these and other openings in the airplane. These can be protected with golf tees. Another fix is to use plastic inserts that go in plaster walls to hold screws. If plastic screening is glued on the openings, it saves the effort of placing and removing tees. Most of the holes are under the left wing, but there is a boot drain on the left side of the vertical stabilizer. Also, there is a battery drain sticking out under the trailing edge of the right wing on most 180 and 200 models. The battery vent on the 250 - 270 Series is just below the battery compartment on the fuselage right side below the engine pylon.

There are some smaller holes on the left side under the wing. These are vents for the area between the bladder of the main tank and the metal holding form and the vents for the fuel pump. These are the witness vents or drains.

Hopefully on preflight there will be no evidence of fuel coming from these drain holes. If one of the holes has a yellow smear running from it, this indicates that the electric fuel pump is beginning to fail. This is oil from the pump that has been overheated and is liquefying and running out. The pump should be replaced fairly soon so that the eventual failure will not leave you stranded, unable to start a cold engine.

If the fuel truck has now arrived and fueled the airplane, let the tank settle (water to the bottom of fuel tanks). It is possible the tanker truck had condensation in it. The drains can be checked after the rest of the preflight is completed if the airplane has just been refueled. This gives time for water to settle to the low points in the fuel system.

Well, we have finally preflighted the fuel system. Next, let us check the hull plugs.

There are six compartments and seven plugs. We will cover these float compartments later, but for preflight, use the square-ended wrench and remove the plugs to see if they are going to drain. Put them back in a little more than finger tight. If any drains, particularly in the main hull, only allow water out slowly, it is partially plugged. Use the wrench to poke up in the drain plug hole to displace any algae growing there. If it is cold out and no water comes out, poke the wrench in the plug hole and make sure there isn't any ice. If it only goes in at one-half inch or so and hits solid, you may want to look for a warm hangar for a couple of hours. Never set the plugs down. Some people paint their hull plugs orange so they can find them when they kick them in the grass. That's one way, but it's easier to just keep them in your hand until replaced in the drain holes.

Now that the fuel and hull plugs are preflighted, let us make our journey around the airplane.

Look at the windshield. Is it clean? The two wires (hinge pins) sticking out of the top of the hinges are supposed to be there. The mechanics use vice grips to pull them out to work on the canopy.

Starting at the nose, either lift the nose (lifting on the nose wheel well) and set the airplane on its tail. Or kneel down if it's low on fuel and light in the tail so that it won't sit up and beg on its own. Looking in the wheel well, check for loose wires, hydraulic leaks, broken pieces, or a cracked shimmy damper. The shimmy damper is the one-half inch (approximately) wide ring around the nose strut that the pilot is allowed to tighten if necessary. Use two seven-sixteenths wrenches to adjust the shimmy damper. A mechanic is not needed to lubricate the Lake. A pilot can do it. If it moves, lubricate it. Generally there will be seven grease fittings in each main gear assembly and eight grease fittings in the nose gear system. Luberplate 1242 or any good multipurpose grease can be used on the wheel bearings. Grabbing the tire and twisting the wheel from side to side should be done with some resistance from the wheel. If it is too free, a shimmy on landing is likely. If it is too stiff, taxiing becomes an adventure. When lifting the nose, check that the hand protecting rubber strips are glued on. You won't have to look hard. It'll leave new life lines in your hands if they're missing. Trim for car door edges from a discount store can be glued on as hand holds. While the nose is up, aim the nose wheel in the direction the airplane will taxi when leaving the tie-down. Generally, this means straight out.

If the airplane is nose heavy and the airplane won't sit on the tail, the nose wheel can be aimed by pushing on the side of the nose (on a rivet line) and the nose wheel will change direction while sitting three point.

The up latch and switches for the gear up and down lights in the cockpit are located in the nose wheel well. On the 200 Series, the gear down switch is not always a perfect operator. It often has to be readjusted by a mechanic. For an extra expense, a newer type of switch button can be exchanged for the older less reliable switch. All three of the gear down switches must be in series to turn on the green light. However, if it is not on when it should be, the nose switch is generally the culprit. It is generally the victim the rather vigorous nose gear action.

There isn't much you can do to preflight this system except to see that the electric wires are intact. In the cockpit, see if the green light is on while sitting on the ramp. If it is not, all of the bulbs for the gear and flap positions are press to test check that the bulbs aren't burned out before you yell for your favorite knuckle-busting mechanic. Press to test the system. If no light indication, switch bulbs with another system.

Eyeball the tires if you don't have a tire gauge handy. If you do have one handy, the 200 Series should have 40 PSI in each tire. The 250 - 270 Series should have 50 PSI in all three tires. As you preflight the nose gear oleo extension, it should be at full extension. This will be about eight to ten inches of oleo showing and takes 100 PSI of nitrogen to hold this extension. As an interesting aside, to meet the drop test requirements, the new

airplane leaves the factory with four inches of nose oleo showing. As soon as the airplane gets out in the field, maintenance increases the nitrogen pressure so that the extension is doubled and taxiing characteristics are improved. If the oleo goes flat, it should be pumped up with nitrogen (air contains moisture and can cause internal rust). Often it will hold inflated for a long time. If it does not, maintenance will probably need to replace an O-ring.

What if you have a flat nose oleo at an outlying spot? Can you taxi on it? The answer is yes, then fly with the gear down to a place you can get it fixed. Can you get into a problem doing this? Yes, there is one condition that can bite you. If you are on a beach with the gear extended and you taxi into the water for takeoff, be sure you taxi straight and not in a turn when you start floating and raise the gear. If the nose wheel is cocked in a turn when it floats and the gear is raised with a flat oleo, there is a good chance of the nose wheel being jammed and not extending for a land landing. This is a good procedure for getting you home from Lake Faraway. Any time the nose is flat and the gear is retracted, you have a chance of the nose gear getting stuck in the up position. If several gear cycles don't extend the nose gear, a water landing may be in order. Pick a lake close to maintenance or attempt to get the nose gear out yourself on the water. Bleed off the pressure and gear handle neutral as 1200 PSI hydraulics can have a wallop. If the gear doors show in the mirror that they are partially open, keep the nose high on your water landing. The best policy is don't retract with a flat nose oleo if you can help it. OK, we've beaten the nose oleo to death, but if you notice the oleo is getting rusty, you may want to lightly sand it to save the O-ring.

Next, you might want to walk along the right side of the nose and check for general condition. A clean windshield might be in order. If it needs cleaning, Lemon Pledge does a good job. It doesn't hurt to have a wax coating in the rain and it fills in the minute scratches that spider web looking into the sun. If there is ice on the windshield, use windshield wash to remove it. Warming the windshield wash up near the heater in the hangar wouldn't hurt. Rainex is also recommended.

The Buccaneers have the hydraulic quantity dip-stick located in front of the right canopy. Use the plug wrench to remove it and try to prevent dripping on the airplane. There are two holes in the dipstick. The bottom hole should show red fluid and the top hole empty; however, the hydraulic fluid is often a little overfilled. This won't hurt and the top hole will then also show fluid. If it is really overfilled, the excess will run out a small drain just below the dipstick. On the 250 - 270 Series, the dip-stick is located on the turtle back below the propeller. Dipsticks angle in a little. To prevent cross threading, put the dipstick on the plug wrench and guide it in on the slight angle. Most Lakes should have the hydraulic pressure up for checking the quantity. A couple of the older ones should have the procedure for checking the hydraulic quantity written inside the bow compartment door. Only two of the old models are unmodified. In checking this bow compartment, be sure the tie line or anchor rope has the snap clip hooked onto the V-bolt. Also see that the rope is in neat and can be pulled out quickly and easily during docking.

When checking the wheel well under the right wing, it should be noted for anything dripping or hanging loose. Feel the operating parts of the gear retraction for security. Wires should look intact. The accordion-shaped boot that keeps the water out of the fuselage should not be torn. See that the rubber is pliable or note to have it changed on the next annual. Note if the tires are rubbing any metal when retracted. As for the gear itself, check for pin holes in the main strut. If the airplane has been operated in salt water, corrosion starts from the inside and only shows as a hole through the paint as the lack of strength becomes critical. The oleo strut should be four fingers of extension (and match the other gear). Do not get excited if the disk brakes are rusty. They'll probably be

pretty clean by the time you reach the beginning of the runway. Make sure there's no hydraulic fluid showing in the area. If you have some place to go, a minor drip can be ignored until you can get it to maintenance within a trip or so, if you watch it. However, it is a hydraulically operated airplane and if it's leaking enough to make you nervous, maybe you had better go to Plan B until the leak is repaired.

To check the wing itself, first of all, check for general condition. Are there any new dings that you didn't know about? Check that the nav lights are secure and not cracked. If you have your own airplane and it has telltales, (the plastic piece that sticks up on the wing tip to show the nav lights are working) see that it has been beveled. In daylight, the nav lights aren't bright enough to be seen from the cabin on the telltale. If the telltale is not beveled, it will only show when it is dark. If you take a file and put a 45° horizontal to the ground bevel, on the top of the telltale, you should be able to determine the nav light is on at twilight instead of waiting until dark. You will notice the hinges on the control surfaces are mounted on one side of the surface (off center). This is because the Lake uses push-pull control rods instead of cables to control the control surfaces.

In the days of fabric wings and wooden spars, the preflighting pilot would grab the wing tip and shake the wing. If any wrinkles would appear in the fabric, the pilot might want to delay his flying until a spar patch had been glued on the cracked spar.

A different problem on the Lake can develop, but the same wing shaking is a good idea. The Lake's wings are cantilever (no struts). They are bolted on. Although the Lake is one of the strongest light aircraft built, the bolts or nuts can loosen up after a period of time. If in shaking the wing there is a clicking at the wing root, don't blame the crickets. It's time for your trusty A and P to have a go at the wing root. Best case scenario, tighten a couple of nuts. Most of the time this is the aft bolt. The more expensive fix (but is seldom needed), is to remove the wing and rework the fittings.

As our preflight progresses to the rear of the right wing, again look for abnormalities. If there are dents in the top of the wing, check the prop for nicks. Spare parts leaving the engine take on a pretty good velocity after a short acquaintance with the prop. A cheap parts retainer can be added inside the cowling that will minimize this mishap. Some sponsons have a handle low on the front. This is for gentle water handling, but don't use them with lines. Use the tie downs, as they are strong. The sponsons are designed as breakaways.

Ailerons can be moved up and down if the gust lock is off but the exercise is about in the same class as that of tire kicking.

The battery in the Lake is not located ahead of the firewall as in some other airplanes. It is in the hull under the floor in the 200 Series or behind the main fuel tank in the Renegade. The battery is different as it has a vent connection on it with a plastic tube taking the fumes overboard. Under the right trailing edge of the wing, check the one-quarter inch tube sticking out to one-half inch to see that the mud daubers don't try to make you suck battery fumes.

Radio antennas can roam anywhere on the various Lake airplanes, even like models. Naturally, check them for security.

Under the belly, check for missing rivets. If there are very many absent, you may want to do touch-and-goes on the water. Save the full stop landings for the new rivets. Note loose caulking and if there are black rivets, don't clean them off. Loose rivets rub and leave aluminum oxide that tell mechanics they would like to retire. If cleaned up, the leakers will be hard to find and replace. The other possibility is to take a magic marker or grease pencil and mark all of the leaking rivets before it goes in for its annual. The bilge pump can be turned off and a hose used to put a load of water under the floor boards. Unless they're bad leaks, wait for the annual. Pulling the interior is expensive, but it's done anyway once a year, so economically the annual is the time to do it. Don't get too

excited about leaks. They don't leak when they leave the factory and they won't leak if you don't use the airplane. But if you use the airplane on the water as it was intended, it will show signs (leaks and seepage) due to normal or abnormal stress of impacting waves, water surfaces or pressure of a boat supporting weight while floating. Scissors don't need sharpening if never used. Lakes will never need maintenance for loosened rivets if they never leave the hangar. Just enjoy the water flying and maintain water tightness as practical. Don't sweat it or expect miracles. As a couple of asides, at a River Ranch Lake Amphibian Flyers fly-in a couple of years ago a show of hands was asked of sixty owners on how many left their Lakes floating overnight. Only two said they did. On the other hand, a ditched 250 sat in high waves thirty-five miles from shore in 1994. It was listed by the Coast Guard as a hazard to navigation for five days before it was towed in. Don't count on all of them being that tight, however.

One loose rivet in a sponson (no bilge pumps in the sponsons) will allow a sponson to fill and the wing to lower. When the engine leans well beyond the CG, the airplane will roll over. This is not a common incident. It is just that the possibility is there, and there are easier ways of cleaning a hull than having it show above the water. The later models have flotation foam in the wings, but I don't want to be the one to prove the system does or does not work. If you need to park in the water overnight and can't get up a sea wall or rocky shore and the water is shallow, leave the gear down so that it won't settle more than a few inches. If left floating with the gear up, normally the airplane will probably float for hours or days, but do you want to take a chance with your magic carpet?

As we work back to the tail, check for oil accumulation. If it's throwing some out, you probably already know about it as you are adding more oil to the engine. Again, look for dents, things that "just ain't right" and note the position of the trim tab. The trim will probably show how it was set before its last landing. If it is to be fueled, the tab will probably be lowered some before the next takeoff. (Trim nose down from pre-fueled position.) Normally, for a series of takeoffs or landings, the takeoff trim will remain at the landing setting.

The trim tab is really part of a split elevator and is hydraulically controlled, but it makes the airplane perform as though it were a trim tab. A true trim tab is fastened to a controllable surface and goes in the opposite direction of the controllable surface (i.e., elevator, rudder and aileron). The Lake elevator trim moves in the direction of the elevator for control inputs. The elevator is controlled by the pilot's control wheel as in any conventional aircraft. The split elevator (trim tab) is controlled by a hydraulic lever between the two front seats. The elevators and trim ride quite high in the prop wash (strain on the hinges) particularly on water takeoffs. It is the only way of getting the tail down. When the tail goes down, the nose goes up. The nose must be high enough to allow the airplane to aim and accelerate up onto the front half of the airplane as the nose is lowered. Or as it is said, to get the airplane on the step. This is the hump phase of drag on takeoff.

Because of this stress on the upward tilted trim tab, the hinges and hydraulic actuating pistons take a beating and gradually develop play. This play is to be checked during preflight. About half to three-quarter inch movement at the trailing edge of the trim tab is normal. If the play gets over one inch, have your Lake mechanic check to see if the moving parts will need to go into rehab.

Most control locks are in the cabin. If you are flying an older Lake that does not have the pin through the rudder pedal lock or the old V-shaped bar that goes over the rudder pedals, you may have rudder blocks holding the rudder in line with the vertical stabilizer. Now would be a good time to remove them.

As we preflight the tail, check that the rudder boot encasing the rudder push rod is intact and won't allow water into the rear fuselage compartment. If water should gather in the boot, a small drain on the left side of the vertical stabilizer will allow the water to

drain.

On the 200 Series airplane, be sure the inspection cover is secure. It is located about eighteen inches from the bottom of the rudder on the left side of the rudder. If it falls off in the water on takeoff, the water will pile in the hole faster than it can spill out the water rudder slot. The tail will then be so heavy that the airplane can't get its nose down to get on the step. (I mention some of these things "cause I've been there".) The water rudder action can either be checked now or when you are close to the cockpit.

As you move above the left side of the fuselage of the Buccaneer series (and you're tall enough), press on the belt on the alternator. If it's loose, the bolts on the alternator may need to be tightened. If you are short or your airplane has bat wings, check the belt by reaching around the engine cowling during the oil check. Note that the orange alternator cooling hose is intact and not loose or amputated by the prop. I.B.I.T. (I've been there, too.) These are checks that are easier to make on the Buccaneer than the EP or Renegade series which are more modest and have their pants zipped up. Check the prop for dings. Something in the engine may be missing. If the prop is rough water spray damaged, you are allowed to dress the prop; that is, file it smooth in long strokes. Check for prop nicks, also. The pilot can file a nicked prop. To file the prop, have a ten-to-one slope for the depth of the nick. For instance, a one-eighth inch nick will require 10/8 or one and one-quarter inch taper in each direction from the nick.

The left wing is the same as the right wing except for the pitot blade. Don't forget to take its nightie off. By the way, if you ever mess up and leave it on and find you're airborne with no airspeed indication, just fly your pattern and approach slightly faster than normal. Land and remove it. In the old days, Piper Cubs were flown from the back seat and the airspeed only showed up when solo. Lack of an airspeed indication or a canopy popping open is not a valid reason for losing an airplane. Bugs coming into an open canopy while taxiing on land or water also make for a poor excuse for wrinkling metal. Ignore the bugs, think airplane handling first. If the canopy pops open on takeoff or in flight and hovers open about an inch, close it at your leisure. The canopy can be held a little further open for disposing of ashes or anything else you need to dump. Just don't pull the ship up into stalls with an unsecured canopy.

On the 200 Series, the left wing also has the landing, taxi lights and stall warning blade. These are preflighted in the normal manner. Check to see if the lights will turn on, navigation lights, too. While you're at it and as long as the battery switch is on, move the stall warning switch to hear the horn. Don't forget to turn the battery switch off until you need it for engine start. Check all the drain holes under the left wing on the fuselage. Make sure the mud daubers haven't done a job on the airplane and the golf tees are removed.

On both sides of the fuselage are spray rails (chines) to help keep spray out of the prop. See that they haven't been used (bent) for a foot step or displacing docks and rocks.

Looking up at the 200 cowling on the bottom, you will see a scoop. It should face forward to catch air to cool the oil. If a mechanic unfamiliar with Lake's has worked on the bird, he may have reinstalled it backwards looking for streamlining. It has happened a few times, so if fresh out of a non-Lake shop, check that the scoop will scoop air.

The Lake is built just like a ladder and is easy to mount. Have the canopy open on one side. The ladder rungs are the step, the edge of the cockpit wall (gunnel) and roof. If that last step is a long one, use the wing. Hand support in the front of the engine cowl keeps you secure. If you have a need to walk on the wing, use soft shoes (rubber) and stay on a rivet line.

To check for bird nests in the spring, open the side panels on both sides of the engine. A netting over the engine will spoil a bird's apartment dwelling instincts. Nests are harder to find in the pylon, which they like, but the net should cure the problem.

On the 250 Series, the oil dipstick is on the left side of the engine, looking forward to define left side. The LA 250 oil is full at twelve quarts and can be flown down to eight quarts.

I recommend filling the oil to eleven quarts and burning it down to eight or nine quarts and again filling it to eleven, unless going on a long trip, then fill to twelve. Carry your brand of oil with you. You might not find it on a trip. Most airplanes tend to spit out some of the last quart if the oil tank is filled too full. I know the manufacturers recommend full is fine, but if they were right every time, there would be no AD's.

The 270T is full at ten quarts and has a minimum of eight quarts for flight. Again, I prefer to burn down to eight quarts to eight-plus and fill to nine quarts unless on an extended flight. Then fill to ten quarts. (I'll wipe the tail off later.) The 200 Series can have oil added straight from the container if you have a steady hand. The 250-270 airplanes will need a funnel or bottle extension to prevent oil spillage.

The 200 Series has a maximum of eight quarts with a minimum of six quarts. If you burn below six quarts, you may see your oil pressure gauge start to fluctuate. Again, fill to seven when it reaches six quarts. The dipstick screws in and is held by putting on normal pressure; however, quite often due to the heat of the engine, the threads of the cap will partially seize and on occasion may take pliers to loosen. The previous person checking the oil shouldn't be yelled at. It's the nature of the beast that the cap tightens up. Oil is the life blood of the engine. An oil change every twenty-five hours will go a long way toward preserving your investment (and maybe your health). The reason for the recommendation of frequent oil changes is there are corrosion inhibitors in the oil. This is a chemical and it is used up by the day. So, the oil change is really needed on the airplane that seldom flies. You can get by on fifty hours. Also, the oil should be changed every four months if not flown.

Oil analysis is 100% needed on a turbo engine. It is about 25% effective on the reciprocating engines. Use synthetic oil in the turbos (270T). Coking is less likely to occur with the synthetic as it can handle higher temperatures. Turbos run hotter. This may cut down on the chance of having to repair a turbo. These suggestions are not official, but I believe practical.

The 200 Series Lakes have their oil checked by opening the front section of the engine cowling. The two catches are released on the sides of the nose cowl. A little tug will get the bottom of the nose cowl to open a few inches. Then, with the left hand, reach under the bottom curved side in the cowling and release the safety catch. With that, the whole nose cowling will raise and lie back on the main cowling. Some airplanes must have the nose cowling wiggled with a little monkey motion to clear the oil cooler opening rubber seal. When closing the cowl, be sure no rubber is up and covering the oil cooler radiator.

The oil dipstick is located just to the left side of the center of the engine (left side as the airplane aims). On the airplanes with the round white plastic oil/water separator, there should be a slit (pressure relief valve) in the hose leading into the separator. If not, the water in the oil separator can freeze and cause the plastic can to collapse. Again, as on any preflight, check for general condition and make sure there's nothing loose that you'd rather have secured.

When closing the nose cowl, you may have to slightly warp the cowl to slide over the oil cooler radiator rubber seal. When the cowl is inches from being closed, use your left hand to hold the spring metal safety lock out of the way for a complete cowl closing. The latches that hold the cowling in place have little slide safety catches. With time, these do not always automatically slide into place. After latching, check that the safety catches are in place and press them into position if need be. I don't personally pull a prop through by hand, but if you are a purist, this is the way to preflight the propeller outside of checking it for nicks, spinner on tight, etc. Move the prop backwards in case the mags are hot. It

won't kick. It will lube the engine a little but it is not a pre-oil. It takes a special pump to pre-oil the engine.

That takes care of the exterior of the airplane. Next will be the cockpit preflight. If reading this is getting tedious, take a beverage break.

Getting into the cockpit is an art in itself. With the left canopy open, mount the left side with the left foot. It goes on the external step, (right foot for the right side of the cockpit). Hold the hand hold on top of the glare shield for leverage. Put the right foot up over the side of the boat and on the floor, then the left on the floor in the standing position. Use the hand hold to lower your body into the seat. Don't throw yourself into the seat. You can break the back rest. Actually, it's not as complicated as I've made it sound. It can be done with one fluid motion and will be after you've done it a couple of times. I've seen tangled foot dances the first couple of times and the wrong foot being used and people facing the wrong way as they get in. It's like incorrectly mounting a horse and finding he has no head.

To digress a minute, you'll be giving rides to non-pilots or even deprived pilots who know nothing about Lakes and you'll have to help them into the airplane.

Have the throttle pushed forward so they don't bang their heads on it. If you are in a Buccaneer, move the seat forward if loading the rear seat. Have the passenger use the proper foot for the side he's getting in on and use the hand hold. The tendency is for a stranger to the airplane, to dig their fingers into the defroster vents and knock the screens out. Knowing this, try to be a step ahead of them and show them the hand hold. Load the right rear passenger from the right side and left from the left. If the first one is agile and slides over, both can be loaded from the same side. However, if you have an airplane with a cargo door, all EP's and 250 - 270T Series load all rear passengers from the right side. They won't be able to hold the hand hold on the bigger airplane, but the front seat back is a good support. Also, the door opening at the roof makes a secure handhold.

Help your passengers get in and buckled before you, as the pilot, get in your seat. Conversely, after shutdown, ask them to wait until you are out so that you can open the right canopy and cargo door and aid them out. Without you to guide them, they won't even know where to place their feet on the external step.

On your preflight, in the cockpit, use a checklist. There is no need for just the abbreviated checklist on a decal that comes on most Lakes. For one thing, it doesn't cover preflight, before takeoff, or flight instruments. Tailor your own checklist to suit yourself or use the one in your manual. But there isn't much to do in the cockpit on preflight, so there's no time lost in using it. Do make sure you have a flashlight and life vests. A whistle wouldn't hurt.

I believe in the hydraulic pump, strobe light and bilge pump auto being on at all times. The hydraulic pump is left on because there is no need of it being off and it could be missed before engine start and takeoff. Off is off when the master switch says so, so leave the hydraulic switch on. The master switch will take care of it. The strobe light switch is also handled through the master switch. Things get busy when docking and beaching and the master switch can be missed. After tying the airplane to the dock and walking up to the cottage, you look back and your trusty strobe is flashing, "Come back, come back". It is better to know then, than when you try a start several hours later. The only time the strobe switch should be turned off is when taxiing out at night on an airport (you can blind the pilot taxiing behind you) or when flying in the clouds at night and the flash is disconcerting.

Now, the auto side of the bilge pump is connected to the battery bus and is hot all the time. That's the way we want it. If the airplane is anchored or you are fishing from a parked airplane and the master switch is off, you want the pump to start working if the hull is taking on water. If there is no water in the hull, there is no electrical connection in

the pump and no drain on the battery. So, leave the bilge pump on auto and it will do its job anytime it's needed. Some wimps add an extra bilge pump (in case the other fails). They also add a horn in the circuit so an airplane taking on water will alert the pilot even in the cottage.

Here are some figures. In "auto", the bilge pump will pump the water out of the hull down to ten gallons. In "manual", which should be spring loaded, you can pump down to two gallons left in the hull. These figures vary from airplane to airplane, but do give you a ball park figure. If you just want to play, add measured water to your hull and see what the manual position will kick water out at. Put the switch on auto and add a gallon at a time until the pump comes on.

If you are doing water work and the airplane seems to be increasingly sluggish when on the water, open the left canopy. Look under the left wing. If water is pumping out, there is more than ten gallons in the hull at eight pounds per gallon. If no water is coming out, hold the bilge pump switch on manual. Have your passenger hold it if it's on the right side of the airplane. Your head has to be out the left side to check for squirting water. If you are alone, use the fuel stick to hold the switch if it is on the right side while you look out.

If it is now squirting, but didn't on auto, there is less than ten gallons in the hull but more than two gallons. If no water came out, either the pump is not working (not too likely) or the day is warming up and density altitude is now hurting performance.

The rear third of the fuselage is required to be watertight. That means no weep hole is legal to allow water that has leaked into the rear compartment to ease into the main hull compartment. It also means that no bilge pump can be located in the rear compartment, as the water exhaust would render the rear compartment not sealed watertight.

The FAA says it has to be water tight. The concern of the pilot is that water can accumulate in the tail and on the water we can't get it out.

It took five years, but Aerofab finally got approval to put a manual valve in the rear compartment that can be opened to allow any water to drain forward to the main compartment with the bilge pump. All airplanes now come off the assembly line this way and it can be retrofitted to the rest of the fleet. The manual valve must be closed for take off and landing.

Another important item on the cockpit preflight is to see that the radio master switch is off. The radio master turns all the avionics off and saves wear and tear on the individual on-off switches. Lacking a master switch, all radios must be off before engine start. Otherwise, on engine start, voltage spiking can damage the electronics in the airplane. There is no need of having all of the radios turned off if there is a radio (avionics) master switch.

Make sure the throttle is at idle after moving it ahead to board your passenger or you'll make an engine start as the Army Air Corps did with "one hell of a roar".

The FAA wants the brakes set any time the engine is running and the airplane is not in motion. The parking brakes are weak on the 200 Series. Back up the parking brakes with your feet on the brake pedals, but the parking brakes should be set on preflight. They're very effective in the 250 - 270T airplane.

Make sure the fuel shutoff valve is on. It is located on the rear cabin wall in the 200 Series and on a few 250's on the ceiling (law requires within reach of pilot). Most Renegades have the fuel shutoff by the pilot's left knee. Early LA250's have the fuel shutoff valve overhead. These are not allowed to be safety wired open. The theory is that there should be no restraining force in case of an emergency shutdown. The problem with this idea is that on a Lake, you won't even know you have an engine fire. It could burn, engine quit, a successful forced landing and when you get out of the airplane, it would be the first you knew you had a fire. I know of one case where a pilot had his Lake engine quit

while flying at four hundred feet. He was over a lake, so he banged his flaps down and landed. There was no time for troubleshooting. He turned around and his seven year old was grinning and the fuel shutoff valve was off. So much for no safety wire allowed on a Lake fuel shutoff valve.

Lesson learned. Don't leave an unattended child alone in the rear seat of a 200 Series. If there is a child there, have an adult with the child and warned of the danger. Just telling a kid not to touch is too tempting.

It's like the time I told a three year old daughter never to shove a bean up her nose. That night she was in the doctor's office having a bean removed. She would have loved a Buccaneer unsafetied fuel shutoff at that age.

Remember, use a checklist in the cockpit on pre-flight. In general, it should cover switch positions, (avionics off, strobe, bilge, hydraulics on, etc.). The checklist should also cover essentials of control positions (throttle one-quarter inch, prop control forward, mixture idle cut off, gear and flap handles down, water rudder up and trim control exercised and again, the ever present, etc.).

Every three or four weeks, the auxiliary hydraulic pump should be exercised. This is to keep the O-ring wet and the pump functional. It's bad enough to lose the electric hydraulic pump, but then to find out the hand pump is gone too, may make you wish you had pumped it occasionally.

Hydraulic fluid is H-5606. Pressure generally operates between 900 and 1200 PSI. There is also a high pressure relief valve that activates at 1650 PSI. This is to take care of an over pressure in the accumulator or in the event of an unlikely runaway electric pump. If the pressure on the hydraulic gauge goes to 1650 PSI, turn off the electric hydraulic pump and use the auxiliary hand pump for the hydraulic pressure.

The flap, gear and trim handles have five positions. Of course, there is up and down. Also, on most, but not all airplanes, there is an off position (with a detent) at the midpoint. Between these positions are the bleed positions. With the lever in this position, you can see the hydraulic gauge drop and hear the hissing noise the pressure makes as it drops off.

Here is a Lake Service Letter:

LAKE AIRCRAFT
Service Letter L-73
Applicability: All Model 250s
Subject: Hydraulic System Operations/Hand Pump

Due to a recently reported incident in which the standby hydraulic hand pump was found to be ineffective the following maintenance procedure should be accomplished prior to first flight of the day by the operator/owner.

1) With the electric hydraulic pump turned off, move flap handle to a Bleed position and slowly bleed off all hydraulic pressure. Note the indicated pressure at which the pressure gauge needle suddenly drops to zero pressure. This is your accumulator precharge pressure which should be 300-400 PSI. Return flap handle to full down position.

2) Extend hydraulic hand pump and manually pump the hydraulic pressure up at least 500 PSI. If hand pump is ineffective or an excessive number of pump cycles (more than 15) are required to achieve 500 PSI, proceed to following maintenance procedure. If hand pump checks okay, stow hand pump and turn electric pump on to normally operate hydraulic system.

MAINTENANCE PROCEDURE

If the above check of the hydraulic hand pump proves that it is ineffective conduct the following:

1) Bleed hydraulic pressure back down to zero with Bleed positioning of flap handle. With shop gauge determine the precharge nitrogen pressure within the accumulator. Record precharge pressure and bring up to 300 to 400 PSI if necessary.

2) Stow hand pump and with electric pump bring system pressure up to green arc (850 - 1250 PSI). Check hydraulic reservoir fluid level and bring up to within dipstick holes if necessary.

3) With electric hydraulic pump turned off, bleed hydraulic pressure down to about 500 PSI. Leave flap handle in intermediate (by-pass) position and turn on electric pump. While electric pump is on, cycle hand pump until you feel a solid resistance to hand pump strokes. Turn off electric pump and return flap handle to full down position. Continue pumping for 5 strokes with hand pump confirming that its effectiveness has returned.

(If repeated need for above procedure is required call the Product Support Department for further details.)

The brakes are set, everybody is strapped in and the passengers are given a briefing. OK. What should the briefing consist of? This is up to the pilot's judgment and his knowledge of his passengers' aviation expertise. Let's just use a general briefing for a first-time passenger. A first timer should be shown how the seat belt works, the canopy opens, the cargo hatch and if there is no cargo hatch, the fact that the two front seats should be evacuated first. Good judgment would have your passenger wear life vests when water landings are planned. However, if caution is shaded a little, at least show them where they are stored, how to put them on and in case of a sinking, to wait until in the water before inflating. Climbing out of a damaged airplane will be tough while inflated, making them oversized for the exit area. Also, the life vest can be torn.

No smoking policy is advisable. It's close quarters and a steady dose of nicotine is hard on the gyro bearings in your expensive toy.

A possible potty trip before flight might make the trip more enjoyable. Let them know that you are human and can miss traffic. Have them tell you when they see traffic. Even if you've seen it, thank them, otherwise you'll lose a little safety margin if your passenger thinks you don't care. Teach your passengers to call out clock positions on traffic. It keeps them in the loop. If you have a heater with Hi and Lo switching, have your rear seat passenger regulate the heat with the switch. Make that passenger the climate control officer. He won't be as likely to get too hot and feel ill. There is pro and con on talking about a burp bag. Talking about it may psychologically induce illness. That doesn't worry me. I'd rather induce a few that at least know how to use the sick sack as to cross my fingers and ignore a potential problem. There is an art to using a barf bag. Teach it. If you don't, you clean the airplane. If you teach the technique and the passenger doesn't listen, the passenger cleans up.

The proper use is to open the bag (not just the top, that won't hold volume), put your fist into the bag so it is completely open. The bag has to then be held up to the mouth and nose, maybe chin in the bag. Never, never, never hold it a little distance in front of the face and think you can hit the bag. With good luck, some will hit the bag.

The passenger should know where a bag is located and for backup there should be another one within reach of the pilot.

If this briefing on the sick sack goes against the grain, try this. Tell your passenger to let you know if he feels ill during the flight. Tell you early, not after the critical stage is

reached. Tell the passenger, you will land if he lets you know. Then, you as the pilot, can open the bag and tell them how to hold it. Greenish color and/or sweating is a clue things may start getting exciting. If you prefer to not mention illness, but wait until it gets exciting in the cabin, your hazard rate of cleaning up will go up.

Avoid tight turns and extended flights in choppy air. Distract your passenger. He is less likely to lose it if being shown how to fly and holding controls than fixing his vision on a ground object. A passenger is less likely to get ill in a cool cabin vs. one that is too warm.

This preflight takes much longer to teach than do. A good preflight can be performed in three or four minutes.

Let's fire it up and go flying.

Chapter 3: Starting and Taxiing

Each Lake built has its own personality. They are like children, even though they come from the same factory. Each is different, as they are hand built, even though on an assembly line. This trait includes the engine also. In the 250 - 270 Series, small differences in the MAP and RPM can smooth out an engine in cruise. The same characteristics are true of engine start. After some false starts, you'll find a system that works best for that particular Lycoming. Some engines like three seconds of prime (done with the electric fuel pump), some as much as twenty-three seconds. If the engine is underprimed, it may fire and die. If overprimed, it won't fire and you will probably smell gas. Of course, an underprimed engine may not fire at all and appear to be overprimed (flooded). With time, you will be able to start your own airplane easier than anyone else when you learn just how to tickle it.

Let's have a go at the starting procedure. If Lake flying is new to you, use the checklist. Engine controls are on the ceiling as in all flying boats to eliminate the need for long control cables and the possible slop and slippage that would accompany the extended cables.

The master switch and alternator or generator switches are turned on. If the battery is low or it is very cold outside, leave the alternator switch off. This will save three horsepower of load against the battery. If the hydraulic pressure is low and battery conservation is needed, turn off the electric hydraulic switch and the strobe light until the engine has started. Then turn on the alternator, strobe and hydraulic switches. Actually, most of the toggle switches are circuit breakers and will pop off in an overload. Even though the hydraulic pump has been on during a flight, it is rechecked before landing as it can pop off. (Been there, done that.) Remember, unless it's a low battery condition, the strobe light switch will be left on and the light flashing on when the master switch is on. This will warn that the engine is about to be started.

OK. After all that discussion, the master (battery) switch is on. The mixture should be rich and the fuel pump normally is turned on for five seconds in warm weather. If it is zero out, it will take up to twenty-five seconds and the time varies with the temperature. Don't forget to preheat if the temperature is below 20° F. If the airplane has been pulled out of a warm hangar, use the five second prime (fuel pump on). Some airplanes take three seconds of prime and some up to twenty-three seconds in warm weather. You'll learn your bird by trial and error. When the time is up, turn off the fuel pump and pull the mixture control to idle cutoff. Very few Lakes start better in rich. The older Lakes have a push button starter and an impulse on the left magneto. Theoretically, the engine is started on the L mag and when the engine is running, go to both mags. However, it starts

just as easily on both mags as just L mag from a practical point of view. Also, this will preclude forgetting going to both mags for taxi. Taxiing on one mag could cause fouling of the non-firing plugs.

All of the later model Lakes start with a key starter. So engage the starter and when the engine starts, ease the mixture control rich. On some 250's and just about all 270's, one-half mixture will be enough. Full rich may flood the engine and kill the start. Also, most 270T's are taxied at one-half mixture for smooth engine operation.

If the starter is dead or there is no electrical power on the airplane, there is a good chance a battery connection needs tightening. By the way, the newest technology is a gel battery. There is no acid to spill and no vent is needed.

If the engine starts but dies, prime for about another three seconds with mixture control rich. Pull the mixture to idle cut off and crank the starter again. This will generally do the trick. If it still won't stay running, try it one more time with a short prime.

If you have reached the point where you don't know if it's under or over-primed, go to a known condition. Flood it. Then unflood it. To flood the engine, mixture rich, throttle cracked one-quarter inch and prime with the fuel pump for fifteen seconds. You may smell gas, a good sign, now you know it's flooded (a known condition). Mixture idle cut off, full throttle and hit the starter. A good guess on time is not to hold the starter over about forty-five seconds or it may heat it up and damage it. If necessary, give the starter a three or four minute cool down period if the engine hasn't started. Normally, after about twenty to thirty seconds, the engine will start and be very rough. Then due to the full throttle, it will pick up and want to run at full power and smoothly. As the engine starts to accelerate, pull the throttle back easy to idle power. As the engine is idling (and before it starts to die), bring the mixture forward to rich. You may hesitate at half mixture to prevent flooding the engine and dying. If it starts to flood out at rich, lean the mixture some.

If the engine has been shut down less than two hours, you will have a hot start. The procedure is, no prime (fuel pump), mixture idle cut off, throttle cracked, master switch on and turn the starter. It should start. Bring up the mixture when the engine starts. If it doesn't start after a couple of tries, mixture rich and fuel pump for three seconds. Mixture idle cut-off and hit the starter again. If it still doesn't start, repeat the last step and use about five seconds of prime. If it still doesn't start, you may have flooded it. Try the last step again (about five seconds) of prime. Now go to the flooded start of mixture idle cut off and full throttle. As the engine starts to pop a little in its flooded condition, slowly bring the throttle back. When it is running smoothly at around 1000 RPM, advance the mixture control.

Hallelujah, we now have the engine started. Check the oil pressure next. It should rise within thirty seconds in the summer or sixty seconds in the winter according to the Friendly Aviation Administration. However, if it were MY engine and I had no oil pressure by forty-five seconds in the winter, I would shut it down rather than take a chance on an unlubricated engine. Oil pressure may be low (in the yellow arc) on a cold engine at idle, but if there is some pressure I would anticipate oil pressure in the green as the oil warms up and the throttle is advanced beyond idle. A short warm up (one to three minutes) at idle never has done any engine any harm. Idle should be at 1000 RPM to keep the battery charging. During this time AWOS or ATIS can be obtained. Clearance can be requested before the taxi checklist is completed and make sure your passengers are tuned into the radio and the intercom is working.

If you've never taxied a Lake before, it is time for "Taxi 101". There is an aftermarket steerable nose wheel for the Lake. However, once you get the hang of steering the Lake, you are not likely to spend the money for something you really won't need.

If it is a first time taxi, start where the space is wide open. If it is a matter of taxiing between rows of expensive airplanes that you can't afford to repair, the instructor should

taxi. Most Lakes only have brake pedals on the left side so the instructor will taxi to a roomy safe area from the left seat. Switch seats and unless you have some Grumman time, it's your turn to embarrass yourself. The airplane will have a mind of its own and its thinking won't correspond to your thinking. It's sort of like learning to ride a bicycle. Nobody can tell you how to lean and cock the handle bars. There will be some trial and error.

If you start out with a straight nose wheel and want to go straight, it seems like a piece of cake. Slight corrections can be made with the rudder pedals. The prop wash on the rudder pushes the tail around and aims the nose wheel. Now try some S-turns. It will probably take a little braking to control the direction of taxi. Now try a 90° turn. It will take braking to make the turn. To come out on a heading (yellow taxi line), some opposite braking must lead in before reaching the heading. In other words, anticipate the roll-out point.

A word on braking. The 200 Series airplanes are nothing to write home about concerning brakes. However, the 250 - 270T airplanes have strong brakes. Don't lock a brake up to turn. It can tear up the grass, scuff blacktop, hurt a tire and strain the landing gear as a whole. Brakes should be on, off, on, off, on in any airplane. In other words, tap the toe brakes only to slow the wheel down and keep tapping to get the steering you want. This also may be necessary when taxiing in a straight line in a crosswind. You may run out of a brake, particularly the right brake, in a rudder taxi turn plus brake. Neutralize the rudders and then brake for more effectiveness.

The landing gear is wide for a light airplane. It is eleven feet three inches from left main to right main. So first taxi with the left wheel within inches of the edge of the taxiway. You can look out and see the wheel. When you can hold that taxi position well, try and taxi the right wheel close to the edge (or down a yellow line). At least put the airplane so that you think the wheel is where it should be. Stop the airplane, loosen your belt and take a look at the wheel to see if you have a feel for where it is. Try it until you are confident you will miss potholes and stay on the taxiway with the right wheel. Now practice stopping with the nose wheel on a spot. When stopping, gradually press the brake until just as the airplane is stopping, back off the brakes just a hair. This will prevent stopping with just a little jolt. It's called finesse. A jolt won't hurt, but smoothness is nicer.

If the nose wheel cocks full over and you can't seem to straighten it out from a standstill using brake, use power. It's a huge rudder. Use a lot of power to blow the tail around but don't stand on the brake while doing it. Tap the brake. Allow the braked wheel to rotate a little. The nose will come around. However, if you have gotten the airplane into close quarters, don't take a chance. Shut it down, get out and pick up the nose and either push the airplane back or turn the airplane until you are happy there's no risk in taxiing.

Empty, the nose weighs less than forty pounds. Even with a passenger (close to the landing gear pivot point) the nose doesn't weigh much over one hundred pounds, so it can be lifted with a passenger in the front seat. I've lifted the nose with three people in the airplane and I'm no spring chicken. So consider leaving people in the airplane as an option if it needs to be manhandled.

There is a caution on taxiing the Lake that is ignored on most other airplanes. The sponsons are low. Be careful you do not strike them on taxi or runway lights, saw horses, marker cones, or snow banks. Some northern fields have snow plow drivers who think all airplanes are high wing. They will leave snow banks on a taxi way closer together than thirty feet. You can't make it. Park on the runway, close the airport, they will finish the plowing.

Learning to taxi, while it sounds formidable the way I stated it, actually can be mastered in five to fifteen minutes. By the way, once the wheels start rolling from the tie down, log it. Flying is not just in the air. Taxiing, run-ups, waiting for takeoff, beaching,

etc., are all part and parcel of aviating. The wings don't have to be holding you up to count time honing your skills.

This is the safe way of taxiing with one of the canopies open. It can be a life saver in hot weather if there is no wind. Make it the left canopy for the pilot's better vision.

If there is a crosswind, have the upwind canopy open. If the downwind is opened, it can blow shut and cause damage.

Regardless, never taxi with your elbow outside of the airplane. I know one fellow that did. He had the wrong one open. It blew over so hard on his arm he couldn't use it for four days. At least he didn't break his arm but could have. Just never put that elbow out. You could have the correct canopy open and somebody's prop wash could make you yell out loud.

Now that we have taxiing mastered, let's head for the end of the runway.

After a few chapters, I've gotten you closer to flying all the time.

Chapter 4: Run Up

The engine is air cooled, but the propeller is behind the engine (pusher). So on run up, it is more important to be headed into the wind for run up than even on a tractor type airplane (prop in front of the engine). Into the wind is ideal. However, configuration of taxi ways, wind angle to run ways, consideration for other aircraft (prop wash), room for jets to taxi past (no run up), etc., doesn't always allow for optimum parking into the wind. So, do what you gotta do. Park as close to the hold line at the runway as other planes allow. This leaves room for other airplanes to run up behind you. Aim your tail so other airplanes won't have to eat your prop wash. Don't allow traffic constraints, tower or yourself to rush you. Use the checklist. You're not drifting into the rocks. Take the time to do it right. For water work, we'll use the flow pattern. This will be covered later. But this is solid ground and a checklist is in order. The same thing goes if parked on a beach.

Set the brakes. They are required anytime the engine is running and the airplane is not in motion. Back up the parking brake by holding the toe brakes. The parking brake may be adequate at idle power, but the toe brakes will need lots of push at run up RPM to hold position, particularly in the Buccaneer.

Use 1800 RPM on run up for the 180 and 200 Series airplanes for a mag check. 50 to 100 RPM drop is normal on the mag check. What would you do if one mag dropped several hundred RPM? Go to maintenance is the wrong answer. First, go to "takeoff power" for forty-five to sixty seconds and then back the power off to 1800 RPM again. This should have cleaned the spark plugs if fouling from taxiing was the cause of the excessive mag drop. Try the mag check again. If the RPM still drops too much, lean the mixture until the engine runs rough or wants to quit. The heat in the engine from this leaning may burn the carbon from the poorly firing spark plug, if that is the problem. Richen the mixture and try the mag check again. If it has improved but still isn't as good as it should be, try full throttle one more time. One more mag check. If the problem still isn't cured, now use the "return to maintenance" answer. However, from a practical operation on a beach or a large lake (and no mechanic swimming nearby), you might take a calculated risk. If you have a lot of room, see if the airplane will fly. If it does, gain some altitude circling over the water. Then head for the nearest airplane hospital. This may not quite fit in the FAR's, but still fits in a practical world. Think of staying overnight on Lake Faraway with the temperature dropping, waiting for a mechanic to give you a repair for a legal mag check the next day. Anybody that locks into FAR's when there could be a better solution has trouble getting his shoes on the right feet in the morning.

Besides, there is actually one FAR that allows the pilot to ignore the other FAR's. This is stressing the pilot's emergency authority which allows the pilot to do what he has to do

in the interest of safety. The pilot is in violation if the operation is unsafe. It could be unsafe to stay in the wilds all night, so don't let a small discrepancy cause a much larger problem. Oh boy, don't get a retired airline pilot started. Back to the before-takeoff run up.

If you have an old publication and see the prop cycle is 1400, disregard it. Standardization now calls for 1800 RPM. After the mag check and while the RPM is still at 1800 "cycle the prop". To get the warm engine oil into the propeller control, pull the prop control back. The RPM should drop 300 to 500 RPM. It is easier on the system if the drop is not over 500 RPM. This you can control. At the bottom of the drop, go forward on the prop control. Once should be enough in warm weather. Two to three times is recommended in cold weather. If it is very cold (zero), the RPM may show a very sluggish reaction. The oil may not be warm enough in the engine to adequately operate the prop control. Let the engine warm up a few more minutes and try to exercise the prop control, again looking for improvement in the RPM indicator following the prop control lever. If the airplane is an LA4 (180), pull the carb heat control on for ten seconds and off watching for a small power drop. See that power returns to normal when carb heat is returned to off. If you can't see a drop on the RPM, but can hear a light engine change, you are getting carb heat. If you can't see or hear an RPM drop while applying carb heat, get it fixed or if on Lake Faraway, be alert for carb icing while flying home.

By the way, there is an emergency thing that can be done if carb icing gets ahead of you in the air. If the carb heat is inoperative or the ice buildup has gotten ahead of the ability of the carb heat to melt it, here is a last resort. It is only a last resort. This is to be used if losing altitude with nothing you like under you. Switch the mag switches off and on a couple of times. This can cause backfiring. It can blow an ice block out of the carburetor. Of course, it may do some damage and may blow the carb heat door along with the ice. It is a last resort, but one to keep in your hip pocket because that carb heat door wasn't going to be any good to you down in the pine trees anymore, anyway.

If you are flying a 250 - 270T Series airplane and the mixture was leaned for taxi, go mixture rich. (Only taxi lean if the engine doesn't run smoothly in rich.)

The mags on the 250 - 270T are checked at 2200 RPM. The mag drop on the 250 should not exceed 125 RPM and on the 270T the RPM should not exceed 175 RPM drop. If you had a dead mag on the backward facing engine, which mag is which? In your mind, turn the engine around on the airplane with the propeller facing forward. Now the right mag is on the right side of the airplane.

The whole airplane won't be covered here as they may vary between airplanes. There are a couple of salient points, common to all Lakes. When checking the suction pressure, do it at mag check RPM. The vacuum pressure drops when the engine is at idle power.

A good battery may show 0 (no charge or discharge). If you are not sure if the ammeter shows a charge, put a load on the electrical system. Turn on the landing lights and look for a drop on the ammeter. If the lights may cause a misinterpretation to other airplanes near you, turn on the pitot heat instead, although this will not have quite the electrical load. Look for some discharge on the ammeter and then a recovery when the electrical load is turned off.

In setting the trim tab, look out the left side at the trim tab. The green arc on the floor between the pilots can easily be in error if the airplane has just come out of maintenance. The cover can be misaligned when re-secured. If the airplane has not been in the shop and you are used to the gauge settings, set by the gauge. A heavier load in the cabin and a lighter fuel load will cause the trim tab to be more upright. This causes nose up trim. The trim should always be up. It is the degree of up trim for different conditions that keeps the airplane in trim. However, if it is not trimmed correctly, it is no big deal to reach down and re-trim as the airplane breaks ground on takeoff. The flaps are down (20°) for

all takeoffs and landings. The light will be white when down and amber when the flaps are up. There is no other position except up and down.

There is a restrictor in the down line for the flaps. Also, there are restrictors in both the up and down lines for the trim. The purpose of these restrictors is to impede the flow of hydraulic fluid so that the flaps and trim will move slowly and smoothly. In addition, the restrictor for the flaps will prevent sudden flap retraction in the event of a rapid loss of hydraulic pressure. With zero hydraulic pressure, it takes an airload of approximately 90 knots airspeed to retract the flaps and even then the retraction is quite slow and manageable. The landing gear has no need for a restrictor.

If setting the Kollsman setting in the window gives you a field elevation of less than 75 feet from the published field elevation, note the amount of difference. Then set the altimeter to the published elevation knowing that it's reading true elevation at this time. If upon returning or landing at another field and an altimeter setting is necessary, just know that there is so many feet of error as you fly a pattern or touch down. If the difference is more than 75 feet, visit the instrument shop.

In checking the flight controls, due to the fact that they are moved by control rods instead of cables, the chance of cross control rigging is nil. On other airplanes, with both hands on the control wheel and the thumbs pointing up, the highest thumb points to the up aileron. On the Lake just move the controls to ensure the control locks have been removed.

It is imperative that the pilot in the left seat be comfortable. Put the long-legged passenger in the rear behind the right seat. The left seat should be in the proper position to handle the rudder pedals. If he is very polite and slides a little forward to accommodate his left rear passenger, he will lose his ability to use the brakes. (And he generally is the only one that has any.) This can make for a very exciting arrival on a short runway or a long runway with a crosswind. In a crosswind with no brakes available, the airplane can be straightened with a burst of power. However, all runways have an end to them. It's easier to have the pilot in the proper position. Feet just don't bend backwards when up close to the brakes. Better to slide back and mash the guy in back than mash everybody. These suggestions are based on actual incidents. As you know, mistakes are usually the bridge between inexperience and wisdom. You should find a fair amount of wisdom in these suggestions.

Chapter 5: Takeoff from Land

We will go into radio procedure later. Let's get the bird in the air before you lose interest. It is easier to get on a runway heading on the pavement if it is constant movement from the taxiway to a rolling takeoff. If the tower or yourself gives you a position and hold, make sure you stop while the nose wheel is straight. If you don't and you park with the nose wheel turned, you may hear tittering on the headset as you try to start your takeoff roll. When a pilot is new with a trailing nose wheel and the nose wheel is cocked, he will find the airplane has an affinity for the edge of the runway. Power is the answer. Don't be a wimp. Idle will allow the airplane to turn with a cocked nose wheel. You've been cleared for takeoff. Add full power, tap the brake if you need to. But steer with the rudder pedals. (Don't hold a brake and add power, allow the wheels to roll a few inches before brake steering. Your tires and landing gear will last longer.)

First discussion will cover a normal no wind, sea level, land takeoff. The throttle is moved to full power. It is moved evenly and should only take about two to three seconds to reach full throttle. As in any airplane, as soon as the rudder is effective, slide your heels back. This will remove your toes from the brake area to prevent an inadvertent brake application. The airplane won't have much speed as yet, so it would be no big distraction to glance at the manifold gauge and see that it showed twenty-eight inches. If the airport is above sea level, the manifold pressure will show an inch less for each 1000 feet of altitude. Then glance at the RPM gauge. We hope to see 2700 RPM on the 200 Series. If the tach shows over 2700, ease the prop control back to 2700. If it is over or short of 2700, have your mechanic strobe the propeller to see if the instrument is a little off or the prop control needs adjusting. The 250 and the 270T each show 2575 tach on takeoff roll.

On the 200 Series, I have heard of owners that adjust their prop control to 2800 to lift four people off of the water. They use 2700 manually for most takeoffs and allow it to the stop when they are in a bind. Instead of using an over redline RPM, I would suggest ferrying the passengers out of the water to the land, one or two at a time and never exceed red line. Four people taking off from land is a piece of cake.

It's not the engine damage or insurance being invalid for engine failure that worries me. It's that so few people have much training in flying with one propeller blade. The hubs are not certified beyond 2700 RPM.

The manifold pressure gauge at sea level on a normal day will read about twenty-eight inches on the 180-200-EP and 250 as it will with most light planes. The turbo-boosted LA4-200 should be held back to 28.5 inches manually. That is, the turbo lever is in and not used unless the runway is at high altitude. The 270T has a wastegate that

automatically restricts the MAP gauge to thirty-eight inches, so a chance of an over-boost is eliminated. On takeoff, check that the engine is developing the power it should have.

Remember that the figure for KTS on the 270T - 250 equals the MPH figure on the 180 and 200. The exception is the EP. The FAA required aircraft manufacturers to switch from MPH to KTS on the airspeed indicator about the time the EP came along. The figures for the 200 in MPH will have to be converted to KTS on the EP. 115 MPH equals 100 KTS or one MPH is 1.15 bigger than one knot. So, a 60 MPH lift-off in the LA4-200 equals about 52 KTS in the EP.

With the exception of the EP, Lake airplanes lift off between fifty-five and sixty on the airspeed indicator. I don't like to teach numbers when "feel" should be the criteria for actions; however, if there is difficulty in feel to a new student to the Lake, I mention that at about forty, start applying a little back pressure to the yoke so that the weight on the nose wheel becomes lighter. (The engine location with thrust is trying to push it down.) Of course, back pressure increases the wing's angle of attack. The airplane will become unstuck approximately at fifty-five if it's light and/or cool. It will roll until around sixty if it is heavy or it is hot (high density altitude). Do not force the airplane off. It will fly when it has flying speed for the conditions. Just have a little back pressure on the control wheel.

On most retractable-gear light airplanes, the gear is left down as long as there is runway ahead of the airplane that can be used in the event of engine failure. This is not true for the Lake. The sooner the landing gear can be raised, the more margin of safety you will have. The main reason is, Lakes failed the rocket certification test. The 200 Series in particular are slow to climb after takeoff and leaving the gear down does smart. Altitude is your best friend after takeoff. It allows maneuvering and thinking time if things go wrong shortly after takeoff. Don't be in such a hurry to get the gear up that you cause a problem, but as soon as you are comfortable, raise the gear, get some air under you, and raise your safety margin.

If the question comes up, why don't other airplanes use this procedure, this is the reason. Their engines and propellers are in front and they will have major problems if they land gear up. Lakes are strong enough in the hull to sustain about four gear-up landings on concrete without major damage. (Trade airplanes after your third exhibition.) If high enough and there is runway in front of you, with an engine failure drop the gear. If there is less than enough time to drop the gear, but you have a small amount of time, move over and land in the grass beside the runway. Only do this if you know it's a level grass area free of rocks. If you're not sure, put it on the pavement.

Now after all this scare talk, I've been flying since the early 1940's and have never had a complete engine failure in a single engine airplane. The odds of engine failure on takeoff are low, but it is possible. Most light airplane engine failures are due to fuel starvation. This is something you should have a fair amount of control over.

As you climb out after takeoff, let the airspeed gradually increase. When the altitude is five hundred feet above the surface, check that the hydraulic pressure is up and that the airspeed is eighty or above. Then raise the flaps. If they are raised at a low airspeed, you may lose altitude. If you take your stupid pills someday and raise the flaps at seventy or less and your altitude starts to sag, drop the nose. You must get a flaps-up airspeed or re-drop the flaps. If you've screwed up on low airspeed retraction, don't compound it by trying to keep the nose up to keep flying.

Try the flaps up prematurely at altitude when you're hot and heavy. It can be an eye opener.

Turning off the fuel pump is easy to forget. This might help. Flaps start with an "F" and fuel pump starts with an "F". Do them together. Always monitor for normalized pressure (14 - 35 PSI) when switching off the electric fuel boost pump. Also, if the engine quits

at that time (inoperative engine driven fuel pump), turn the electric driven fuel pump back on. Electric fuel pumps are expensive and often only last one hundred hours of flying time. At \$350 for an exchange pump, that's \$3.50 per hour for pump usage. They don't last one hundred hours if left on for the flight. So using the "F" for a crutch when you pick the flaps up, turn off the fuel pump. In the traffic pattern when coming into land, put down the flaps then the fuel pump. So, now you know about the "F" word.

Let's now look at a takeoff at high altitude or a high density altitude as the problem is the same in either condition. If the runway altitude is above three thousand feet or it is a hot day at a lower altitude, give some consideration to leaning the mixture for takeoff. Before takeoff, before or after the mag check go to full power. If the engine feels rough, try leaning the mixture while watching the exhaust gas temperature gauge. Allow it to rise to peak and then richen the mixture. Reduce EGT 100 to 125 or rich of peak. Then tighten the mixture control lock, so it won't slip. This should give best power for the takeoff. The lock should always be tightened to prevent accidental mixture control slippage, except when water taxiing and after idle cut off on engine shutdown. On the water, things can happen fast in close quarters and shutting down the engine quickly may be necessary.

This procedure of full power is not practical on the water so take a stab at leaning the mixture. In this case, don't secure the mixture control. When the takeoff is started on the water and if full throttle is applied, listen to your engine. If it does not sound smooth, move the mixture control fore or aft slowly. Find the smooth setting and snug the mixture control twist knob.

On the land, once the mixture control has been properly set, make a normal takeoff. However, with takeoffs at altitude, all non-turbo airplanes become ground lovers. The takeoff roll is extended and the climb rate is poor. If the density altitude is high and the runway is short or there are obstructions on climb out, wait until it is cooler or you have a good head wind. The wait for better conditions can't be near as long as waiting to have your airplane rebuilt.

Time for a muddy field takeoff. Find the firmest spot you can for the engine run up. Then take it out rolling. This holds true for a few inches of snow also. If you allow the airplane to stop where it is a little goey, you may have to shovel. That's why you carry the paddle in the winter. Pull the control wheel fairly well back before adding takeoff power. This helps counteract the engine pitch-down forces on the nose wheel. Don't use your Lake for a plow. If this mud is in the spring or cool weather, don't climb to freezing altitude. If you do, you might consider leaving the gear down so it won't freeze in the up position. Even then, you may have frozen mud giving you automatic braking on touch down. (It's worse when only one brake freezes.) The muddy field takeoff is OK to do, just keep in mind other possible ramifications and make your decisions accordingly. Land in a lake and then put the gear down in the water. This beats washing a muddy airplane.

Let us explore crosswind takeoffs on land. Crosswind capabilities and takeoff distances were not required when the 200 Series airplane was certified. The 250 - 270T Series have a proven crosswind capability of fifteen knots. However, the Lake manual conservatively recommends nine knots. You are not in violation of FAR's if you exceed the proven crosswind capabilities, but you are now in the test pilot mode. If you have an accident because of this strong crosswind, do not be surprised if your insurance company does not return your phone calls.

Let us assume a 15 MPH crosswind. This I would consider safe and easily controllable.

Start all crosswind takeoffs with full aileron control into the wind. Add takeoff power. Good control of your airplane calls for the nose wheel staying on the center line. How do you know it's on the center line? From the left seat if your right foot is over a taxi or runway center line, that's close enough for government work. That system even works for

large airplanes.

As the airplane increases speed and control surfaces come alive (the control wheel will feel the air pressure on the ailerons), ease off some of the aileron input. So that the airplane does not turn into the wing that will soon be lower, start adding opposite rudder. A crosswind takeoff is a cross control maneuver. At around forty start easing in back pressure. The nose wheel will come off the ground around fifty, the downwind main wheel will come up next and the upwind wheel will come off last at fifty-five to sixty. When in the air, allow the cross control forces to ease off and establish a crab to proceed down the runway center line. Crab after airborne and remove the wing-low cross control.

It is done exactly in reverse sequence to a crosswind landing. We will cover landings after we do a little flying.

Chapter 6: Air Work and Leaning

We're not going to go into air work in any depth. The reason is that most maneuvers are basically the same for most light airplanes. If you need a good description of requirements for proficiency flying, you can get generic explanations of maneuvers from FAA books or flight schools that put out videos or booklets. This book, I remind you, is written for people who are already pilots and have done many flight test maneuvers. Basically, this chapter will cover the actions of a Lake that differ from airplanes in the Piper, Cessna, etc. class.

Due to the low nose on the Lake, the pilot will find a considerable difference in appearance of the nose to the horizon in steep turns. The attitude of the nose is higher in a left turn and lower in a right turn as seen from the left seat. The steep turns should be easily handled with a 45° bank and a 360° turn for private pilots and 720° turns for commercial pilots. Of course, the common error in this maneuver is altitude control. Be aware of your VSI indication. It will tell you well in advance if your altimeter is going to climb or lose altitude. If the VSI shows a climb, ease off the back pressure a little before the altimeter has a chance to move. If the VSI begins to show a downward indication, either add a little back pressure or take out a couple of degrees of bank before the altimeter shows a change. Rolling out on a heading should be smooth, beginning 15° prior to the heading. A 5° lead on a rollout to a heading for each 15° of bank is normal. (A 30° bank would require a 10° lead on rollout of desired heading.) These points are not any different than with other airplanes, but in training, I've noticed these are problem areas, particularly on the Lake. Holding the ball in the center is tougher on the Lake and some rudder pressure may be necessary all through the steep turn. Generally, a small increase of power is needed in steep turns.

Slow flight on most light airplanes has no practical application. It only develops a better sense of control and feel for the airplane as the pilot hones his skills. In other airplanes the question is, can you or can't you do this required maneuver? However, on seaplanes there is a very important reason for slow flight proficiency. You must have a fine sense as to controlling the altitude with throttle and airspeed with attitude. To a small degree these controlling factors may be blended. For instance, if in slow flight the airspeed was a little high but the airplane was slowly losing altitude, a slight nose up might correct both the airspeed and altitude. If at this point the airspeed was on target, but the altitude again began to sag, you will have to add a little power to control the altitude. The reason this maneuver is so important to seaplane pilots is that the slow airspeed and slow descent on a glassy water approach require these control inputs to make a safe glassy water landing when required.

Stalls, again, we're not going to dissect the maneuver. We'll hit a couple of points to keep in mind when doing stalls in a Lake. The FAA no longer requires the twenty-four types of stalls required in the 1940's. They used to have four basic stalls, the approach to a stall, normal stall, complete stall, and accelerated stall. These four were done with the variation of both power off and power on. They were done straight ahead and in turns in either direction. The FAA realized that these maneuvers were extreme and that the main object should be to recognize the approach to a stall and make an immediate recovery.

The approach to a stall is the surviving (CAA) FAA maneuver. There were no stall warning devices on 1940's airplanes. Nowadays, when doing this maneuver, don't recover on the sound of the horn but when feeling the burble (nibble if you will) as the airplane edges close to the stall. The airplane is recovered by dropping the nose, adding full power and regaining safe flying speed. This maneuver is to be done with a minimum loss of altitude, assuming it could happen only a little above the tree tops.

You are doing this approach to a stall, so let's look at Lake's peculiarities. First, with the above center line thrust engine, adding power, particularly at slow speed, drops the nose rapidly. So don't overdo the forward elevator control movement. Next, the Lake is a dirty airplane (with a boat underneath, the high engine and sponsons, not aerodynamically clean). With the gear and flaps extended, it is a very dirty airplane. This dirty characteristic requires a little more energy (added power and altitude loss) for recovery than a cleaner airplane. Be sure that the elevator feels solid and the airspeed is increasing with good health before pulling the nose up. If you do raise the nose prematurely, you will find the Lake shaking in a secondary stall. In real life, down low, excessively rapid back pressure could cause you to hit a bird. The problem is the bird could be in its nest.

So, it's a fine line as to when to raise the nose (and it takes practice). Don't attempt to recover too rapidly and hit an altitude-losing secondary stall. On the other hand, do recover with a minimum loss of altitude because if it happens to you, you may be at a low altitude as things get exciting.

Chandelles, lazy eight's and pylon eight's are described in other publications that will tell you what is required. The Lake can be mastered, but is still one of the most demanding airplanes you'll probably ever fly. Advanced maneuvers (commercial requirements) are demanding in a Lake. They can be performed in a Lake but may take a little longer to master in a Lake than in an airplane that was built to be a trainer.

For practice on the stall recovery on the 270T, we only push the throttle up part way as it is easier on the engine. In a genuine stall recovery, don't spare the horses. Use full power for recovery if you get tangled up with the real thing.

As long as I have sidestepped discussing air maneuvers in a Lake that are common to most light airplanes, we'll throw you one bone in this chapter and discuss engine leaning.

As you know, to run the engine, we must have oxygen mixed with our fuel for it to burn. Different requirements call for different ratios between gas and air. As we climb, the air becomes thinner (the molecules are spread out). There are fewer molecules in a given volume. The weight of the molecules acts like a long spring that has the coils closer together at the bottom of the spring. The air is 20% oxygen. This oxygen is required for us to burn energy and is necessary to support combustion in a gasoline engine. If we climb to high altitude, we need to receive supplemental oxygen to run our bodies. We can get this in one of two ways. We can use an oxygen bottle and mask to supply us or we can pump air into a relatively tight cabin (pressurization) and have more air molecules to draw upon. The engine also can have more air pumped into it. This is done with a supercharger or a turbocharger. It is a confined wheel with fins (something like a water wheel). It runs off of engine gearing or exhaust pressure and pumps outside air into the engine. This compresses the intake air so there is a real pile of molecules including the 20% oxygen that can be mixed with fuel. This will only work while climbing for so long, into thinning

air. The 270T is certified to fly at 20,000 feet. It will go higher, but it still has a strong engine at this altitude. This power will fade at higher altitudes as the turbocharger is limited in the amount of air it can compress.

On engines that are not running, just sitting on the ramp, the manifold pressure gauge reads atmospheric pressure. Standard at sea level is 29.92 inches. This is the amount of mercury that can be supported in a glass tube with an end of the tube sitting in a dish of mercury with the molecules pressing down on the dish. Original physics tests were done in inches of mercury and those readings have stayed with us. We now use pressure instruments that show us the air pressure in the engine manifold. When the engine is started there is about an inch drop or a little more at sea level shown on the manifold pressure gauge. On takeoff, on a normally aspirated engine (non-turbocharged), twenty-eight to twenty-nine inches will show for power at sea level. This will reduce about one inch of pressure for each thousand feet of altitude at the airport. If the takeoff is made at 4000 or 5000 feet above sea level, the mixture control will have to be pulled back to a leaner position so there won't be too much fuel for the amount of air to burn it. If there is too much fuel, it can't all burn and won't burn as hot as it should, as the excess fuel will cool the whole burn process. This will show in black exhaust smoke of incomplete burning and the engine may falter and not have enough power for takeoff. Now, the turbo engine is fine and won't need to be leaned at high throttle settings. Extra air is pumped in to give a complete fuel burn. The 270T should show thirty-eight inches on the manifold pressure gauge for takeoff at sea level. However, on a lot of 270T's at near idle while taxiing, the mixture may have to be leaned without the extra air being pumped in due to low throttle setting. Sometimes if the engine is taxied with the fuel pump on, a rough idling engine will smooth out.

When a Lake with a normally aspirated engine climbs out from a low altitude airport, it will have mixture rich. If the first power reduction is made at 1000 feet, the manifold pressure has dropped from say twenty-eight inches on takeoff to twenty-seven inches. We won't make the first power reduction until 1 000 feet, because while engine failures are rare, many that do occur happen on the first power reduction. This 1000 feet gives you a fair amount of altitude for safety. Remember, Lycoming says you won't hurt the engine running it full bore all day. As a personal preference and knowing that heat is the biggest enemy of an engine, I prefer to make a reduction at 1000 feet to climb power.

Lake climb power on all but the 270T is twenty-five squared. That means pull the throttle back to twenty-five inches and pull the prop control back to 2500 RPM. When another 1000 feet of altitude is reached, the manifold pressure gauge will have dropped to twenty-four inches. Add throttle and regain twenty-five inches. This can be done until around 6000 feet. By then the throttle will be all the way forward and there ain't no more. As the climb continues at full throttle, the manifold pressure will continue to drop until at 10,000 feet there will be about twenty-one or twenty-two inches on the MAP gauge.

At about 4000 feet, the mixture control can be pulled back a little. If you have an EGT (exhaust gas temperature) gauge, watch it climb as you slowly lean the engine. When it reaches a peak and starts back down, don't lean anymore until you have climbed another 1000 feet to 2000 feet. Then lean it again with the same procedure. When leaned in flight, check the mags. If rough on one mag, the mixture is too lean.

All leaning should be done with one earphone off of one ear. If the engine loses power or runs rough, richen the mixture until it sounds smooth and strong. Your ears can be a better monitor of engine performance than instruments sometimes.

If the engine instruments are on the right side panel, the pilot in the left seat will have to lean his head way over to the right to get the correct settings. The parallax is great if the eyes aren't fairly direct behind the instruments. The engine instruments on the 180 and 200 are on the right panel. The 250 and 270T have the engine instruments in a

cluster in the lower left panel. This eliminates the parallax problem.

At cruise altitude, pick the RPM you want and the manifold pressure you can get or that sounds smooth. On the 250, there are different combinations of RPM to MAP to get the same percentage of max power. For instance, to get 75% power, you can use 2200 RPM and 26.0 MAP or 2300 RPM and 25.0 MAP or 2400 RPM and 24.0 MAP. The lower the RPM, the quieter the engine. However, different engines with their own personalities need a different combination to get a smoother operation. So if one set doesn't work, try another. When set up with the RPM and MAP you are happy with, richen the mixture control a little, watch the EGT drop some and then lean (remember one ear exposed) until the EGT gives you max and then drops 25°. If not marked in degrees, drop one mark. If the temperature has not started to drop by the time the needle has reached the star or red line, lean no more. Some knowledgeable pilots have become a little gun-shy of leaning beyond peak. They are afraid the engine is too little cooled by too little fuel. They only lean to peak. Fuel burn will only be slightly higher. Again, you get your choice. If there is no EGT or you suspect it is inaccurate, lean by ear. Lean until the engine noise changes and then richen the mixture only until it sounds normal. Always lean with at least one ear-phone off of your ear.

On the 200 Series, there is not much choice on power settings. We can't operate continuously between 2000 - 2350 RPM. So cruise is twenty-four squared or 2400 RPM and whatever you can get on the MAP above 6000 feet. Leaning is done in the same manner as discussed on the 250.

The EP has a balanced crankshaft and can be run at any RPM. So if twenty-four squared is rough sounding, try some other settings, increasing a little MAP as you reduce the RPM or vice versa. The actual leaning is the same. There is one little restriction on the EP's balanced engine. Twenty-four inches is the maximum MAP at 2450 RPM.

The 270T is a little different breed of cat (but has a terrific pedigree). Above 10,000 feet, the engine may require the electric fuel boost pump to keep the fuel pressure in the green. At 14,000 to 15,000 feet, the MAP will have eased down to a sea level pressure of twenty-eight to twenty-nine inches. The airplane will still be climbing at 1000 feet a minute at full gross. If the MAP is still up at twenty-nine inches at 17,000 feet in the climb, it should be reduced per the chart in the manual.

Remember above 12,000 feet in daytime and 10,000 feet at night, everyone in the airplane should be on oxygen to prevent mistakes and permanent brain damage.

Oxygen is needed above 10,000 feet at night so as to prevent some temporary loss of vision.

Power settings at cruise can vary from max twenty-nine inches and 2400 RPM to recommended cruise of twenty-eight inches and 2400 RPM or recommended cruise twenty-seven inches and 2200 RPM. Again, some variation can be introduced to find the smoothest or quietest power. However, the 270T is by far the quietest of the airplanes both in the cabin or listening from the ground.

On the 270T, if speed is needed (Customs is closing), try thirty-two inches and 2200 RPM. This will give you 125 KTS and 16 GPH. Twenty-eight inches and 2300 RPM will cruise at 118 KTS and burn 13 GPH. If you're sightseeing with friends, loaf along at twenty-six inches and 2200 RPM; this will cruise at 110 KTS and burn 10.5 - 11 GPH.

In the old days, flying with a MAP reading higher than the RPM was a no-no. For instance, you couldn't use twenty-four over twenty-two. That would be twenty-four inches MAP and only 2200 RPM. However, that was true for big old round wartime engines to ensure longevity. This does not apply to present day opposed engines. If that were true, we could never operate with our turbocharged engine; however, there are some limitations on the 250. Do not exceed twenty-seven inches MAP below 2300 RPM or twenty-five inches MAP below 2000 RPM.

About the only concession we now make to this old restriction is to reduce throttle before the prop control and on an increase of power, we add RPM (prop control) before we add MAP (throttle) on power increases.

Wartime power (or emergency power) in the radial engines did allow for high manifold pressures over RPM readings. It was limited to five minute duration. This was either to escape or shoot the other guy down. Much longer than that could give a pilot a glider rating.

Now that you have a choice of power settings, let's lean the rascal. In leaning in the best economy power setting, lean to peak the turbine inlet temperature (TIT) or 1650 degrees Fahrenheit, whichever comes first on the 270T.

For maximum power cruise, determine peak TIT without exceeding 1650 degrees by leaning. Then richen the mixture to bring the TIT 125 degrees below peak TIT temperatures.

The minimum recommended power setting is twenty inches MAP and 2200 RPM. Lean as you would for best economy. Avoid prolonged idle setting with low cylinder head temperatures. That is, keep away from prolonged power off descents.

If you wish to climb when at cruise on a turbo engine with the mixture leaned, richen the mixture first, then climb with a rich mixture. The turbo makes the engine think and run like it is at sea level. Give it enough mixture so it won't run hot.

The 270T has the engine most vulnerable to rapid engine temperature changes. This is the reason for doing stall recovery training without using full throttle. Reducing power can be done in one inch MAP changes with twenty to thirty seconds between reductions. Your engine can be babied this way if you choose.

In general, when leaned out in cruise at 75% power, the 200 Series will burn ten gallons an hour. The 250 will burn fourteen per hour. After you are familiar with your leaning procedure, you can lean using the fuel flow meter. The 270T will burn about fifteen gallons per hour.

If the 200 is not leaned, it will burn fourteen GPH. If used in training at full rich (part of the time in descent and on the water), the fuel burn will be ten GPH.

The 250 and 270T will also burn fourteen and fifteen GPH (respectively) at full rich in training due to frequent power reductions.

It's time to head back to the airport for a landing and coffee.

Chapter 7: Land Landings

When an airplane descends, try to prevent shock cooling. This especially happens when the engine is running at full power and suddenly the power is reduced. The various parts of the engine cool at different rates and the cooler parts contract more than the warmer parts. This stresses the metal and forms microscopic cracks that can grow with time into metal fatigue and failure. This temperature change can be minimized by partially reducing power for descent instead of reducing power from full throttle to idle. Another way of protecting the engine against shock cooling is to reduce the power in increments. For a long descent, bring the manifold pressure back a couple of inches and let the temperature stabilize about thirty seconds and reduce the MAP another couple of inches for another half minute. This can be done until the power is fairly well back. On the LA4-200, this may put the RPM in the yellow arc (2350 - 2000 range). If the power reduction of the throttle reduces the RPM to this area, further reduce the throttle until the RPM drops below 2000 RPM. Don't prolong operating in this range (the yellow arc). The only time to operate in the yellow arc is when on final and a given power setting is needed to land when and where you want the airplane to be. Don't baby the engine and bend the airplane. The EP, 250 and 270T are not affected by a yellow arc caution area.

On the 180 model, remember that carb heat should be used on final or anytime the power is close to idle, as in a descent.

The 270T is the most susceptible to shock cooling and because of this, reducing the power to idle should be avoided until touchdown. When descending in the 270T, do not go full rich right away. This will cause shock cooling. Instead, reduce the throttle a little at a time and gradually enrich the mixture in descent. In fact, the temperature control is so important that there is a three minute cool down at idle required before engine shutdown on the 270T. Part of this three minute cool down time may be used in low power taxiing. The other criteria that could eliminate part of the three minutes of idle could be that the engine is cool enough to shut down if the cylinder head temperature is below 300. The problem is, the shaft in the turbo between the exhaust driven wheel and the pump (compressor) wheel must have moving oil to carry off the heat of the shaft. Otherwise, non-moving oil will coke (bake) on the shaft, leading to eventual damage of the turbo.

Protecting the engine from shock cooling is just as important as making sure the engine is warm before take-off, which requires some idle time in cold weather. Two minutes is advised for warm weather and a four minute running time before power is applied in cold weather for the mag check.

When descending into the pattern, if the air is smooth, the pilot can allow the airspeed to build up to a little below red line. This can be done from some distance away

from the airport so that a slow descent will arrive at traffic altitude as the pilot reaches the field. This small period of speed will in a small way make you feel better for the speed you lost in climb out. It helps you brag about your airplane, when you mention that part of your trip was at 140.

If it is fairly choppy, you must keep your airspeed out of the yellow arc on the airspeed indicator.

The white arc on the airspeed indicator shows us the speed at which we can operate our gear and flaps. They can not be extended or flown in excess of 107 KTS or 125 MPH. To do so will stress the airplane and is in non-compliance with the FAR's.

When the airplane is slowed down, like when practicing stalls, it often sounds like someone is beating on the fuselage near the engine with a rolled newspaper. This most likely happens to airplanes with bat wings and no Q-tip props. There are a couple of theories about this noise. Right or wrong, the one I subscribe to is that at slow speed and with no Q-tip to contain it, the air slides off of the propeller tips. This air slaps the bat wings. When faster, the airplane outruns this slung of air. You've been given choices in this book. Try another theory if you don't like that one.

In addition to reducing landing speeds, bat wings (mud flaps?) reduce drag. Without bat wings air comes up from under the wing and into the prop at sixty-five and almost acts like a speed brake. It disrupts the normal air flow to the propeller.

There are a couple of procedures that are peculiar to the Lake. Remember, on takeoff we got the gear up earlier than we would on other airplanes. Regardless of the procedures of other airplanes, the Lake should have the gear put down before the flaps are extended. The reason is, if the airplane loses all its hydraulic fluid while the activation is happening, we'd rather have the gear down at the airport. It's better to make a no-flap landing than a partial or no-gear landing. Most light airplanes have electric or manual flaps. Bigger airplanes that have hydraulic flaps and landing gear have more redundancy than a Lake. So, the preference is gear down first.

But you know it's going to be a bad day if you put the gear handle down and the gear goes half way and stops. I teach, and do, a procedure that helps us old forgetful fellows stay out of trouble. Instead of just glancing (which is easily forgotten), touch the airspeed indicator (after takeoff to ensure eighty or better for flaps up and on gear down to ensure you are in the white arc). Then touch the hydraulic pressure gauge. If there is no pressure, you may want to think things over. We will cover hydraulic failures later, but at this point, no hydraulic pressure, don't put the gear down. You may want to head for the lake. With a dangling gear, there is no way of landing anywhere without spending big bucks. If you get into that position, put it on the airport. It can flip on the water, but at least you can get ground support on an airport.

Don't be bashful. Ask for fire engines and an ambulance if you get in a crack. I'd rather have ground support and not use it than not have it and wish I had asked for it. Besides, those guys just love running their sirens. You could make their day. Of course, if you picked up the habit of touching the airspeed indicator and hydraulic gauge to ensure proper speed and pressure, they wouldn't have to interrupt their card game.

After the gear green light comes on and most of the hydraulic pressure has been recovered (900 or better), extend the flaps. It wouldn't hurt to again touch the hydraulic pressure gauge again to be sure the pressure was well on the way to recovery. The white light (should be the lower light) will come on when the flaps are down. You can't miss that the flaps have moved. Every time they are moved the airplane has to be retrimmed. Remember, flaps start with an F and so does fuel pump. Ease the propeller to high RPM and bring the mixture to rich. The reason the flaps are added while on downwind is safety. The airplane is being slowed to about 80 in the pattern.

The turns to base and final are coming up next. Banks in the Lake should not be

made below 80 without flaps. The stall speed is increased in a bank. If the airplane is accidentally slowed below 80 and is banked, the chance of a stall is considerably increased. Put safety on your side. Extend the flaps on downwind instead of base or final. A stabilized pattern is easier to fly. A good approach improves the chances of a good landing. (The second most fun there is!)

There can be no warning horn for the landing gear as landings are made sometimes with the gear down and sometimes not. So the proper way of checking the gear position is to look in the mirror and see the actual gear position. Actually, the two main gear can each be seen with a little neck stretching, but the nose gear must be seen in the mirror. Now, with an instructor or the FAA or your trusting passengers and yes, even alone, after checking, say out loud, "This is a land landing, the gear is down." If you prefer to count 1-2-3 gear down for a landing, so be it. But be consistent and do it every time.

I worry about the student (or licensed pilot) that is too lazy or intelligent to verbalize the type of landing surface and the gear position.

While there can be no warning horn, there is a very good warning system that can be added. On a partial power reduction a voice will tell the pilot the gear position and whether the landing should be on water or land. This message repeats until an acknowledgment light is touched.

It is an impressive system and costs \$1600. Contact Lake & Air 612-496-3870 for further information.

At this time either run a checklist or do a flow pattern. While I am normally checklist oriented, I would probably do a flow pattern. The reason for this is at lower altitudes doing water work there is less time to run a checklist and a checklist keeps your head in the cockpit instead of keeping you aware of your surroundings. So a flow pattern is a checklist that is memorized, but follows a system that matches a checklist. The flow goes across the panel, drops to the pedestal, then the floor and arcs overhead and covers eight items in all.

This flow pattern is done after everything is in place to be sure nothing has been missed. The only difference is the position of the gear handle, depending on whether it is a land landing or a water landing.

I recommend touching (or brushing with the hand) eight items as listed in the next paragraph. If you are learning, your instructor knows you are covering the whole flow pattern. If the FAA is riding with you and is knowledgeable about the Lake, he will understand the lack of reading a checklist. If no one is looking over your shoulder, the habit will tend to keep you out of trouble instead of missing something. Fly as though big brother is watching you all the time. You can get into enough trouble in life without setting yourself up.

The flow pattern goes like this in all models of Lake Aircraft: Starting at the left lower panel, first item is four switches on. These four switches are the master switch (battery), alternator (or generator), fuel pump and hydraulic pump. Moving to the right, check the gear handle in its proper fully locked position (and light either red or green), then the flap handle for proper position. Sweep the hand to the water rudder (should be up for all takeoffs and landings) and trim tab. Actually, even though you are checking its position in theory, relax pressure on the control wheel and see that the airplane is flying in trim. The manual recommends with one soul on board for landing, trim slightly nose heavy during the approach phase. This makes the flare feel conventional due to a slightly aft center of gravity when operating solo. However, I personally believe in being in trim at all times including approach. So again, you get your choice. Sweep the hand up to the throttle. Again, as you do that, what you really are doing is glancing at the power setting and being satisfied that the throttle setting is what you want for the pattern. This is determined by glancing at the altitude, manifold pressure and airspeed. Your hand will then flow back

and check that the locked mixture control is full rich (unless landing at a high altitude airport). Next, push on the prop control and make sure it is forward. You are now set up to land or if needed, go to takeoff power, if a "go-around" is necessary.

The verbal procedure as these items are touched will go like this or however you wish to tailor it: four switches on, gear handle down, green (or up and red), flap handle down, water rudder up, trim set, throttle set, prop forward and mixture rich.

The flow pattern is completed but because we are fallible humans, back to the mirror. For safety's sake, this and the necessary lack of a warning horn, the gear position must be checked twice. So for the second time, we look in the mirror and check the gear position. The belly shows particularly well on the left turn downwind to base. So try it there every time to form a habit. Again, we say in this case, "This is a land landing, my gear is down."

If the flow pattern is interrupted, start over. This should be done if reading a checklist and also done if interrupted doing a verbal flow pattern.

If your airplane only has a mirror on the left sponson, remember that the two main gears probably line up and only the left one shows. Stretch your neck and look out the right side where you can see at least the upper half of your right landing gear strut.

The green light doesn't always work. There are now improved switches for the airplane that don't smash as easily with the fast acting nose gear. On occasion, the mirror may show the gear down, but there may be no green light to show locked. I have landed this way many times, but I've never been happy about it.

Now knowing that the green light may not be lit showing a locked gear down, we will go ahead and land (with our fingers crossed). Bear in mind the mirror may show the nose gear down and we can see the left main in the mirror and assume it is hiding the right gear reflection. Wrong! Stretch and look out the window if there is no mirror on the right sponson. I have had the right gear stay up with the other two gear down and locked. So it can happen. The hydraulic pump switch is a circuit breaker. It popped off when the gear started down and the residual pressure only operated two gear in this case. I prefer two mirrors, but more on that later.

Some instructors use 80 for all approaches. I prefer 70 when it is cool and the air smooth and the airplane is light. If the conditions are a heavy airplane and it is hot or a little turbulent, I prefer 80 on approach.

So, use your judgment or preference. There are some other instructors that use the numbers as I do. If a student of mine tells me he prefers 80 for all approaches, I say, "Have at it."

Now, why use 70 for ideal approaches? It is a little easier to land on a given spot with ten KTS or miles per hour less to bleed off. 70 uses less runway, which could be more critical in no wind. It could make the difference of clearing the runway at an intersection for the benefit of the airplane behind him. If a pilot can fly right on 80, he should be able to fly right on 70. He is still a long way from stall speed in good conditions.

Why use 80 in less than ideal conditions? It gives a larger margin for error. The stall speed will be higher when the airplane is heavier in warmer air (higher density altitude) and will have less stability. Gusty air can suddenly have little or no velocity between gusts and the extra 10 can make a difference on an airspeed drop and not allow a stall. Also there are sink areas between gusts and the extra energy (speed) allows the nose to be pulled up to prevent a rapid sink over the condition of there being no airspeed to spare.

I believe most instructors that use 80 for all conditions recognize that a student in a Lake is pretty green in it. So they make sure there is a margin always built in. Again, that's what makes horse racing. Take your druthers.

Well, after all that, let's talk about a normal wind down the runway landing. All Lakes have so much drag that the only way to consistently land them lightly is to carry power

until touchdown. Leave the power on until the nose wheel touches. Carrying twelve to fifteen inches of power will give the airplane a normal, controlled rate of descent. This power setting can vary depending upon your rate of descent and where you want the airplane to touch down.

A common mistake is to carry the power until within one foot of the runway and then take the power off as you might in a Cessna. In a Lake, unless there is an excess of speed, this generally results in a fair (not a greaser) landing. The pilot then smiles and looks at the person in the right seat and mentions that all Lakes are stiff legged. It's possible had the pilot resisted the impulse to pull power off another few seconds (until all three gear are on the runway), he might have been able to say, "Piece of cake".

In the old days there was a saying, "You can't use the runway that's behind you." Another good old saying was "Land on the numbers." Times have changed. Many more airplanes have landed short of runways than have run out the end.

Yes, it's true both still happen, but the ones that run out the end are a damn sight slower than the others. The friendlies came up with an idea that is working quite well. There is now less tin at the approach end of a runway. Allowing for error, the touchdown spot is no longer the runway numbers, but parallel heavy white lines on the runway. This allows some extra runway for the airplane that lands short of the touchdown zone. If the runway has VASI lights, they will lead the pilot to this touchdown spot of white marks. ILS landings are also aimed at these white marks. If making an approach at 70, aim about 50 feet short of the white marks. When the nose comes up and speed dissipates the Lake will float right to the touchdown spot. If using 80 on approach, aim about 100 feet short of where you want to touch down. Twelve to fifteen inches of manifold pressure depending on airplane weight and outside temperature will give a rate of descent of 500 feet per minute.

Normally on downwind, reduce the power setting to twelve to fifteen MAP opposite the intended touchdown point, then start the descent.

Lakes often experience nose wheel shimmy. This is particularly true in a crosswind, so keep the nose wheel off the runway a little longer than you might in another light plane. If it does shimmy, raise the nose wheel or at least reduce the weight on it until the speed drops off a little. All airplanes should be landed on the center line. This gives you room for error on either side of the runway in case of problems such as a blown tire, jet wash or a sudden gust, etc.

The only times you might be inclined to land on the side of a runway (mind the sponsors) could be a crosswind on ice or a known brake problem or even heavy rain (hydroplaning) in a crosswind. If it were a huge wide runway (military field?) and you had to get a controllable crosswind, you might angle into the wind.

A general statement though, is land on the center line. Once all three gear are on the runway, slide your heels forward so that your toes can use the brakes when you need them. When you are in the pattern or on final, look at the taxiway layout and plan your route for after landing. Plan your touchdown and braking to be down to taxi speed at the turnoff point, but not before. Be nice, don't make the guy behind you go around. If it is a long runway, there is nothing wrong with landing long to convenience the airplane following you. The other way is to land and keep your speed faster than normal taxi speed on the runway until time for slow down and turn off.

If you are low time and any of these suggestions make you uncomfortable, don't do them. First comes your lack of anxiety. Finesse can always come as you gain confidence and experience. Next, let us look at a short field landing over a high obstacle (trees, wires, billboards, etc.). We know we can get out again, as we can taxi back to the trees and use all of the field. We know this because we looked the site over from the air first, but getting in a short field may raise our respiration rate.

Approach can be made at a slow airspeed (65 - 70). Just clear the obstacle, drop the nose for a little increase in speed for roundout energy. Then pull the nose up, reduce the power if it will help get the nose up, but don't take much off as you are hanging on the prop. On touchdown, cut the power and pump the brakes. Don't lock them.

Either practice this with an instructor or shy away from the maneuver until you try a few over an imaginary obstacle where you have room for error. Improperly done, it can shorten your frame to five foot. OK. So that's one you don't want to try. Short field take-offs require takeoff power before the brakes are released or taxiing on the runway rolling faster than normal from the taxiway.

Let's look at crosswind landings on land. These are a must. Short fields are not. Crosswind landings are done on land as they are with any other airplane. This goes for large transports or light airplanes. But here is a quick review. I mentioned before it is done in the reverse order of a crosswind takeoff.

On final approach in a crosswind, establish a crab so that the path of the airplane over the ground proceeds down an imaginary extended runway center line. As we near the runway, the approach is turned into a cross control slip. The wing down prevents the airplane from drifting with the wind and the rudder aligns the fuselage with the runway so we won't peel the tires off sideways on touch-down. To get into a little more detail, let us assume a right crosswind. On turning from base to final, roll out level with the nose aimed to the right of the runway. The amount of offset nose will depend on the degree of crosswind (strength of wind and angle). Proceed toward the runway with the amount of crab that will keep the airplane over the imagined extended runway center line.

Proceed toward the runway until about thirty to fifty feet above the runway. At this point, gently push in the left rudder to bring the airframe straight down the center line. At the same time, gently drop the right wing enough to prevent any drift with the wind. The path through the air should still be down the center line. Use 80 on this approach, as the stalling speed is a little higher with a wing down than with wings level. If it is gusty, use 80 or a couple more.

Start a roundout at fifteen to twenty feet above the runway. Bringing the nose up will begin to kill off the airspeed.

Although the wing is down, you will not strike the sponson landing on land with the gear down. Continue to descend gently until the right wheel touches. Then the left wheel will touch. While there is still some speed on the airplane, say 50, allow the nose to touch. If you are going too slow, the airplane may want to weathercock. If there is a lot of rudder applied to prevent the weathercocking as the nose wheel touches, there will be a shimmy. Pull the nose wheel just off the runway if it shimmies. Momentarily center the rudders and let the nose wheel down again. Don't brake during a shimmy. It's harder on the airplane. See, like I said, "Piece of cake."

How much crosswind can or may you use? Lakes have proven fifteen KTS as an accepted crosswind component. The Lake training manual conservatively recommends nine KTS. So the more on the nose the crosswind, the stronger the wind can be for a given crosswind component. If the wind is given to you at 330 at 25 KTS and you are landing on runway 36, are you legal? The answer is yes, because there is no limit. The next question is, am I within the 15 KTS crosswind component proven on the Lake? This is the one the insurance could look at and the FAA might wonder if you were moving into the test pilot status. Here is a formula that can be done in your head:

Remember this formula \$5.79.

.5 = 30° crosswind

.7 = 45° crosswind

.9 = 60° crosswind

Take the degrees of crosswind, use the corresponding number times the wind veloc-

ity. If the answer exceeds 15 and you land, you're a test pilot. If you break it, you pay for it. The insurance company may not recognize you when you phone if you have exceeded the proven crosswind capabilities of the airplane. Yes, it can be landed at a higher crosswind component, but you are beginning to stretch your luck.

To get back to our problem, a wind at 330 crosswind on a runway at 360 is a 30° crosswind. Thirty uses the number .5. Twenty-five times .5 is 12.5 KTS. Your crosswind component is less than 15 KTS, so you are OK to land.

Suppose the wind was 315 at 25 KTS for runway 36. This would be a 45 crosswind. The factor for 45 is .7, so we multiply $.7 \times 25 = 17.5$. You are now over the 15 KTS crosswind component. It's time for another runway or another airport.

Let's have a look at airport traffic patterns. This is another area that is not carved in stone by the FAA, but is strongly recommended. The recommended pattern is a left hand rectangle with the runway being the upwind leg. After takeoff and the gear up, to leave the pattern on takeoff, fly straight out for at least three miles beyond the airport or on takeoff above 500 feet, make a 45 degree turn to the left and continue for two or three miles. Above 500 feet and 80 airspeed, the flaps may be raised.

If staying in the pattern, on takeoff above 500 feet, look behind you to the left for other traffic and then make a left turn 90° or short of 90°, as you will now have a wind out of your right. Ground track 90° to the runway, wings level now on crosswind, keep climbing on the way to 1000 feet. Look behind you to the left, turn downwind if there is no conflicting traffic and announce your left downwind position on the radio. Level off at 1000 feet. (Pattern altitude and pattern direction may vary for local airport constraints.) On a Lake, gear down first. When the hydraulic pressure recovers above 900, flaps down. Turn on the fuel pump along with the flaps. Put the prop control and mixture full forward. Check the gear position in the mirror verbally. Run the flow pattern. Look behind you for traffic, make a left turn and look in the mirror in the turn. Check the gear position verbally for the second time. Announce you are on left base leg. Again, this should be a squared off pattern. Where should you turn in downwind to base? Normally, about a city block beyond the end of the runway. What if there is another airplane on long final? Wait until he is abeam you just off your left wing). Then a square pattern should keep you properly sequenced behind him. If you suspect this is a new pilot that may stop on the runway, give the other airplane a little leeway and extend your downwind a little. What if you are worried on turning final that you are too close to the preceding airplane? Go past the runway line and then back, or if you have the altitude, do some shallow S-turns on final to give you a better spacing. When turning on final, check to the right to make sure no one is making a long straight in. If there is, you may have the right of way but don't play bumper car. Let him ease in. Be nice. Somebody might be nice to you sometime.

Lake Aircraft make better approaches if made steeper than most aircraft. So keep your base to final high. You won't overshoot as the Lake has the power-off glide angle of a dead cat. If you're high, take off a little power. You may want to add it back just before touchdown. (Remember, it lands softer under power.) Why have I beaten a basic traffic pattern to death on a Lake book for people that are already pilots? The problem is that once we get into water work, patterns are not as much of a priority unless operating on a seaplane base with other seaplanes. Then good pattern work is a safety item. But doing water work with the Lake allows the pattern work to slide so that more time can be utilized in water proficiency. This slippage sometimes comes back to haunt us into doing a poor job when we get back to flying with the lowly land plane pilots in the pattern.

To enter the pattern, the downwind leg should be entered on a 45° entry leg with a radio announcement.

If being controlled by a control tower there may be no pattern at all. The tower will determine where you should be to fit into the landing sequence.

You are not illegal if you enter on a long downwind or a mid-field crosswind or even a straight in at an uncontrolled airport. But if you do this, announce what you are doing and remember there may be NORAD (no radio) airplanes near you. Even if everybody has a radio, two may talk at the same time, which to others on the frequency sounds like a pig falling into a hot tub. You won't even know your message was blocked. So keep your eyes open.

There is only one thing that can't be taught in aviation and that is good judgment. Work at it - develop it - work at it.

Chapter 8: Modifications and Ideas

Cheap Reep has a few ideas that you might be able to use. The first is stop by K-Mart to buy a matching mirror to glue on your right sponson. Lake only puts the left one on, but it is handy to glance out the right side to check the right main gear position. Often there are mountains reflected so the view is poor in the left mirror. Other times the sun is low on the left side of the airplane and you can't see into the mirror. If you have a mechanic put it on, sit in the left seat and have him move the mirror so that you are sure you can see both the nose gear and the right main gear. Mark the spot. If you glue the mirror on yourself, hold it in place with tape overnight. Then pull the tape off. If masking tape is left on paint too long, it can pull paint off. The mirror will be on a curved surface, so put some caulking in the open slit between the mirror and sponson, as the opening is toward the front and the wind could pull it off, if not caulked.

As long as you're in K-Mart, you might pick up a touch-up paint stick. They look like felt tip pens but contain oil paint. These can be used to cover new rivets or scratches or rubbed rivet heads and other rub spots.

You might want to pick up the foam used to keep water pipes from sweating. A couple of pieces about five inches long will make Cheap Reep's arm rest, when slid over your canopy handles. Cut a one inch square slot out of one end and it will slide over the part of the handle that joins the canopy.

As long as you've been foam shopping, buy enough to insulate the breather line hose. Split the hose on one side and attach it from the engine to the slit in the hose and from the other side of the slit to the jar. Then add a piece from the jar to the end of the drain. The warm oil when insulated will probably prevent the water mixed in it from freezing. Of course, the slit will handle the back pressure if there is a freeze up, but the insulation may prevent cleaning up around the slit area.

Keep a tube of Loctite in the airplane. It can be used to stop a leak around a rivet. This should do the trick until the rivet can be bucked or replaced.

Don't put wing walk on the wing. Some have tried it. The airplane wouldn't fly. One fellow did get off, but it raised the stalling speed 15 MPH.

Here's an item that may or may not work on your airplane, depending on the location of your strobe lights. The mirror shows you the landing gear position just dandy in the daytime. The nose gear doesn't show at night. This works on some airplanes. Put some reflective tape on the nose gear yoke. It may flash in the reflection of the strobe light showing when the nose gear is down. If you'd like to carry this a little further, you might want to also put a piece of tape on the nose gear door that lines up with the gear tape when it is in the proper position.

If the green light is not on and the reflective tape gizmo doesn't work and it's a night landing and you have passengers, try this. If in a 200 Series airplane (landing light in the left wing), fly a couple of feet above the runway. The person in the right seat should see the shadow of the nose gear if it is down.

How would you land if the nose gear is up? Don't go to water at night. Call for ground support. You can always call a flight station 122.2 or 122.3 or Center and let them know to call for ground support. This is in case you are out in the boonies. Land on the mains and hold the nose off as long as possible. Damage will be very minimal. If there is snow beside the runway, still use the runway at night. You'll have no depth perception off of the runway and there could be obstructions.

If a main won't extend, pick all of the gear up and belly land. Call for ground support first. It's not that big a deal, but be prudent and have help available.

Here's one for thought. In some circles, touch-and-goes have gotten a bad rap. The argument is the engine cooled from the descent and landing. These circles believe that this cooled down engine warms up taxiing back to the beginning of the runway. My personal belief is that this fits in the same category of, "Do something, even if it is wrong." First of all, the engine on touchdown is not as cooled down as the engine condition on the first takeoff of the day and we're not afraid to use takeoff power at that point.

Next point is that a Lake is normally landed under some power, not idle. This keeps the temperature up. Also, on final the air cooling is reduced to almost half the cruise cooling (slower airspeed) and the air temperature is generally warmer on the ground than in cruise or even the traffic pattern altitude. Even airplanes that are landed at idle power are not harmed by touch-and-goes. The engine is not that cool. You get more bang for the buck on touch-and-goes instead of spending so much of your time on taxiways. I believe the taboo on touch-and-goes is only another old wives' tale.

A couple of airplanes that I have flown, both Buccaneers, had the ability to get the adrenaline moving. They each showed gas at just under 1/4 mark at about eight gallons. On looking back a couple of minutes later, in each case the fuel gauge read a tad below empty. Now this can really clear your sinuses. You know the fuel was there a minute ago, but you don't know if you've broken a fuel line or ruptured a fuel tank or have a bad gauge.

In one case, we landed on the lake, shut down and stuck the tank. It showed seven gallons. It was ten miles from the gas pump, so we flew back to the airport. In the other case, we were downwind so we kept the pattern in close. Upon checking the main tank, we found it still had eight gallons. These two airplanes continued to show this fuel loss every time the gauge got a little below ten gallons (1/4 mark).

If it happens to you, land, you may have dumped all of your fuel. If it shows you still have the fuel your watch says you have, you can avoid the heavy breathing the next time it happens to you. Of course, if you have an airplane with this warped sense of humor, don't let it get below ten gallons. It's better the airplane pouts than you panic. Incidentally, by law, the only time an aircraft fuel gauge is required to be accurate is at empty. The gauge is not supposed to go below E as a car does. If the gauge works as the law says it should, when it says E, it is going to get quiet.

Remember our seven plugs, six compartments? Let's talk about the care and feeding of the hull plugs. They should be installed by you a little more than finger tight. They are self threading (as is the hydraulic dipstick), so it is possible after prolonged water work to have a hull plug work loose and fall out. Water in the rear cabin foot wells is a clue. Get on shore or fly alone if the airplane is getting heavy and land at an airport. The airplane will be draining enroute and for some time afterwards. Then put in a new plug. Use one of the two spares that you carry.

The plugs should have grease or plumber's putty on them to prevent them from

rusting into place. When a plug is out of the airplane and on your plug wrench, wipe the threads on the grease that has squirted out of a bearing or wheel axle or wherever you see excess grease showing. The rear plug normally will never have water drained from it, as it is high when the airplane is normally parked. If parked with the nose high (on a ramp, etc.), this drain hole can drain. So it is not necessary to remove this plug on every pre-flight. However, the plug should be removed and checked that it is greased. This should be done every three or four weeks so that it won't rust in.

Removing a rusted plug can be very expensive. I heard of one fellow that figured with enough muscle, it will let go. He put a three foot pipe on a wrench and pushed until things let go. The only problem was the rusted-in plug never let go, but he took enough skin out of the belly to stick a soft ball in.

Normally, if the mechanic who is used to this problem gets the plug out without any damage, be happy. Of course, he's had to use a torch to heat it and he works by the hour. But there is a simpler answer. Don't let the plug rust in. Use the grease.

Lakes often don't fly much in the winter. If your airplane is parked outside, remove the plugs as melting snow and rain run down the pylon and accumulate in the belly. If you keep your airplane in a hangar, this is not a problem, so don't remove the plugs. When the plugs are removed, hang them from the left control wheel in a bag and put the plug wrench visible on the seat or floor. Having a warm day in the winter and shooting a water landing with no plugs is a no-no. Plugs hung in front of you should be a pretty good reminder.

But if you do go winter flying, put the plugs back in. Even in our very northern states, a lot of rivers stay open all year. In the event of a forced landing, you could have a nice water runway within reach. It would be a shame to have to put the airplane in the pines because the hull plugs were two inches from your hand instead of providing a tight boat.

When the airplane is cold soaked, the Bendix sometimes is too stiff to slide and allow the starter to engage the engine. On the 180 and 200 engine (no rear cowling), sometimes a screwdriver or L-shaped tool can pull the Bendix into engagement.

There is another way that can work well for all of the airplanes, well cow led or not. On complete shutdown after a flight before shutting off the master (battery) switch, just bump the starter. Just hit the starter switch for a second to engage the Bendix and the propeller will just start to move. Release the starter switch and turn off the master switch. The Bendix is now engaged and will not have to slide into position if the next engine start is on a frosty morning. One word of caution. On cold weather starting, watch the ammeter. If it takes off full scale, the Bendix did not release and the engine will over-speed the starter. If this high amp reading shows, shut down the engine.

While the subject of winter flying has come up, remember to preheat below 20°F. Don't fly in icing conditions, even if you get away with it (meaning you landed in one piece). You will have damage on the fuselage where the propeller has slung ice. These dents are ugly looking. Besides, it's illegal to fly in icing conditions.

If the airplane has frost on it, try putting the frosty surfaces facing the sun. In the old days, frost was a no-no. Now the FAA recognizes that polished frost (rubbed smooth with a cloth) allows the wing to retain its proper shape. Getting the drag and distortion of rough frost rubbed off makes it legal to fly. What if you're still a little leery? Try this. If the runway is long, start your takeoff. If your airplane normally lifted at 60, watch the air-speed. If it lifts off at 65 - 70, fine. Keep flying. Just know that your stall speed is a little higher than normal. Get the gear up but don't raise the flaps until above 90. If the airplane should shake, put the flaps back down. Sublimation (solid to gas) should remove the frost due to air moving over it in about ten minutes, if there is no visible moisture in the air. Again, try the flaps up a few minutes after the first attempt. If the airplane is

solid, leave them up.

On the takeoff if the airspeed gets up around 75 and will not fly, then abort.

This need not be a panic thing. That's why we used a long runway. Just take the power off and gently brake so that the airplane is at taxi speed at turnoff on the far end of the runway. You are not likely to find this procedure spelled out anywhere as a lot of policy makers believe in CYA. However, I am getting long in the tooth and what can they do to me for giving this advice? It is a good procedure if you polish the frost and use a long runway.

Bat wings were built on the Lake for some time. Then an owner of the company came along that didn't like the aesthetics of the wing, so he stopped ordering them from Aerofab. The 180's are certified only with bat wings. 200 Series airplanes are certified either with or without bat wings. There was a period of a few years in the 1970's and early 1980's that had no bat wings built on the Lakes. Then they were added for the EP model from 1982-1/2 to 1985. If you have a model with no bat wings, you can add them for about \$4,000 plus paint. Is it worth it? Maybe yes, maybe no. The airplane will fly better with them. Will it fly \$4000 better? That is for you to decide. My personal belief is that you will lose 1 to 2 MPH in cruise with bat wings. On an airplane that cruises 120 MPH, and even that is variable depending on weight and temperature, 1 or 2 MPH loss can't hardly be proven or noticed. On the other hand, the bat wing airplane will lift off on takeoff on land or water at about 5 MPH less speed. This can be important when taking off in strong waves. There is less impact on the last waves before takeoff and there are fewer waves until airborne. I personally prefer bat wings.

The 250 - 270T have no bat wings. They had been put on the test airplane and a stall lost 5000 feet on the recovery. The designer engineer riding in the right seat didn't say a word. After landing he took his screwdriver out and silently removed the bat wings. The subject doesn't come up and some things are better left unsaid.

All models of the Lake are considered a one source system for fuel to engine. All of the tanks go to the main tank and from there to the engine. The proper way to use the aux tanks (the ones in the sponson) is to burn the main tank down to 20 gallons. Then turn on the aux tank pump switch. This will illuminate two green or blue lights. These lights show that power is going to the pumps. It doesn't prove fuel is pumping, but it probably is, unless there is a mechanical problem. These tanks take about twenty to twenty-three minutes to empty into the main tank. If you started pumping before the main tank was low enough, some of the aux fuel would go overboard. Pump for thirty minutes. This will guarantee the aux tanks are empty time-wise. It won't hurt the pumps to run dry for a while. During this pumping you will see the main tank fuel quantity increase. It will start back down when there is no more aux tank fuel to be transferred. It is possible due to a malfunction that not all of the fuel will leave the aux tank. If a gallon or two hangs up, you probably won't know it until you refuel the aux tanks. Another malfunction is no pumping action on one aux tank. After about twenty minutes, you will have a badly out-of-trim airplane. You can fly holding a lot of aileron, but it is uncomfortable. Land and fill the empty aux tank to balance the airplane. Don't use any aux fuel until you can have it looked at.

On the airplanes that have wing tanks, these tanks won't feed to the main tank until the main tank burns down to twenty gallons. If the aux tanks are then turned on, the wing tanks won't start flowing into the main tank until the main tank is again burned down to twenty gallons.

When fueling the airplane, the main tank must be fueled first. If the wing tanks are fueled first and the main tank has less than twenty gallons, the wing tanks will flow on to the main and won't be full when the whole fueling process is done. This could be quite eye opening toward the end of a long trip.

In the case of heat expansion, fuel in the wing tanks flow out an overflow. Fuel in the main tank is kept from flowing into the lower surfaced wing tanks by check valves. These check valves are almost no pressure check valves by necessity of the system. Thunder, wind on the ramp or even an F16 taking off can release these check valves. Then the main tank starts to port into a full wing tank. This extra fuel then goes out the expansion overflow. It is possible to dump six or seven gallons on the ramp. Various combinations of check valves have been tried as a fix. However, one owner has found that by filling the main tank within three inches of full and the left wing tank within one inch of full and the right wing to three inches from full, the dynamic imbalance will be corrected. If fuel does port between tanks, you will hear the check valves clicking. This works for ramp parking. If you are going flying right away, it should be OK to fill the wing tanks if it is a long trip.

Your passengers and friends all want to help you service your airplane. Unless they are knowledgeable (you've shown them what you need), do it yourself. They all want to latch the canopy handle as they get in. You generally have to unlatch it again to raise them both to close yours. As you put them in the seat, tell them, "Leave the handle, I need it yet." Plus, they often try to force it the wrong way and the handles are fragile. And speaking of fragile handles, they can be babied some if one hand pulls the canopy in hard by hooking the fingers in the canopy channel. The other hand can turn the handle.

Next, unless it is a fuel man you know, do your own fueling. Strangers to a Lake often get a ladder from the truck. Very spryly I scream, "I've got it. Just hand me the nozzle." I can generally get this out before the ladder touches the tarmac. It's easy enough to get hangar and pier rash without a line boy leaving us a permanent memory on the wing. When fueling the airplane, ignore conversation. Somebody always walks up to you while you are fueling and looking into the dark filler hole. They can be counted on to say, "Nice airplane! How do you like it?" Your mother taught you to be polite so you raise your head and say, "Fine." Trust me, that's when the tank overflows into the scupper every time.

The proper response should be, "Talk to you in a minute." And don't take your eyes off of the filler hole. Fuel trucks don't have the auto shutoff's that most in-ground tanks and pumps have. You can spill up to a half a gallon during your polite look-up and "Fine".

In filling the aux tanks, if you can see the fuel meter and know the aux tanks are empty, put in six gallons. Feel in the tank with two fingers. If the fingers are dry, put in two or three tenths and check again. When close to the top (generally six and one half gallons on the meter), quit. An inch below the filler allows for expansion without leaving blue streaks on your sponsons.

So, either train your gas person or do it yourself. Some of the 270T's say TURBO on the engine. Make sure you have a 100LL truck and not jet fuel for a turbine engine. This is another reason to be on hand during fueling. Kerosene makes a gasoline engine pilot's nose wrinkle.

Put your own hull plugs in. A friend can be an ex-friend as he or she tightens the plugs and they cut deeper each time. They can go all the way into the hull. Now you've done it. The plug assembly will have to be drilled out, replaced and repainted. The plugs should be set just a little more than finger tight. Better, you do it yourself. If you have a hull plug that is already recessed and you are beginning to sweat it, try wrapping plumb-ers Teflon tape on the plug. This will back it off several threads. But keep a roll of tape in the airplane as the wrapped tape will have to be replaced every few times. So it's less work in the long run to drain the hull and put in your own hull plugs.

Next do-it-yourself project is to put your own anchor away and lock the bow compartment yourself. This is a true story. On the water, the passenger put the anchor away in the bow compartment. Everybody wants to be a good crew member. The only problem is he dropped the anchor into the section that has access to the nose wheel instead of the box-shaped compartment for the ballast and anchor. The anchor nestled there with the

nose wheel (luckily, didn't bind it up). When the gear was extended at the airport, the anchor gaily hung out by its line and didn't start wild bouncing until touchdown. Put your own anchors away, my boy.

I mentioned don't let someone else secure your bow locker. I heard of a case where, while taxiing, the bow locker lid opened, the line blew out and wrapped around the prop. The securing clip did not have a direct forward pull on it, so it held tight. The line wrapped up like a yo-yo string and bent the engine pylon forward before the line snapped. I say again, fasten your own bow locker, unless you prefer your airplane to have a rakish look.

You may want to clean your own windshield. Wiping a dry cloth on a dry glass windshield will leave it scratched. Wiping dry on a dry Lake Plexiglass windshield will leave even bigger scratches. Don't use Windex. You may bubble the windshield. Lemon Pledge fills the scratches nicely. If there is any grit at all, wash the glass off before the Lemon Pledge. Rainex does a good job of preventing the windshield from smearing in the rain. Do it yourself. Nobody cares about your airplane the way you do. In throwing the canopies over from one side to the other, put your hand on the head piece of metal at the top. Now there won't be any fingerprints to clean. Don't put your hands on the glass if you don't need to. It's hard to stay friends with friends that lean over on your airplane with scratchy belt buckles. Keep an eye on them if you want to keep them as friends.

When filing a flight plan, use the proper designations for your airplane:

LA-4: LA04

LA4-200: LA4-2

LA250: LA25

LA270T: LA2- T

Opinions on Q-tip propellers differ. Some believe it's just a frill and not much advantage to have a Q-tip on the LA4-200. They believe a Q-tip is a sales gimmick. There is some agreement that it does run a tad quiet. Q stands for quiet. The airplane came through production with a straight prop. The Q-tip (bent prop tips) are an after-market add-on. The propeller is shorter with the ends curled so the tips are slower and quieter. The theory is that there is no loss of efficiency as the air over the blades is not wasted sailing off the end. The curled blade tip holds the air on the propeller as a winglet holds the air on a jet wing and uses it all. So the theory is that the Q-tip is quieter, but just as efficient as an unbent propeller.

When the Q-tip was tried on the EP, it was found to be of no value. It works quite well on the LA250 and LA270T.

One slight disadvantage on the straight prop is that it is closer to the fuselage and a hard landing can cause the prop tip to strike the fuselage. This is particularly true if an older airplane has engine mounts that are tiring. There is more play in the engine movement.

On the standard LA4-200, when they built the glareshield, they nearly missed. It's so small, it missed its purpose. The 250 Series does a fine job of keeping the instrument reflections off of the windshield at night. The 200 Series is blinding on glare back from the windshield reflections. There are some after-market glareshields that help, but Cheap Reep uses poster board. A square can be cut in half and used under each canopy. Trim off the part that sticks beyond the canopy on the outside. It does a fine job and costs about a buck. Label them R and L and top and bottom, or it becomes a puzzle while flying. They each can be folded in half and put in the pocket behind the right front seat. This is the easiest to reach from the left seat. In flight, the canopies can be raised an inch or so and the cardboard glareshields slide under to hold them in place. Who says paper airplanes

are just for kids?!

A poor man's anti-theft device can be as simple as drilling a hole through the throttle handle and its housing.

Just don't lose your own key to the padlock you install in the throttle.

Smoothness is not an instinct. It is something that has to be developed. Some people have a tendency to be smoother than others, but the skill still has to be honed in everyone.

In the dim long ago, I used to instruct in J3 Cubs. That airplane could show every imperfection and ham-handed movement made by a student. The student used to hope for a choppy day to hide his slightest twitch. Some instructors would put a pencil in the hole in the top of the rubber hand grip and have the student fly, holding the pencil between a thumb and finger. The threat was that it was the instructor's only pencil and the student had better darn well not break it. I used the method of touching the controls while asking for a maneuver and saying I wanted pressure on the controls, but I did not want to feel the student making any control movement.

When a student could make the J3 do what he wanted it to do by just pressure and no obvious control movement, he had developed smoothness. He or she was getting pretty darn good.

Now, in many other fields, sports, casting for fish or driving, etc., we can all strive to smooth out our movements. Driving, anticipate the red light, get off the gas pedal early. Slow down, then ease on the brake so that you run out of motion gently at the point you planned to stop. If the car has an automatic transmission, ease up on the brakes just as it comes to a stop to prevent the lock up stop at 2 MPH that auto-transmissions induce. When the light turns green, don't give yourself whiplash. Control your car 100%. Pretend you have already poured the drink you've promised yourself when you get home. Pretend it is sitting on the dash. Start out as though any that is spilled is irreplaceable. You are never too old to improve your smoothness quotient.

Now, about the Lake. The airplane is heavy on the controls, particularly the rudder. Think gentle. Be gentle, well, fly gentle when you can. There are many times you can with just pressures. Do it when you can, but it is not a don't break the pencil airplane. Often definite control movements are called for. The rudder is big because it is needed. It may take some obvious movement to make sure you are the pilot and not just a passenger. The bottom line is be smooth in everything you do all day long. Let this development carry over to your Lake flying, but do be positive, when that is required, to make the airplane perform the way you want it to.

Most switches on the panel of the Lake are really circuit breakers. If the hydraulic, light, fuel pump, etc. electrical systems have a short or overload, they will kick off even though they look like plain toggle switches. In the older airplanes, they are just plain push-in pull-off circuit breaker buttons.

Now, some of these CB's are used often. The electric fuel pump in particular is used heavily. This usage causes them to wear. There is a proper way of minimizing this harsh treatment. When these CB's are pulled often enough, it is possible to have them come apart and you are sitting there with the CB between your finger and thumb a foot from the panel and your elbow is sore where you bumped it when your arm sprung back as the CB became unglued.

The civilized way for pulling out on a CB is to pinch it between the side of your index finger and thumb. Then use a knuckle or finger joint as a fulcrum against the panel and rotate your hand on this knuckle to control the pressure to pull out the CB. This pressure controls the motion so only enough pressure is applied to disengage the CB. It prevents the hard pull that makes the CB hit its internal stop. This harsh stop usage will cause eventual CB destruction. It's not that I am so smart, it is just that this method was taught

to me when I went to flight engineer school and was taught as an economic measure to prevent breakage.

Normally when parking the Lake, the flaps are left down. There's no good reason for doing it that way, but still that's the way it's generally done. However, if the airplane is parked for a long period and storms may be along or a known storm is on the way, leave the flaps up. Flaps create lift and a good wind on the nose could make a difference of lifting the airplane, with either broken ropes or pulled out ground tie downs.

Never move a Lake without hydraulic pressure. The landing gear could collapse and give a sponson a new look. If hydraulic pressure is not available, put vise grips on the tabs on each main gear to hold the folding brace rigid. If a land landing is made with doubtful hydraulic pressure, come to a stop on the runway until the vise grips can be put on the main gear. If you try to be polite to other airplanes in the pattern and taxi off the runway, a gear could fold and then the other airplanes really would have to wait.

The Lake has a trailing nose wheel that will allow a turn of around 40° either way from center because it trails when the airplane is in forward motion only. It will not stay straight for a backward push. The only way to keep it straight going rearward is to have 2-by-4 guides on a ramp or use a tow bar. However, the airplane is balanced so that only about forty pounds are on the nose wheel. The quickest way to move the Lake rearward is to pick up the nose and move it back. If others are helping to push, they must push back at the wing root. If the push is farther out on the wing, the leverage will overpower the nose lifter and the nose person will be unable to control the direction of push. ("OOPS" doesn't cut it.) Push the nose with the stomach, not the chest. I have re-broken ribs using my chest pushing hard up an incline. (OOPS, again, was the wrong response.)

We have a girl in our hometown and her reputation was a little tarnished, but she was fun and exciting. Some said a little dangerous; however, I knew her as well as anyone did. Only part of the gossip was true. She was fun and exciting. The rest of the rumors were put out by guys that didn't really know her except by sight.

Now the same thing can be said of the Lake. As for the girl, she's history, but I picked the most fun and exciting airplane I could find and I specialized in it. I assure you with the proper training and understanding, it is a docile airplane. It requires more training because it is demanding, but spend a decent length courtship in training and recognize that if this lady is treated right, she will give you more hours of pleasure than you have ever had so far in flying.

Alpha Insurance can back this up. Despite the hazards on water the nay sayers complain about, Alpha says that there are more land claims than water claims on Lakes. The land claims are no higher than any other land plane claims. It's just that the Lake has a normal amount of land claims plus some water claims. The other airplanes would match the water claims, too, probably if they were capable of walking on water as we do.

Alpha Insurance gives a discount to owners that go through the Lake approved twenty-five hour course. While a seaplane rating can be acquired in ten hours, the insurance company recognizes the safety of more training.

Almost all insurance companies only continue their coverage if the owner takes re-current training.

I don't know the figures, but I have seen several float planes, floats up in the water and I have never heard of a Lake being capsized when turning down or upwind on the water.

Hull airplanes with sponsons under the wings seldom are involved with water taxi incidents. However, if taxiing is going to take the wing over a low mooring float, raise your flaps for clearance. If a log suddenly appears close and is going to pass under the left sponson, give a burst of power. The left wing will rise and the sponson will clear the log. This works best on the 200 Series airplane where torque is most prominent. If the right

float is endangered because the log is very close, when you are displacement taxiing, don't add power. That would cause the sponson to go deeper and hit the log with the front of the sponson instead of the bottom of the float sliding over the log. You might aid the situation by dropping the gear and slowing the airplane down to ease the contact.

Some owners have added various rods, springs or gizmos to hold one or both canopies open at the same time. This is a personal preference. From my point of view, I prefer not to have them, because climbing in and out requires a fair amount of head ducking and scrunching to get under the canopy that is half open to get into the seat. To each his own.

My preference is a standard Lake setup where there is a complete windshield throw over. If taxiing with one open, remember, have the one into the wind open. It is nice to do in the summer and, of course, there is no prop wash. A word of caution. If taxiing with both canopies shut, but unlatched in a strong crosswind, be alert. The wind can scoop the canopy open and throw it over with enough force to do damage (bend the canopy). So if the wind is strong, do fasten down at least the upwind canopy, even if it is hot weather, if you don't want the canopy open.

A paddle is a must in a Lake. You will have to paddle sometimes and maybe use it for a shovel or to fend off a boat or dock. Many times, due to the wind or rocky shoreline or bottom, mooring is required at a buoy. Lying on the bow on your belly and catching the buoy is only part of the problem. Holding onto the buoy while over a ton of airplane tries to drift and tying the line to it at the same time could make you a candidate for TV's "Funniest Home Videos". However, if you have a paddle with a hook in the handle and a slot hand hold in the flat blade, you might look pretty professional as you moored your Lake.

If you are a featherweight and need a lot of ballast when you are alone, you may prefer to use lead shot or lead ingots. This would allow enough room for the seven pound anchor.

Gluing screening on the holes will keep the mud daubers out and save you from buying golf tees. If debris should collect behind the screen, take the screen off, clean out the hole and reglue the screen. You might even carry a small tube of model airplane glue with your airplane tools.

If you have an older airplane with only one tie down on each wing, add another one on the other side of the sponson on each wing. They are relatively cheap and it can prevent the tie down ropes from rubbing paint from the sponson, if tied at a bad angle from the tie down ground anchor.

To keep the wings level in a windstorm while moored, tie a five gallon bucket on each wing at a tie down point. If the bucket is full and the top of the bucket is level with the water, the wind will be hard put to raise a wing and put the other wing and sponson under. The buckets can be used for carrying stuff and can be used as stools at your camp.

There are several kinds of heaters used on Lakes.

Basically, they all act about the same. Some can control the heat with a lever. The older ones give you a choice of HI and LO. HI is too hot and LO is not a whole lot better than no heater. So the switch will be cycled frequently. To prevent it from becoming too hot and inducing air sickness, put a rear passenger to work. Tell the passenger that she is the climate control officer and show her how to move the switch to warm or cool the cabin. However, if this switch is moved at night and you forget you gave out a duty, you don't know how loud that "Click" can be right behind you. It will clear your sinuses until you figure out what that noise was. Also make sure they don't hit the prime switch or off switch instead of the HI - LO.

The heater itself is over the cabin roof. The vents aim at people's heads. Your ears

can be quite comfortable while your toes are complaining. In this case, turn on the defrost fan. It is designed to throw cabin air from under the instrument panel up onto the windshield. Turning it on pulls the cold air from your poor toes which is replaced by slightly warmer air from your waist area. It does circulate the air and mix it. However, if it is really cold on just the other side of the nose skin, it will only raise the temperature by your dying toes from 0°F to 10°F above. Hey, it's better than 0°.

The heater has an overheat switch. It acts much like a circuit breaker. When taxiing in a strong downwind, the heater can overheat due to lack of airflow into the heater. If turned off without a cool down period, it also will cause an overheat and pop the overheat button. The law is that if the overheat button has been popped, an aircraft mechanic must remove about twenty-five screws, remove the bonnet (heater cover) and check the heater for damage from the overheat condition. He will then discover that the overheat switch did its job and the heater is fine. With that, he will push the button back in, put the bonnet on the heater, replace the twenty-five screws and present you with a bill.

You will see a lot of Lakes modified with a hole in the side of the bonnet. They happen to be about the size to fit a ball point pen and are opposite the heater overheat switch. Most owners don't pay to have the switch reset by a mechanic more than once.

So that you don't forget to turn off the heater, but let the cooling fan run, turn off the heater on downwind leg. If you forget and park the airplane, you will hear the heater or at least the fan still running when the engine is shut down. Leave the master switch on and turn off the heater, allowing the fan to run off of the battery for about three minutes. If you turn the master switch off just after the engine dies and the heater is on, you will probably have to reset the overheat switch. It has missed its cool down period and popped the button.

If it is windy on taxi out for takeoff, wait until the airplane is faced into the wind to turn on the heater. If you pop it off taxiing downwind, you can not reset it from inside the cabin.

There are some people that buy electric quartz heaters and set them down by their feet. And that's all I know about Lake heaters.

Chapter 9: Radio Work and Patterns

When making your radio calls, always put the word Lake in front of your call sign. The airplane has such a distinctive silhouette that it is easily identified visually in the air. A Cessna or other vanilla airplane can easily be mistaken for another Cessna or any other high-wing airplane. I don't care what the rest of the guys do, but I'll take any break I can get, say Lake, to keep from tangling up with another airplane in the air. If you transmit Lake 1234 is on downwind, know that other traffic will be watching for you. They won't confuse you in a flock of Cessnas and think they have their traffic spotted, but be in error.

If talking to ATC or the tower or approach control, still say Lake. They know your general performance envelope. It beats telling them an "N" number only. Put all the chips in front of you that you can.

It was first believed that a transponder antenna on the belly would easily be wiped out, so most Lakes have them above the wing line. This causes the antenna to be blanked out by the wing or other parts of the airplane part of the time. ATC will report they've lost your TX. Rock your wings. They'll say, "Now I've got you. OOPS, I've lost you again." An explanation of your antenna mounting only confuses ATC. The controller will quickly try to hand you off to the next controller with a different ground antenna location. If you're tired of this game, you can have your antenna relocated about two feet behind the step on the belly a couple of inches from the center line. The later built airplanes have them located there with great success. The epoxy is good and no one has wiped one off the belly so far. ATC doesn't lose radar contact with the belly mounted TX antennas.

You don't have to lower your voice an octave to sound professional on the radio. Think what you are going to say before you press the mike button. If you are new at radio use, go over the initial call in your mind before you speak. A void saying "uh" too many times or leaving long pauses. Keep your transmissions short and to the point. Other people also need that frequency.

If on an uncontrolled airport, don't congest the line. You normally don't need to report that you are taxiing as you would to the tower on ground control frequency at a controlled airport. If you can see the runway being used while taxiing out, there is no need of calling Unicom, unless you just want to confirm your radio is working.

I am bringing these things up as they pertain to airplanes other than Lakes, also. I've seen a lot of Lake pilots that could improve their radio skills, so I am throwing it in.

When you want information on field conditions, wind, runway use, etc. call Podunk Radio or Podunk Unicom. Give your call sign and make your request. Always end the transmission by repeating the radio or location being used. This is because it might have

been missed the first time you said Podunk.

Example, "Podunk Unicom, Lake 1234 taxiing out for takeoff. Give me the wind and active runway please. Podunk." Why ask for the active when you have the wind? The wind might be between two runways or the wind may be light and the opposite runway is the preferential runway until the wind speed exceeds a certain amount, say 5 KTS. It might be a varying wind between two runways but existing traffic is using the runway not favored for a couple of minutes. The same type of call can be initiated approaching the airport. "Podunk Radio, this is Lake 1234 about ten miles southeast, landing Podunk say your wind and active please. Podunk."

Podunk Radio doesn't really care about your location but other airplanes in the vicinity will perk up their ears and watch for you.

The person that should be on the Unicom may also be the gas person and the telephone person or in the sandbox. So call far enough out to give yourself another chance for a call a little closer in if there is no reply.

Most traffic patterns are at 1000 feet AGL. If no one answers and you are not sure of the wind or runway, climb 500 feet above traffic altitude and look at the windsock and runway, taxiway layout and where the terminal and gas pumps are. If there are no cars in the parking lot, you probably won't get any gas.

The proper way to enter the traffic pattern overhead is to be at least 1500 feet above the field. Keep an eye out. Some jets, because they are faster, fly the pattern at that altitude to keep from eating up the slow trainers. Proceed on a reciprocal to the 45° about two miles from the field. Look behind you as you should before any turn land, sea, or air. Make a left descending turn back onto your 45° inbound entry for downwind. Announce your position on the 45° entry leg. If you will conflict with an airplane on downwind (it has the right of way) either do a 360 or fly a wide downwind if there is no other airplane on downwind than the conflicting downwind traffic. Make sure you announce what you are doing. There is no need to raise the other fella's pulse rate. If flying a wide downwind, you can drop in behind the other airplane, after he turns base leg. If you announce on downwind, whether you will be making a touch-and-go or a full stop, it can be of aid to other airplanes in the pattern.

When speaking on the radio, your lips should all but brush the mike. If you purse your lips, they should well touch the mike. This will give your transmission maximum clarity.

If you have a squelch on your radio or intercom panel, adjust the volume and then back off the squelch until you no longer hear side tone (your own voice). Then bring the squelch back just enough to return the sidetone. You can be counting or saying testing or whatever turns you on, to determine you have good reception by your sidetone. Call Ground Control or Unicom if you have doubts. You can ask for a short count (1-2-3-4-5) if you think you can make your adjustment quickly or a long count (1 through 10) if you believe it will take longer to adjust the volume and squelch.

Some squelches squeal when too high. Back them off until the squeal stops, too much back-off and there will be no sound. Find the right spot. Remember, if you know all this stuff, skim it, but these are areas where I have seen weakness with a lot of pilots. It doesn't hurt to have a little review of the basics if it's been a long time back that you learned them.

A few frequencies you may want to have handy in your pocket or cockpit include 121.5. This is a universal emergency frequency. However, in real life I have found on occasion this was not monitored. For backup, try 122.2 or 122.3 and even if you don't know who will answer, call

Flight Service. The closest Flight Service will answer. They listen up very well. Take your problem to them. They'll get you a better frequency or try hard to aid you. Remember

that air to air is 122.75. Another common air to air frequency that is used is 123.45. It is not kosher to use it. It belongs to the Marine Corps in the Carolinas. However, I have never heard of anyone being giggered for using it. We know we probably shouldn't be using it, but it's not in the category of shoplifting and it is such a handy number to remember.

At the end of the flight, tune to 121.5 to see if your ELT has been accidentally activated. Find out now rather than at 2 a.m. when some CAP member bangs on your door and asks you to go to the airport and turn off your ELT.

As you know, 1200 is the VFR squawk on the transponder. At a busy area airport, you may be assigned a number for your TX, even if VFR. This helps the radar people to keep airplanes separated. Now if you are taxiing out for takeoff and it is busy, a lot of airplanes taxiing around, put your assigned number on your TX but leave it on standby until cleared for takeoff. Otherwise, the radar screen no longer looks like a bunch of fireflies in a fruit jar but becomes a scope of overlapping lights and numbers that are indecipherable. With all of the airplanes on standby until takeoff, the radar man won't pull the plug out and go to the nearest bar in tears.

Remember your TX codes for communicating without the radio. If you are NORAD or just can't transmit, squawk (turn your TX code) to 7600. If you are having an emergency (fire, uncontrolled gyrations, bad vibrations or lost, to name a few), then squawk 7700. Also know your hijack code. Light airplanes have been hijacked while on the ground. If flying a hijacker, use your squawk. If he has a gun, he has a ticket to ride. Very likely the hijacker is not normal, so stay passive and do whatever you can do to calm him and take him where he wants to go. Don't blow your cool.

These codes originally caused a horn to blow in the Center while a flashing red light came on. The horn was too distracting so only the red light is activated now. The problem is that many pilots while changing through their TX codes for A TC would pass through a 7 and cause the alarm. Now if you want to be a good guy, to go from one number to another, turn the dial in the direction that will get you to the new number without going through the 7. This will cut down on the false alarms at the Center.

Something in radio transmission that you may not have been exposed to is quality numbers. Five is the best number. If you have been having complaints about your radio transmissions and don't know if it is the complainer's receiver or your transmitter, ask the next receiver how he reads this radio. If the answer is loud and clear or a little scratchy but readable, you know what you've got. If the answer is 5 by 5 (or 5 squared), it is loud and clear. It is 4 by 4, it is adequate. If the reply is 5 by 3, the clarity is impaired but the volume is fine. So the numbers will give you knowledge on how you are being received. It may be time to put food on the radio repairman's table.

If you are proceeding down a runway that has no taxiway, announce your intentions. If you are a private pilot, you say back taxiing down runway two. Professional pilots are more likely to report backtracking. Either is correct.

Another mark of a long time pilot is to set the directional gyro (DG), pull the knob out and give it a twist. This guarantees that the knob didn't stay in and lock the DG on a heading. The problem of a locked DG isn't as pronounced with today's instruments as in the earlier gyro instruments, but if you want to make the person sitting beside you think you are accustomed to flying WWII fighters, give the knob a twist after setting the DG.

A private pilot is more likely to announce on the radio that he is taking off on runway one five. The gray beard is more likely to report he is departing runway one five. The main thing is get the message out, but if in getting out more professional verbiage works, do it. Like chicken soup for a cold, it can't hurt.

Chapter 10: Weight and Balance

You have all had to do weight and balance problems. If you don't do them regularly, you probably will have to look at a Lake training manual, go over the example and then substitute figures from your individual airplane manual that differ from the training manual. For instance, a lot of radio equipment in your airplane could change the arm or moment in the stripped airplane example, in the training manual.

Then work out your figures. This is the cheapest way of determining if you need ballast in the tail or nose to keep your CG within the limits of the envelope for a safe balance of the airplane.

Lake Aircraft has nomographs. This is a metal plate that fits over a plastic graph. You put marks on the plastic at the marks at the plate. These are available in both the 200 and the 250 Series airplanes. It is easier to work with than the math. They run in the forty to fifty dollar range.

The top of the line is a calculator that has the 200, the 200 with aux tanks, the EP and the 250 programmed into it. The 250 and the 270 weights are close enough to cover them both. You enter the figures for your individual airplane into the calculator. It is by far the easiest method of working a weight and balance reading for your airplane. This calculator is a two hundred dollar item and is available also from Lake Aircraft. It calculates balance for landing fuel also. It is possible to be in balance on takeoff, with no ballast, burn a lot of fuel and be nose heavy needing tail ballast for landing. This is figured out for you and the ballast in the tail can be added before takeoff. Of course, the calculator also gives you your gross weight as you add into the calculator all the information it asks for.

My suggestion is to work out several problems when you have the time. Then put the configuration and ballast and location needed for different examples on a card in your wallet. For instance, two passengers, light fuel, needs no ballast. Four passengers, fifty-four gallons of fuel needs ten pounds of ballast in the tail. This covers burning thirty gallons for landing. Or one person, fifty-four gallons takes forty-five pounds in the nose. These examples come from a card I carry that has these and other configurations already worked out for the 250 - 270 airplanes.

While the cabin is eighteen inches longer than the 200 Series, the whole airplane is nearly four feet longer. This makes for a longer teeter-totter and the 250 - 270 Series is much more sensitive to needing ballast than the 200 Series. The increased fuel capacity increases the need for ballast on the 250 - 270 airplanes also.

The 200 Series only has a bow locker for ballast. It seldom needs tail ballast. However, two people in front and little fuel can easily require some ballast in the baggage area.

Including the anchor, the 200 Series will need ten to seventy pounds of ballast in the nose depending on the pilot's weight anytime the pilot is solo. Belting in your baggage on the front seat can minimize the ballast. If the forward ballast is needed and not in the bow locker, your neck is now out the whole ten feet. Engine failure on takeoff would cause the nose to pitch up and trim and forward elevator can't get it down. The resulting maneuver would terminate the flight.

Some people use plastic bags for sand or water for ballast. Then they don't have to carry weights when not needed.

The maximum gross weight for the 200 Series is 2600 pounds. If the aux tanks are full of fuel, the max allowable gross weight is 2690 pounds. The aux's must be full to allow this higher gross weight. It has to do with spreading the higher weight out across the wing to prevent a concentration of weight at one spot (the point where the wings basically join). The CG has a range of 5.5 inches (102.5" to 108").

The 250 - 270T has a range of 2 to 8 inches. The 250 Series airplanes have a maximum gross weight of 3140 pounds for takeoff and 3050 pounds for landing. A rear CG location will cause the 250 to climb faster. For cocktail information only, the Sea Wolf has a gross takeoff weight of 3650 pounds and a landing max weight of 3450 pounds.

The civilian version Lakes will get off the land in an overweight condition, but take some room and climb slowly. You are not very likely to get an over gross 200 HP Lake off the water. So fly balanced and within your weight limit.

What is the biggest hazard of flying a Lake improperly balanced? If the airplane needs nose ballast and you have an engine failure in takeoff, this nose will come up. You will try to drop the nose but there is too much weight behind you. Next, you will run the trim forward. If you have enough altitude this may help. More than likely you are going to run out of altitude, airspeed and ideas all at the same time. If you can't get your nose down, nothing else counts.

I have heard of flying with down trim so that the nose can be easier to trim down in case of an engine stoppage. I much prefer to fly an airplane in trim and have the proper ballast in it.

Chapter 11: Publications

There are not many sources for information on hull flying. Edo Floats Company puts out some good information on water flying, but of course it is geared for float flying. The same goes for the FAA.

"Lake and Air" put out a book, FAA-5-8081-ILA. This book is titled, "Private Pilot Practical Test Guide for Airplane Single Engine Sea-Airplane Multi-Engine Sea." It is not a how-to, but tells you what the FAA can ask for on a seaplane exam. It leans toward float operation also.

For another source of information, call your local FSDO. Ask them to send you a copy of AC91-69, Seaplane Safety for Part 91 Operations.

Dick Causley wrote a book some years ago. It was a how-to book for the 200 Series Lakes. It is out of print now, but if you can find one, it's worth reading. The name of the book is "Fly, Float and Flounder". I mentioned at the beginning that not all instructors use the same techniques. To prove consistency of this, I will differ with Causley on this point.

He recommends in a light or no wind condition to land into the current of a river. His theory is that the airplane will stop sooner into the current, so that part of the idea is correct. However, this is one question that is asked on a flight test. The question is, into current or down-stream? The answer is that even though it doesn't make too much difference to a hull, a seaplane rating entitles the pilot to fly floats with no further testing.

Landing a floatplane into the current tends to pull the nose of the floats down and the prop can strike the water. It is comparable to stepping onto a moving sidewalk going the wrong way. It will pull your feet the wrong way and you'll land on your nose, as can a float plane landing against the current. Landing with the current is like stepping on the moving sidewalk while moving the same way it is.

Best source of ideas in stationary or floating dock designs is Follansbee Dock Systems. Request Follansbee's 64 page catalog of docks, floats, hardware, fasteners and accessories. To obtain a copy, call 1-800-223-3444 or 1-304-527-4500.

Luke Smith has written two manuals for the Lake Aircraft. He can be reached at 175 Highland Street, Laconia, New Hampshire 03246. Phone number (603) 524-5004. One is for the 200 and the other is for the 250-270 Series. These are being marketed along with a videotape on the Lake Aircraft. So this is another source of information for your limited hull flying library.

Bruce Rivard of Lake Aircraft has a hobby. He has been putting a record of all Lake Aircraft on a computer. He knows their damage history and various owners, so there is a possible source of information you could use.

Of course, Lake Aircraft has its own flight manual for sale. Then you have the airplane manual in the airplane itself, which is the holy word. All in all, there is not too much printed information on the care and feeding of your pet.

There is one large stack of information available. This is based on letters in a newsletter to all members of the Lake Amphibian Flyers Club. It is chock full of ideas and experiences that members are involved in. One good tip could pay for your dues many times over. I find ideas in it that I probably disagree with 10% of the time. Hey, that's fair! I have ideas that can easily have a higher percentage of disagreement. When you join, you will get all of the back issues until the stock runs out. The stack is thicker than the family bible and while not saving your soul, could save your butt.

The address is Lake Amphibian Flyers Club, 815 N. Lake Realty Blvd., Frostproof, Florida 33843. Bill Goddard is the guru that donates his time to put this organization together. The sixty to eighty Lakes that show up every February at River Ranch, Florida show the success and interest in this organization. There are seminars with mechanics, instructors, insurance agents, factory people and other Lake knowledgeable people talking to the group. There are meetings for the wives who can do without the technical stuff. These seminars will probably be the most educational Lake information you can pick up. See ya at River Ranch!

[Editor's Note: Bill Goddard recently passed the reigns to Marc Rodstein, who can be reached at 561-483-6566.]

Chapter 12: Reading the Water

The proper safe way of landing on the water is to fly by the area first and check for shallow water and obstacles. I recommend deciding where the wind is from. Then do the flow pattern and fly downwind at three hundred feet. If you are landing in a river or narrow spot in the water, you might make an earlier pass at a higher altitude to check for high altitude wires. That is a wire between two hills over a river.

Fly this downwind at 80 and flaps down. At this speed things aren't going too fast. At three hundred feet the smaller floaters are more likely to show than at five hundred feet.

Remember to check your landing gear position twice. The only thing more embarrassing than landing on the airport gear up is landing on the water gear down. What generally happens, if you do, is the airplane will probably stay right side up, but the shape and appearance will probably change rather radically. The resale value is now very low.

Now, after telling you that this surface check is recommended for safety before landing, let me get back to the real world.

Well anyway, it's my real world. If I were 100% safe, I wouldn't get out of bed in the morning. I am a firm believer of calculated risk. This means, you can stick your neck out a few inches without getting your head chopped off. Don't stick your neck out ten feet or you'll be darned lucky to keep your head. .

So I always drag every river before landing. Debris changes on a river by the half hour. If you don't check a river, your neck is out ten feet.

In the spring for a month after the ice has melted, I check the surface of all bodies of water before landing. Boat houses, piers that have broken loose and debris that has washed from shore on water that has risen due to snow melt and rains are prevalent.

But after the lakes clear up and on lakes I am familiar with, I put my neck out only two inches and land without checking the area. Real world, use calculated risk. You do when you throw your leg over your Harley. You do when you are driving at 65 MPH and the fellow going the other way at 65 is only a foot or so from you. You do when you leave a secure job for another job. Our whole life is full of calculated risks from the time we learned to ride a bicycle. We calculate we can ride the bike on a country lane but not on a super highway.

So, I have had students shoot touch-and-goes on large lakes for a distance of twenty miles. That's a lot of bang for the buck in training. But that's not done in the spring.

If the wind is strong, we'll often see foam streaks on the water. These streaks line up with the wind. The streaks do not move. The waves move with the wind. However, as seen sometimes on the water and almost always from the air, we can see a phenomenon. The illusion is that the streaks are moving and they are moving into the wind. Actually, the

foam streaks are moving up and down on the waves and remaining in one place. The waves are moving with the wind but you'll swear the streaks are charging into the wind. With that view, we know where the wind is coming from.

Sometimes the wind is not perpendicular to the waves. This can happen when the wind shifts. The waves have momentum and will continue on the path the original wind blew them. Over time they will change. However, the foam is light and passive and as the wind shifts, so will the foam. To land into the wind, when the streaks and waves don't agree, land with the streaks.

Wind direction can be picked out by many methods. In a very strong wind, cattle stand with their tails into the wind. Birds taking off, land and water, take off into the wind. Birds sitting on the water face into the wind if it amounts to anything. Anchored boats aim into the wind. The old standbys of smoke and flags are good. If the wind is light or strong, it will show a wind shadow next to the offshore wind. The wind can't drop right down over the trees or weeds or a bank and ripple the water. The wind shadow will be glassy water. Land toward the shore with the glassy edge of water and you will be landing into the wind. If the wind is very light, it is not necessary to land into the wind. If the wind is 4 or 5 KTS downwind, it really doesn't matter in a Lake. Downwind becomes a little more critical in a float plane. The faster speed on touchdown tends to pull the nose down on floats and the prop is in a vulnerable position.

If the waves are high enough to just start breaking and just a few have white caps from low altitude (below 500 feet) or on the water, you can read the wind direction. The waves are ridges of water and if they are high enough because of the wind, the same wind will blow the tops off of the ridges. The air mixed in the blown wave top makes the white cap. Looking with the wind you will see no white caps as you look over the rounded backs of the blown ridges. If you look into the wind, you will see white water as the air mixed water (white cap) drops below the wave ridge. Bottom line, land or take off toward the white caps, particularly if you see no wind streaks or if you see them but can't determine the wind direction by the streaks.

White caps start breaking when the waves reach one foot. That is, the waves are twelve inches high from trough to crest. Twelve inches is the limit for the 200 Series airplanes, so land if there are a few white caps. Don't land if there are a lot. You as a pilot can handle higher waves, but your Buccaneer will start stretching skin and straining rivets. The limit for the 250 Series airplane is eighteen inches of waves for takeoff and landings. Again, that is all the airplane is designed for. A pilot can handle much more than the airplane, but it is the pilot that uses the good judgment to limit the water he uses.

Actually, the heavier structure Sea Wolf has taken off in four foot seas. So you can see, a pilot can manage a lot heavier sea than our 200 and 250' can.

The 250 can use the eighteen inch waves because of its longer fuselage. It stretches the airplane out over more waves and this gives more support over the length of the fuselage. It is similar to a Cadillac crossing a plowed field versus a Volkswagen. There is just more length, thus more longitudinal stability.

When on the water, one thing that can bite you on takeoff is a swell or a boat wake. We will get into that later, but as for reading the water, a swell mayor may not be visible. A boat wake does generally show. When the airplane is on the water, it will show as a gray pencil line just below the horizon on the water. You as a pilot, are sitting so low that you can't see detail, only this gray line. We'll talk later about what to do about it. Right now, I just want to get you familiar with reading water.

Glassy water is generally a mirror surface. The water surface itself can't be seen. It is transparent. If clouds are at 2000 feet, they will reflect and make the water look 2000 feet deep. Or the water may be clear and the bottom shows, but you have no idea where the

surface is. You can practice and simulate glassy water landings, but until you fly a real one, you won't believe just how disconcerting the lack of visual surface can be. In fact, if you try a step landing on glassy water, you stand a good chance of supporting the maintenance department.

On the land we cannot see wind, unless we are by a wheat field. Then we can see gusts move across the field. Most airports don't have wheat growing on them, so these unseen gusts can grab you as you start to land and really clear your sinuses.

These gusts are easily seen on the surface of the water. These patches of energy (stronger wind or gusts) show as dark patches moving across the surface of the water. There are many times they don't move. If there is a good breeze over a cliff onto a lake, this air may move downward toward the water like a waterfall and stay there. The wind or dropping air will hit the water surface and spread out before dissipating, but the impact point will show dark water that doesn't move. However, most cat's paws move across the water and are quite visible. When there are only a few cat's paws or they are spread out, they can be avoided. Just land a little distance from them and don't penetrate them. They are a little harder to see on takeoff, but if you get into one, remember, you will probably get a surge of airspeed and be airborne. As soon as you are through it, the energy (fast moving air), is gone and so is some of your airspeed and you may well plop back onto the water. Knowing this can happen will prevent you from climbing too high (hold the nose down when airborne). Be ready for a little back pressure to hold off a rapid descent back onto the water, on the back side of the cat's paw. A cat's paw moving through a sailing regatta can leave a lot of wet sailors.

On landing, if you do land through the middle of a cat's paw and are a few feet above the water, again, hold the airplane down as it wants to climb with the extra airspeed. There is almost always a drop on the back side after you are through the cat's paw. Knowing this, you are much better prepared mentally than you would be in gusty air on land. So be ready to go from forward pressure on the yoke to back pressure to keep the airplane from making a solid touchdown beyond the cat's paw.

Another wild thing that can happen is to have a very compact centralized cat's paw with a sharp edge. If you land with only one wing over the cat's paw, that one wing will be the only part of the airplane feeling extra lift. That wing can lift quite suddenly when you're only a couple of feet in the air. It is a good test for your reflexes. I'd hate to wash the airplane one wing tip at a time.

If you want to land in a muddy river and you can't see bottom, don't land if there are bumps on the surface. Make sure all of the water is at least a couple of feet deep and not passing over rocks six inches below the surface. If you have your heart set on landing in a doubtful area, check it out by boat or poles before you try it. If you can't, forget it. Think of all your old dear friends who married somebody else. You can't have everything. Set your heart on something else a little safer.

If taxiing on a winding river, remember the deepest part is on the outside of the curve of the river bend. It can be quite shallow on the inside of the bend.

One of the things we check on our low dragging of the river or any other landing spot is to watch for wires. They can cross any place on a river or inlet if the distance is about the same from both shores. However, if there is a narrow spot or an island, the odds are greater that there will be wires there. There are more wires without balls than with them, so don't count on the wire owner to protect you. If a wire ever shows up in your face and you can't get over it, go under, way under it. That prop is ten feet above the belly.

If you ever shut down on a river above a dam and you can't get your engine started, you can't get the anchor to hold and you can't paddle hard enough to reach shore, throw the gear down. Except when just before the ice starts to form, there is a cable above almost all dams to protect fools, boats out of gas and Lake owners that can't start their

engines. So put the gear down and use it to hold you on the cable until a boat can be put in to tow you away. By the way, a Lake does not tow forward well, without a yoke or bridle. If you only have a single line for towing, fasten it to the tail tie down and tow backwards.

Now, we've talked about glassy water, but there is another surface that can bite you and that is glossy water. Water can freeze (glossy water) and look like it is just glassy. Be dam sure in the fall that the lake did not freeze on the calm cold snap overnight. I have seen this condition when the ice did not show as ice. So have others. One unnamed Lake owner landed, saw ice chips flying every-where, but there wasn't enough room to get off straight ahead. He continued to use his EP as an ice breaker until he made a V-turn and took off in the water runway he had just created. This sure beats allowing the Lake to sink. He took off before he sunk, but his airplane looked like it had been worked over with a fire ax. If you are not sure, "DON'T LAND!".

Chapter 13: Normal Water Takeoff

If starting out for a water takeoff from a ramp or a beach, do a mag check if your prop wash won't cause trouble.

If the start up is on the water and the gear is not on bottom (no brakes), a mag check can be made at idle. This will not give you a chance to see if the mag drop is excessive, but you will know if there is a dead magneto. Doing a mag check on the step is just too risky. Calculated risk leans in favor of no mag check versus being at a goodly speed on the water with your head down and eyes glued to an instrument.

The checklist can be done if standing still (on the beach). You might consider the flow pattern if moving under power on the water. One word of caution, a lot of Lake checklists skip flight instruments. Make sure your altimeter and directional gyro are set.

First, let us look at the takeoff on civilized water with the 180 or 200. The surface will be anywhere from glassy to 8 or 10-inch waves. This is comfortable water. To keep the bow spray off of the windshield have the control wheel all the way back. To minimize the left wing rising due to torque, use full left aileron. Now add full throttle. Full throttle should be attained in 3-4 seconds. Too fast and the engine may falter. Too slow and the propeller is exposed to spray longer than necessary. If the wheel is not back first, you will wish you had windshield wipers. Full throttle with the elevators up will push the tail down in the prop wash and the nose will rise above the bow spray.

As the airplane moves forward and air becomes effective on the ailerons, the control wheel can move toward neutral to the extent the wings stay level. A common tendency for beginners is to touch one sponson on the water or at least take off one wing low on the takeoff run.

When the nose is as high as it is going to rise, allow the nose to lower. Either it will lower of its own accord, as the pilot eases off the back pressure, or it may have to be helped with a little forward pressure on the control wheel.

At this point only the front half of the fuselage is riding on the water. The airplane will accelerate and the engine above will tend to push the nose down. This will now require the beginning of back pressure to combat the engine force and to angle the nose and wings up to lift off at flying speed.

While some right rudder will be needed on a land takeoff, even more right rudder will be needed on a water takeoff. This is due to torque of full power for a longer period of time. The acceleration on water is much slower than on land due to the drag of the water. Pick a point and aim at it. A common error is to allow a left arc on takeoff on water when learning.

I prefer no headsets during water work, as there are aural clues to be gained on

where your airplane is in relation to the water. As much as I hate to teach numbers on takeoff, because I would rather you had a feel for the airplane, I will mention the numbers. The back pressure will be initiated around 40 IAS. You will hear the leading edge of the water to the hull start moving back. It will leave your rudder pedal area, go behind your seat area, the airspeed will be increasing and then the water will be under the back seat. The nose will now be high enough and the airspeed will sustain flight and the airplane will surge as it becomes airborne.

If the nose is not raised soon enough or stops rising on takeoff, the engine thrust will start pushing the nose down as the speed increases. Your aural clue is the nose gear doors will bang in complaint as they should be out of water above 40 on takeoff. If too much back pressure is applied the airplane won't accelerate to flying speed. The back of the airplane will be dragging. The sweet spot (balance point) must be found and it will move aft as the speed increases.

The bat wing airplanes will lift off between 50-57 MPH depending on gross weight and temperature. A good ball park figure is 55. The 200 without bat wings will lift off 55-63 MPH. Lakes lift off at the same speed on water as on land. It just takes more real estate to get up to the speed on the water.

If the airplane should become unstuck from the water prematurely, keep it in the air, if you can. If a gust has lifted the airplane off with minimum air speed, do not climb. Level off at two to five feet above the water until the airspeed is healthier, then climb. If an attempt to climb is made at 55 or 60 and the gust disappears, you could be twenty feet or so and find yourself below flying speed. It's better to drop back to the water from a few feet than from twenty feet. A gusty day will often find you leveling off on the deck until the airspeed is sanitary.

If a Lake is overweight, it will take off on land. On water, it won't get on the step. The nose won't get high enough to drop it on the front half of the airplane. If it won't get on the step, it can't accelerate and take off. If the plane is overweight, you might as well try to take off with a pontoon float boat.

If you can get on the step, it will fly, that is, if the lake is long enough.

If you are borderline on getting on the step, there are a couple of things that can be done to make the difference. One is to run the trim control all the way rearward. In that the trim is really part of a split elevator, you will add to the down push on the tail. The nose may then rise higher and make the difference of rotating over onto the step. If this works and the airplane accelerates on the step, reach down and move the trim forward some. Take a guess, don't look down. You'll need your eyes looking out on a marginal takeoff. If the trim is approximately correct but not in the balanced position, you'll feel it on takeoff. Then reach down and trim for control balance. It's no big deal to trim as you get airborne. The right hand should be kept on the throttle on takeoff (except if trimming) in case an abort is needed.

Another possibility of getting a heavy airplane on the step is to rock the airplane fore and aft with the control wheel. If it seems to be gaining (nose getting a little higher on each wheel pull back) then hold the wheel forward. Sometimes the airplane has risen enough in the water that it will allow the speed to increase and the airplane will gradually rise until it is on the step. Now you are home free. If it will get on the step, it will fly.

Another trick that might work is lean the engine for a little extra power to get on the step. Then go rich. Lycoming says don't fly lean at sea level.

If that doesn't work, head downwind. Sometimes that makes the difference of getting on the step. The little bit of difference in ground (water?) speed may get the Lake up to hump speed. If this works do a 180-degree step turn and then make the takeoff.

There is another possible solution that has been used. I don't particularly recommend it, but if you are stuck on the water, you may want to try it. If you can't get the nose high

enough to get on the step, quickly pull the throttle back. This will cause the nose to rise. Quickly go back to full throttle. With good timing you may catch the forward rocking motion to put you on the step. If you are caught in a crack and this works for you, you can mention my name. If it doesn't work, I don't want to hear about it.

When training, take care not to land over three or four times in the same area. The locals may start smiling when first they see you, but then begin to look at you as they would a clay pigeon, if you continue to beat them up with the world's noisiest propeller airplane. By the same token, avoid churches on Sunday and schools on weekdays and stay away from hospitals at all times. Stay off of the cottages on a lake. If it has to happen, don't go down the shoreline, just brush across one house, leaving the lake. It cuts down on the complaints.

Give boaters a wide berth. Some act like you're there just to annoy and frighten them. They think they own the whole lake (they don't know the seaplanes own it).

If you have taken off in the middle of the lake, there may not be enough room to make an over the water 180-degree turn. In this case move over to the edge of the lake and make a teardrop turn. If this is a low altitude turn (200-400 feet), have at least 80 on the airspeed. If you don't have 80, drop the nose a little to pick up the airspeed to 80 or more. You really shouldn't lose over 50 feet to get your speed. Do not bank over 45° at the maximum for this low and slow (below 500 feet and at 80) maneuver. Offend a cottager rather than jeopardizing the flight.

Many takeoffs in a row and step turns on a long training or practice period will wear out the left arm. If this happens use two hands on the wheel as the left arm loses sensitivity. The right hand should be on the throttle but if the left hand needs help, do what you gotta do.

On the 250-270T Series there is only one trim tab. It is on the left side of the elevator. This allows the left seat pilot to look out and see it for preflight setting. It also allows the twist of the prop wash to press on only one side of the tail. This helps put a twist on the airplane as a whole, preventing the strong left wing rising tendency on takeoff. So the bigger airplane does not need the full left aileron input before takeoff that the 180-200 airplanes need.

Some of the Renegades need partial left aileron and some need practically no left aileron at the beginning of a takeoff. Each airplane has its own personality and no two are exactly alike. In fact, if three people are in the airplane and the rear seat passenger is in the left seat, the airplane can get on the step without touching the wheel. Just add full throttle and let go of the wheel. This is just a confidence maneuver, not a normal method of making a takeoff. The airplane is longer and the spray doesn't affect the windshield as much as on the 200. The nose will rise on full throttle and then as the airplane accelerates the nose will lower on the step. At 60 KTS a slight bump back on the wheel or back trim and the airplane will take itself off of water. The takeoff in the 250-270T is much easier for the pilot than the 200. The longer airplane does not have the tendency to start popping up and down on the nose. The 200 is more likely to start a porpoise. The cure is the same as for most Lake mishandlings. Just add a little back pressure anytime the airplane gets a little unruly. Even if too much back pressure is applied, no harm done. However, too little or no back pressure will allow the oscillation of the porpoise to continue or increase.

Normally, back pressure will help most uncomfortable situations. There is an exception.

At speeds of 0 to 25 or 30 some back pressure can be applied if hitting a boat wake or swell. Above 25-30 a little forward pressure will hold the airplane on the water. Nothing will put the knot in your tummy like hitting a swell at 40 and taking off like a ski jumper. Nobody is happy at ten or twenty feet of altitude and 40 on the airspeed indicator. We will

get into the action to take in the bounce recovery chapter.

If you see a wake or swell that you are approaching, pull the throttle all the way back. If it is a good size wake, wait until you are through the wake at a slow speed before re-advancing the throttle. If it is a small wake, go for it. Swells are often not seen. These are the ones that can get you in trouble. The boat that made the swell may be long gone. The swell, even when large, can be gradual enough in slope so that it doesn't show.

If you are taking off in ocean or Great Lakes swells, take off parallel to the swells, even if crosswind. If you can ride the ridge top of the swell for takeoff, you are less likely to get into trouble.

It is best to use a harbor that will eliminate the swells. Do not take off or land on a swell face. First choice is the ridge or top of the swell, next is the backside of the swell and next the trough. Trough is the last choice because although there is no side slant to the surface, the face of the swell might catch up with you. The face of the swell is a real no-no. Use the heading of the swell ridge even if it is crosswind. An attempted takeoff or landing across swells can reconfigure the shape of your airplane. If there are no swells, then into the wind for takeoff and landings is the preference.

Good judgment often comes from experience that comes from bad judgment.

There is a four-letter word that applies if things start going wrong on a takeoff. No, that's not the word. The word is STOP. Don't be afraid to abort if you are only marginally in control of a situation. The smartest thing to do sometimes is taxi back to the beach and wait until conditions are more favorable. There will be less egg on your face delaying a departure than scaring everybody, including yourself. There are times it pays to have religion. Be a devout coward.

If on the ocean and the wind is crosswind to the swells, take off parallel to the swells and crosswind. Use a right crosswind if possible.

These heavy airplane takeoff techniques apply to high altitude water takeoffs also. The 200 series airplanes generally can't take off from a lake above 4-6000 feet in altitude. The 250's generally are limited to lakes below 5 to 7000 feet. So don't land where you can't get out. If you do land and if you can't get out, wait for a cool morning (or near winter) to lower the density altitude. You may make it by ferrying your passengers out one at a time. The 270T, of course, can handle gross weight on a 10,000 foot lake.

For training, I reduce the MAP one inch for every 1000 feet of altitude I am simulating. For instance, normally the MAP gauge reads 28 or 29 inches on takeoff at sea level. I have the student add throttle only to 23 inches. Six from 29, giving us 23 inches, simulates an elevation of 6000 feet. Unless we are light or it is cold, most 200's will not get on the step. Then we will add an inch and use 24 inches on the MAP. This is performance at 5000 feet. Now the airplane will probably fly. The lesson in this case is, don't land on a lake above 5000 feet if you have a promise back home that night. The same technique works for practice on the 250, but the altitude performance may be 1 or 2 thousand feet higher with the 250. There is no need of simulating altitude for the Turbo as there are not many lakes that even exist over two miles high. Remember, 10,000 foot high lakes are one of the reasons there is a 270T.

I know some of the purists out there will point out that there is less propeller efficiency at altitude. There are other factors that may make just the MAP reduction not quite an accurate simulation. However, this method is close enough to demonstrate altitude effects without proving it won't get off of some high lakes. It could get lonesome overnight on the high cold lake proving a point and looking for authenticity.

While we are on the subject of reduced power on takeoffs, here's another "been there-done that". If you've been to the coffee shop and now taxi off the beach and can't get full power on takeoff, try leaning.

The case that came up was on a 200 which only had 22 inches at takeoff power. The

injectors had gone bad. The mechanics came out to the beach and tweaked it. The MAP now showed 23 inches. Still no takeoff with one pilot. Then the mixture control was brought back, part way, on the takeoff with full power and the MAP rose to 25 inches. This was just enough to get a 140-pound pilot off and back to the airport for maintenance. It's no guarantee, but if the MAP becomes a wimp, it's worth a try. Lean it. You just might prevent the mechanics from making a house call.

If the airplane is heavy, you have four people in a 200, and you want to show them some water work, there's a way. Take them off of land and do step landings but keep it on the step. If the airplane comes off the step you may have to leave your mother-in-law on the shore with the gators while you take the others back to the airport. Then go back and get your other passenger, if she's still there. However, if you stay on the step and speed-boat around the lake and then shoot a couple of touch-and-goes (splash and dash), they will think they've been on the water and will retell the experience often over many a Bloody Mary.

Let's look at takeoffs that are crosswind. Because of the normal torque of the 200 series airplanes, the left wing will rise. If we add a wind from the left, there will be more forces (wind plus torque) than we can handle with full left aileron. So, a left crosswind is often out of the question in the 200. This problem is not nearly as pronounced in the 250-270T series.

The correct way is to use the crosswind to help counteract the torque effect. So a wind on the right will tend to lift the right wing and the torque will tend to lift the left wing. With these two forces in balance, generally no left aileron is needed for a right crosswind takeoff.

An oral test question is, "If you are in a north-south canal and have a west wind, would you take off north or south?". The answer would be south to get the two wing balancing forces. The slogan to remember is, "The wind on the right is the right way".

This leads us to another situation. All takeoffs and landings on the water are to be made with the water rudder up to prevent bending it. This goes for step taxiing also. On a crosswind takeoff, in a canal or close to a lake shore, raising the water rudder before takeoff will probably allow the nose to head for shore. It will weathercock into the wind. In this situation, start the takeoff with the water rudder down. About the time the nose is lowered the air rudder should become effective. Then raise the water rudder. You won't be moving more than about 10 MPH so you are not endangering or loading yourself to retract soon after the air rudder becomes effective.

Most Lakes that are stolen by non-seaplane pilots are cracked up. Unless there has been some time spent reading, in ground school and flight training this can be a tricky little airplane. Proper preparation can keep your airplane wrinkle proof. Both the takeoff technique and landing expertise must be understood to keep a pilot whole. Ask any thief that has taken a Lake for a joy ride, if he's still with us.

When practicing takeoff and landings at the airport, we will often do touch-and-goes. On the water we also splash and dash. Even though the gear was up for takeoff, do not assume it is still up for landing. Even with takeoffs to two or three hundred feet, the gear position **MUST** be checked in the mirror before the next landing. I personally know of a splash and dash accident in a twin amphibian where the gear position was not checked. The left gear drifted down. On touchdown the nose crumpled around the feet of the two pilots in front and locked them in as the airplane sunk. The two in the back seat survived. Why do I tell you these horror stories? I want you to live to be old pilots. I want to impress on you the need to check the gear position at least once and preferably twice in the mirror before every landing, land or water.

If doing a splash and dash and takeoff power is applied at a rather high speed (45-60), be sure the wheel has back pressure or the high thrust line will push the nose down

a firm amount. Also, the aural clue is the water banging on the nose gear doors.

If the landing is made to a full stop on either land or water, a flow pattern is not needed. Everything on approach and landing is in the correct position for takeoff. This includes the elevator trim.

Chapter 14: Step Landings

There are three types of water landings plus crosswind landings. The most common landing is the step landing. Later we will also cover glassy and rough water landings.

We have previously discussed traffic patterns and flow patterns. The traffic pattern in water work does not need to be as well structured as it should be around an airport, with known or unknown traffic. A low downwind (300 feet) can be flown to check for debris. The difference on the flow pattern is that the gear will be up, and the vocal statement given (and checked) twice is, "This is a water landing, the gear is up". This is said after checking the mirror.

If an obstruction (log) or boat wake shows up on final, just add a little power. When you know you will land beyond it, reduce power to 15-12 inches for the balance of the approach.

You may find it hard to believe, but I have seen a few students put the gear down on final to a lake. Before you get too critical of these people, remember, just because you haven't done it, doesn't mean you are immune to this step beyond embarrassment. State what surface the airplane is landing on and what the gear position is. And like Santa Claus, be "checking it twice".

Again, final is flown at 70 or 80. The approach can be a straight-in or in a turn. The turn can put you in close to shore, in comparison to a straight-in over a cliff or tall trees. Also, a turning approach may follow a winding stream. The absolute and most important caveat is WINGS LEVEL ON TOUCHDOWN. If a sponson touches the water before or simultaneously with the hull, you can make book the sponson will either have the bottom pushed in or show a neat set of wrinkles on the side.

For a step landing the approach is made at 70 or 80 until about 20 feet above the water. Then a gentle roundout is started. Keep the 12-15 inches of manifold pressure, as the lake needs the energy for a gentle water touchdown. The round out will start to dissipate the airspeed. Slower water touchdowns are nicer. You don't want to be contacting the water at 70. Only if the airplane floats in the ground cushion, may you want to pull all of the power off.

Hold the Lake off from touchdown until the airspeed is 60 or a little below, unless the airplane is quite heavy. The rules change as the keel touches the water. On land when landing a tricycle gear airplane, a slight amount of back pressure is added to hold the nose wheel off after the mains touch down. Don't do this on your step water landing or you will be airborne, running out of airspeed, and set up for porpoising. (Again check with the untrained Lake thief.)

The airplane should have been trimmed for no back pressure on final. Then on

roundout, some back pressure would be applied to the control wheel. On touchdown release some of this back pressure. That sentence is the most important statement in the chapter. On touching the water with the hull, don't add back pressure. Don't shove the wheel forward. Don't maintain the roundout back pressure. Again the important sentence is, on touchdown release some of this back pressure. Allow the nose to settle until the airplane's level on the water. If the nose doesn't settle, a slight forward pressure can be applied.

The airplane will now have the attitude of a speedboat. The power can be cut to idle. At this time, as the speed slacks off, the tail will settle. The airplane will spasm a couple of times as it comes off of the step and then settle into displacement mode. However, there is a little finesse thing that you can do to relieve the spasm or jerk motion, if you will, when coming off the step.

You have this beautiful speedboat attitude as you ease off the back pressure and reduce the throttle to idle. Now keep this attitude by slowly pushing the wheel forward as the airplane slows down. The wheel will reach the stop (full forward) but by then the Lake will be very slow and as it comes off of the step, it will be a TLC feeling. Then the airplane will settle into displacement mode. The high bow wave will still appear but the passengers will have felt nothing but smoothness from touchdown to stop. Again I say, there's nothing wrong with the first way, but holding the tail up as long as possible is just another case of finesse that you can add to your repertoire.

Chapter 15: Crosswind Landings

There are many reasons you may wish to land crosswind. One may be that the narrow river has a crosswind. Another is that closer to shore is better than high waves, even if crosswind. It's possible that a shallow lake has a channel that is crosswind. It is often easier to manage a strong crosswind takeoff than a strong crosswind landing. The reason is risk wise the Lake can max out in a drift to a landing sooner than in a crosswind takeoff. This is because on takeoff the drift is at below flying speed. But on landing the speed in the air is a fair amount above stalling speed. Drift versus water forces will be considerably higher on descent and touchdown than accelerating for takeoff on water. The water on takeoff dampens a lot of drift. On landing the drift is pronounced, and touching the water stops the drift right now with a side force.

To land in a crosswind, remember the wings must be level on touchdown, contrary to a land crosswind landing. So while the wing may go down to pick your spot for touchdown on approach, level the wings for touchdown. The airplane can't be landed in much of a crab as such, but will be drifting. The path over the water is not the way the nose is pointing. The manual calls for a crab touchdown in a crosswind, but in my book (this one), I'm apprehensive of this technique.

The airplane will have some sideways motion as it touches the water. There are limits to your abilities. There are even greater limits to the Lake's abilities to land crosswind. Your judgment as a pilot is to recognize when the drift is so great as to be unsafe. This is, again, your calculated risk.

The airplane can be landed in a greater drift if there is very little wave action. This could be in a protected canal. The same amount of drift could bite you if on touchdown in waves and the hull was exactly flat against a wave and caused a wing to drop hard. Ouch.

The question that comes up is, "How much drift is too much?". The answer is not as evasive as it sounds at first. Make an approach, fly low over the water, eyeball your drift. If you are uncomfortable, it's too much drift. Don't force it. It's like those old girl friends we talked about. You can't have everything. If it looks unsanitary, DON'T LAND. Never mind that you promised somebody you would pick them up on the canal for a ride. They're not going anyway, if you shed a sponson. Most passengers or potential passengers appreciate a pilot they deem safe and cautious. A superior pilot uses his superior judgment so he doesn't have to use his superior skill.

Chapter 16: Water Taxi

There are three methods of taxiing. One is displacement (idle speed). At this speed the weight of the airplane equals the weight of the water it is displacing. The balance causes the airplane to float just so far down in the water.

Next is plow taxi. This is done at any speed that is less than the speed to raise the airplane up on the step for step taxiing but is faster than displacement speed. However, to prevent the prop from eroding, Lake plow taxi will not be fast. The other is step taxi.

In displacement taxiing, if at all possible, never exceed 1000 RPM or the airplane will suffer propeller water erosion. The propeller will be pitted as though fine bird shot had hit it. The pilot is allowed to file it out with long smooth strokes. But it is easier to keep track of the RPM gauge. In time, a pilot can hear 1000 RPM and know when he is exceeding it just by ear. It takes a while to get anywhere at 1000 RPM. But in big waves it may be the only prudent way.

The third method of taxiing is step taxi. This is the way to speed things up and taxi on the step. This speed-boating can be done with the canopy opened or closed. It is generally closed, but it is exciting to streak down a winding river in the summer time with your passenger's canopy open. It should be worth a drink to you after the sun's gone over the yardarm. Don't step taxi in rough water. The rivets will complain.

First, let's discuss why the airplane (and most floats) have a step. To make a takeoff on land, the airplane must change from level to aim up (angle of attack). When the airplane gets to rotation speed the nose is raised and the airplane is aimed in a climb. As the speed increases to flying speed, the airplane lifts off of the ground. Rotation was done on the main landing gear.

To get off of the water, again, the airplane must rotate. The point of rotation must be near the balance point or center of gravity as when the wheels are extended. When on the water, the step creates this pivot point of rotation. If it wasn't there, the airplane would have to rotate off of the tail. But putting the airplane on the step before a lot of speed is built up and then having only the front half of the hull in water (less drag) allows the rotation to occur on the skeg (back end of the keel) as the nose rises.

Step taxiing, of course, is moving on the water between 10 and 60. This is done only with the front half of the hull in the water. The airplane sits much higher on the step, in step versus displacement taxi. The bow spray is different so there is no prop erosion. The only erosion that is picked up is after full power is applied and before the step position is acquired. Of course, this is true of every water takeoff. This is because the proper way to get on the step from displacement is done as though starting a takeoff.

Pull the wheel full back, left aileron if a 180-200 airplane, full throttle. After the nose

reaches peak up angle, lower the nose and ride on the step. Reduce the left aileron and reduce the power as the desired speed is attained. A common mistake is holding back pressure too long. Once the nose is as high as it will go, it is inefficient to keep it there. Start the nose down, to get on the step immediately, after acquiring the nose high position. You are now sitting on a large rubber ball. The airplane must not only be balanced fore and aft, but keep the wings level also.

If the speed drops off, the tail will settle and the airplane will fall off of the step. If the speed is too great the airplane may fly (you may be headed toward shore, don't want that). Boats may want to race you. ABORT. More on that hazard later.

OK, now that we've got your toy making like Miss Budweiser, let's try some turns. When a race car is on a track, it is banked in the turns. When you fly, you bank in your turns. When you are on the water, you also bank. On land, air and water always look way behind you before you make a turn. On the water a boat may be trailing you and a turn could be unsafe. In fact, it could even be a hostile water cop and you might want to turn your step taxi into a takeoff.

The work load, on step taxiing crosswind, increases as the wind velocity and angle increase. There can be a limit as to the amount of strong wind you want to fool with on a crosswind step taxi. Comfort level (spelled judgment) will probably be the deciding factor. Don't be in such a hurry that you risk the airplane. In a strong wind at displacement speed, tack or make a smaller angle to the wind and change the course a few times so the wind doesn't control you. You can even drift to get into a different position on the Lake. Experiment with air rudder position and with the water rudder up and down while drifting. Also, leaving a windward canopy open can change your drifting attitude.

Bottom line, just don't cling too close to the edge.

You got the airplane to play with on the water anyway, so take some extra time on the water, if that is the prudent way.

To sail a Lake backwards, downwind, release the controls. It will probably aim into the wind and drift rearward. Let the wind steer the tail downwind. If necessary drift downwind beyond the point you want to be, if it is off to the side of you. Then taxi at an angle over to your destination. This is the way to sail a Lake in a goodly breeze.

If the breeze is quite stiff, in a turn from downwind to upwind in displacement come to a stop. The airplane can be nearly stopped by extending the landing gear in the water. Water rudder retracted will cause the airplane to pivot around in a very short radius as it weathercocks. This will minimize the time the wind will try to lift the wing while crosswind. Water rudder down will extend the arc and expose the wing to a crosswind for a longer time causing the low wing tip to drag in the water. If the tip does start to get wet, turn off the strobe lights and navigation lights, if on, to prevent a short and a popped circuit breaker. Give it time to dry out before turning the circuit breaker (light switch) back on.

If aimed into a strong wind on the water and the airplane won't turn downwind, try this. Go as far as the wind will allow the turn, then kick opposite rudder and use the momentum to turn back to downwind. If it doesn't quite make it, kick the opposite rudder and try to get it around the other direction. If that doesn't do it, sail backwards.

Another trick that works sometimes is to put the gear down before turning from downwind to upwind. All but stop the airplane on the water. Then gear up and turn into the wind. Turning to the right will allow the upwind (right wing) to be held down as some power is added while crosswind. Remember, the left wing wants to rise when power is added.

So to make a step turn on the water, look behind you for nosey boaters. If clear, push the rudder and drop the wing until the bottom of the sponson is gliding on the water. Don't bury it. If the front of the float is pushing water, you may have to buy a new one.

Going from straight ahead step taxiing to a turn will generally require a small increase in power. Also, as a turn in the air requires some back pressure, so will a turn on the water or the nose will get too low.

Don't let the sponson have air under it. Get all the bank you can without straining it. After some S-turns, a couple of 360's might be in order. The biggest mistake made on these is allowing the speed to die off and then falling off the step. There is no set speed for step turns. It must be between displacement speed and flying speed, but as the airplane comes around into the wind, the IAS may read up to 45 and downwind it could read close to zero. The speed on the water is what counts, but it is all a matter of feel. The throttle will be changed all through the maneuver to keep the right feel, speed and control. In step taxiing from straight to a 180-degree turn, add a little power and a little back pressure in the turn on the water as you would in the air. There is more drag in a water turn than straight ahead step taxi.

Outside of scaring the fish, why are we doing this maneuver? There are two reasons. One is so that the pilot can have a much better feel for the airplane. It takes practice to keep from losing the attitude of being on the step. Until this maneuver is done well, the pilot doesn't have a good feel for the airplane on the water.

The other reason for becoming proficient on step turns is that it may be necessary to depart a small lake or one that has partially frozen over since you arrived. It was a larger lake when you landed the day before. I know, here's where you say, I'll never go into a tight spot like that. As the song goes, "Never Say Never." Wait until someone opens the dam after you've landed. Besides, what's wrong with a little knowledge. The FAA will give step turns on a rating ride.

Let's talk about getting out of a small lake. Put the airplane on the step. Follow the shoreline as close as practical. The biggest circle you can make gives you the most room. After you are on the step, reduce the power only enough to prevent losing control of the airplane. As the airplane approaches 30° from the wind line, apply full power. Continue to turn and lift off in the turn. After the airplane is in the air and if there are tall trees, continue to turn. Watch the angle of bank. Stalling speed increases with angle of bank. A 45° bank at a low altitude is acceptable with flaps, if 80 shows on the airspeed. If you have 50-100 feet of altitude but are shy on airspeed, drop the nose a little, to get your 80. Stalls in a bank scare me more than controlling the altitude to get the airspeed that's needed.

Now this circular takeoff works very well on small lakes with the 250 and 270T. Of course, practice where you have more room. But with the 180-200 models, the airplanes often won't accelerate much above 45 in turns on the water. In this case, take off in a letter D instead of O. Either do a 180-degree turn, go downwind on the step, hang a U-turn and add full throttle in the middle of the U and take off into the wind. Or to make less than a 180-degree turn and get takeoff speed possibly slightly sooner, try the D-turn shape into the wind, applying takeoff power 30-45 degrees before the into-the-wind takeoff heading. With an arc to a turn instead of a 180, the speed of step taxi will be higher on entering the straight line of takeoff. The 200 will accelerate well on the straightaway with the wings level.

There, I've got you out of that small lake you said your were never going to go into.

Chapter 17: Rough Water Landing

Now let's talk about that rough water you said you'd never land in.

Remember, the limits for the 180-200 are waves of no more than 12 inches. Technique is different for the Renegade so age before beauty, we'll cover the shorter airplane first.

The landings used to be called stall landings. But that is poor technique for the 250-270T, so all high wave landings are called rough water landings for all of the airplanes. The rough water landing on the 180-200 is still a stall landing. Nothing has been changed except the name.

Generally, rough water is caused by wind or boats. Let's assume it is wind this time. When it's windy, it's generally gusty. When it's gusty, the airspeed can bounce around a lot on final. You may have the airspeed it says you have. If a gust quits, the airspeed could drop 15 MPH. If you had been on approach at 70 you could now well be below flying speed. So to compensate for this possible loss of 15 MPH bring the airplane in at 85 in gusty weather. Losing 15 then will only give you 70 but well above stalling speed. So 85 is a good airspeed in rough air. However, you sure don't want to hit a wave at that speed. So the slowest possible speed is the easiest impact on the airplane. Ease the throttle back to about 12-15 MAP close to the water. The airplane will slow down, but if we hit an inadvertent stall less than five feet from the water, it's not the same heart stopper as being slow and stalling at 50-100 feet.

Allow the airplane to fly 2 or 3 feet above the waves and see how long you can make the airplane fly by just bringing back the wheel. Either carry a little power, 12-15 MAP, or cut the power to pick a touchdown spot. Hold it off. Hold it off. Hold it off. When the wheel is all the way back, the nose will be high and the tail low. The airplane will stall as the wheel is back against the stop and the whole airplane, tail first, will drop into the water. This drop is only a matter of inches for the tail. Hold the wheel back. A few good waves will slap the bottom. Then the airplane will stop forward motion in short order. If the wheel is not held back, several more waves will be hit before the airplane stops. Just as the airplane touches the water, pull all of the power off if you didn't pull it off just before touchdown. If you forget to pull the power off on touchdown, again you'll meet a few extra waves.

Even when practicing this rough water landing on good water, it's not a pretty maneuver. The airplane will still buck through small waves with the wheel held back. We're not looking for pretty. We're practicing getting into rough water at below flying speed.

The speed for approach on the 250-270T is good at 85 KTS, but the touchdown is completely different. If you take a short stubby pencil and put a little notch in the middle

of it, it is hard to break. This is because the pencil is so short there is not much leverage to break it, even with the notch. But if you take a long pencil with the notch, it is easy to break because of the leverage that can be applied.

So while the stall landing of the 180-200 does not endanger the integrity of the airplane, the 250-270T is in the category of the long pencil. Lake recognized the strain that could develop on a stall landing on the long airplane. At the beginning, with the 250, rough water landings were made with the back half of the airplane (skag to tail). But this still left a lot of airplane out of the water on a drop in a stall landing. So before very many pilots were taught this technique, it was changed to its present method. It has stood in good stead for 10 years as of this writing.

Now the airplane is slowed down from the 85 KTS approach speed just over the water. However, while quite slow, it is not stalled but lands in a nose high step position. Cut the power, either just before touchdown or on water contact. There is still flying speed on the airplane, but just barely. Hold the nose slightly high on the 250. When on the water and the speed gets below 55 KTS, apply full back pressure to stop with fewer wave impacts. If a rogue wave should try to airborne the airplane, keep the nose down momentarily (wheel a little forward). If a swell or huge wave lifted the airplane, use a bounce recovery (to be covered later) and again make a nose high step landing. As a last resort, if well airborne and stalled, tail the airplane in like a 180-200. This is in case the airplane is falling and can't be recovered. Stay level, only half throttle, then just before touching the water, wheel back and tail the airplane into the water.

Suppose the rough water is a result of boat traffic and not wind. Normal approach speed is called for. Stay handy with the throttle and pick the spot with the least action. If you're all ready to touch down and see a wake at that point, add enough power to clear it and then ease off the power. Land parallel with wakes. Never land crosswise to them. If there is a hodgepodge of wake, fall in behind a big fast boat. He'll calm the water some and his wake will spread out and not be a problem to you. Land on his propeller track. Don't land too closely. He may close his throttle to watch you. But he really doesn't want to see your eyeballs. Another reason to not land too closely behind very large boats, is they can have rounded swells following their stern that are hard to see. These swells can be three or four feet high. If there is a lot of boat traffic, go someplace else. Beats getting beat up.

If the rough water is a result of high winds, there's no requirement to land where the wind has a long fetch. Seek shelter. Either land into the wind close to shore where the waves are not so high or land behind a peninsula (a breakwater). Land behind an island. Land into the wind, in the sheltered low wave portion. Land close and turn away to miss the island, as you get closer to the island on the water. By then you should be slowed enough that even if you turn out into the big bad waves, they won't hurt you. Give yourself room to turn between touchdown and slowdown and the island.

Both the step landing and the rough water landing have been discussed. In particular, the 200 series tail first landing should not be mixed with a step landing. Make either a step or a rough water landing. A combination, that is a slow nose-high step, can very easily get away from you. In that position, the nose is too high to ease it down on the step. The speed is high enough on touchdown, that the airplane will hit the belly and climb and start a wicked porpoise. Do it right, either step or rough water. Don't try to combine them.

Back to boat traffic. It is possible to get in where it is so busy you can't take off again until everybody else goes home to eat. It's just like the bad crosswind, fog or below freezing days. On bad boat days, find another exciting thing to do.

Chapter 18: Rough Water Takeoffs

Well, I've gotten you into this lake with all the rough water. I guess I'll have to tell you how to escape.

If the waves are over the limit for your airplane, seek shelter. Try to find a spot where the waves are not as high. Take off into the wind toward shore. If there are no obstacles on shore, you won't have to go as far away into heavy water. If there is an inlet, aim for it. Just make sure the wires aren't there. Taxi out to an island, if one is growing in that lake. The lee side is protected, while on the left and right sides there will be rough water. This rough water comes together some distance downwind of the island.

The lower wave height is the width of the island, at the island and tapers down, downwind until it disappears in an apex surrounded by high waves. Taxi a little beyond the apex, turn toward the island (into the wind). Start the takeoff in heavy waves and plan so that you will get on the step just as you reach the apex. Your takeoff heading should be just inside the side of the island. This should keep you out of the heavier waves. There will not be enough room to get airborne before reaching the island. As you get closer to the island (and the waves are getting more gentle), start a turn on the water. Aim outside of the island. If you are not airborne upon reaching heavy waves, there will only be three or four strong bumps. But the airplane is getting light and hitting them at light weight (maybe at 50). This is not as severe as being heavy (little lift) at 30.

Now comes the next tricky part. The wind often is howling around the side of the island. It will often lift the up wing and attempt to roll the airplane. You may be at twenty feet when this happens, so stay alert. On a rare occasion if the break from sheltered air to strong winds is too gentle (small angle off of wind line), only the wing outboard of the island gets the wind. Now the down wing gets a lot of lift and rolls the airplane back toward the island. I have had this phenomenon happen twice. Full opposite control does nothing until that wing is back behind the trees on the island. All of this happens at about 20 feet. The trees can't be cleared. To do this properly and safely, the break back from the wind line to go around the island must be about 60° after this happens. Bottom line, make a definite break away from the island to begin with and be alert for low level wind induced acrobatics.

On a takeoff into high waves, sometimes a slightly nose high altitude may be needed. Don't add too much nose up or the airplane will slow down as it slides off the sweet spot. But a little nose up will help when a wave crest on the nose moves the flotation center forward. This slight back pressure will help to keep the flotation point a little more rearward. Basically, on rough water takeoffs, maintain attitude. Do not try to anticipate each wave as you approach it. Maintain attitude. If you try to play each individual wave, you

will start varying your attitude as you push and pull for each wave. This will induce porpoising. If you do start to porpoise, a little back pressure should stop it. If you are starting to lose complete control, STOP. Just pull the power off until the airplane is docile, and only then, add power and resume the takeoff. If you, again, get into a porpoise, again, abort. Wait for better conditions, seek shelter (lee side of land and lower waves), or look for a little recurrent training.

Here's another gimmick. I neither recommend it nor condemn it. But I teach it and leave the use of it up to the discretion of the pilot in future use. On rough water, start the takeoff with the flaps up. Have the flap handle in the center (off) position. Start the takeoff. When the airplane is on the step, push the flap handle down. Speed will only be 20 or so. If the gear is put down by accident, instead of the flaps, the speed will not be great enough to cause damage.

First the cons. One man I respect has been a Lake instructor for over 30 years and doesn't believe in it and has never done it. If the pilot ever grabs the gear handle by mistake, it will probably be the last mistake he makes that day. If it's that critical, don't take off. This is assuming the gear being extended at 40 or 50.

Now for the pros. If the rough water will bend the flaps, don't put them down until the airplane is on the step and the flaps are well above the waves. With the flaps up, there is less drag and flying speed will be reached earlier than adding the drag of flaps in wind and wave slaps. Some pilots love the method.

I teach the maneuver. The choice of using it is the pilot's choice. I think you should be familiar with all of the options. If the waves are mean into the wind, think about a crosswind takeoff next to shore on the upwind side of the lake. Remember the wind on the right is the right way. The caution on this is look out for down drafts. When the airplane gets airborne, let the airspeed build up maybe to 80 at 5 to 10 feet in the air before climbing to any altitude. Wind often comes hard over the trees or hills or cliffs and can funnel down drafts back onto the water. Better to slap back in from 5 feet instead of 50 feet. So be alert for down drafts on windy crosswind takeoffs close to shore.

This chapter is not meant to be a scare tactic. You can get into trouble on windy days. Know your limits. Caution is the better part of valor. If you feel the need, get some dual in rough water work, even if it is simulated. You may intend to avoid windy days. But the wind can increase while you are flying. Know your airplane and how to take care of yourself. Either fly enough to stay proficient or take some dual to regain competency.

Don't forget you are the pilot. If it is too rough for you or your airplane, cancel. Just carry a telephone so you don't worry anybody. A really good pilot doesn't fly when he shouldn't.

Chapter 19: Legalities & Instruction

When you get your license, where can you land on water? Not in New Jersey. With a lot of paperwork you can get into a few Ohio lakes. Beware of waters controlled by the Army Corps of Engineers. Most states recognize that freedom in the United States is exemplified by free spirited seaplane pilots. Some places are controlled by politicians that are throwbacks to personalities that caused the colonies to revolt. With the exception of these few out-of-step bureaucrats, the U.S. has the freedom to operate on the water with an abandon undreamed of in the rest of the world.

I recommend joining Seaplane Pilots Association (SPA). They put out a book giving the restricted bodies of water in all the states. They also list seaplane bases in this book. However, with an amphibian it is often easier to do maintenance and fueling on an airport. Downtown docking in a river or lake can be handy though.

I can understand the advisability of restricting some bodies of water. However, in N.J., you can only land in the Hudson and taxi up to their shore. There's a Greenwood Lake that is half in N.Y. and half in N.J. A seaplane can land in the N.Y. section and taxi into N.J., but the majority of the states are fairly enlightened into sharing their assets with all of their fellow countrymen.

A lot of the restricted ponds are for drinking water AND are too small to use anyway. Not all of the bodies are listed. Local governments will pass a law and then not tell anyone except the local water cop. Surprise.

One of the neat ones is no restriction against airplanes. There's just a 10 MPH speed limit. If you get your garter caught in one of these problems, you can try to explain to the Marine Patrol that there is no law forbidding airplanes, but the speed limit is for boats, not snowmobiles, not bicycles, not airplanes, only boats. Also, this is what you understood, apologize and promise to go away, unless you live on the lake. Then maybe you can have your yard declared a seaplane base and put it on the sectional, while you take on City Hall.

On legality, you know that even though you have a ton of ratings, if you don't have a single engine sea (SES), you can't take a passenger up for water landings. Generally, an insurance company won't cover you for solo water work until you have your SES. However, it is often possible to get a land checkout. Then the insurance company will cover you to fly around only as a land plane as long as you stay off of the water until rated.

On the water, as in the air, the boat on the right has the right of way. Pass on the right when overtaking. Head on, each craft alters to the right. FAR part 91.69 states, "Each person operating an aircraft on the water shall in so far as possible, keep clear of all vessels and avoid impeding their navigation, and shall give way to any vessel or other

aircraft that is given the right-of-way by any rule of this section." Of course, the less maneuverable craft (sailboat, rowboat, etc.) has the right of way. In other words, keep out of the way.

Speaking of legality, one couple bought a used 250 through Lake. They had it one week when the husband got a call from the DEA. He was told they would like to have a look at his airplane. He said, "OK, if I'm there when you look at it"

The agents came and started nodding their heads sagely saying, "Yes, that's it" The owner asked what they saw. They had spotted a patched up hole in the cabin that matched a gummed up hole in the fuel scupper. The owner asked, "What does that mean?". He was told that this showed that a waterbed full of gasoline had been in the rear seat The blocked holes showed where the plastic hose with a squeeze ball had passed through the wall of the fuselage to the scupper. The scupper drain, although now open, had been plugged up. The fuel cap was left off of the fuel tank. By squeezing fuel from the waterbed mattress to overflow the scupper into the fuel tank, the airplane had a range that would easily make a trip from South America to 'most anywhere in the U.S. DEA agents have a right to impound any equipment used in drug running. The owner asked, "Are you going to take my airplane?" They replied, "No, the previous owner did it" The owner asked, "How do you know?" He was told by the agents, "Because he's one of our boys."

The smuggler was a DEA agent who had gone bad. They had been keeping an eye on him. Actually, the DEA can take your airplane for just having a length of plastic hose in it. Yet you may need it for transferring fuel from another airplane, in the islands, where fuel is not available. Another thing that can raise the DEA's suspicions is a radio altimeter in a Lake. A night landing can be made on the water with a radio altimeter in shallow ocean water. Drugs left underwater can then be pinpointed with a GPS.

To prevent theft of their airplane, some Lake owners, particularly in the Florida area, have a secret hidden switch. This switch allows power to flow from the battery to the master switch. If I had one, not hidden but showing, I'd label it "Ejection Seat".

Flight examiners are a lot like flight instructors. Their personalities differ and sometimes their approach to a water rating is different from the next fellow's. While not too many of us normal people look forward to a check ride, some may. But they're probably into whips and chains, also. Believe it or not, almost all flight examiners are programmed to pass you. They've been there. They want you to pass.

All you have to do is repeat the passing maneuvers you've shown your instructor you can do. If you couldn't do them and hadn't done them, the instructor wouldn't have recommended you for your rating ride. So everyone is on your side. Study your manual, don't talk when you are paying to be listening. Bring up to your instructor, any areas that are bothering you. Know how to do the weight and balance. Find out the inspector's weight and do one in advance. Know the answers to some of the standard questions, for instance, the papers required in the airplane. How would you pick an abort spot in a small lake (or a short, wet, grass runway)? Answer, there are no charts for Lake distances. The certification was made before charts were required. So taxi down, eyeball it and pick an abort point and abort if you are not off at that time.

If you are in the air and want to know if a lake is big enough to go into, measure it. At 60 MPH, one minute is a mile of lake. Fly both ways and take an average. At 90 MPH, a mile is 45 seconds and 23 seconds is a half mile. 2000 to 2500 feet is enough room to get off of a lake safely. No mountains on the end of the lake, please.

On the water you can draw a line. Taxi across the abort spot. Hurry to the end of the lake for a takeoff. The first wake will be a warning. Then the bubbles will show on the water where you drew the line with the hull.

Upstream or downstream landing no wind?

Explain symbols on a sectional, especially seaplane bases. Know what the numbers mean about altitude in a grid in a sectional (I've heard it asked on a seaplane oral). Know the hydraulic numbers for a Lake. Remember 350 PSI for precharge. Normally the system charges to 1250 and kicks on when the pressure drops to 600 or 700 PSI.

I know of one examiner that says this is for a Seaplane Private, so I will ask many Private oral questions. He should know these answers. I can't argue with that. The next examiner says he has passed his Private. The examiner says he's not going back into that. I'm here to add his seaplane rating to his Private license. "I'll ask him some questions about the Lake and water work. Then I want to see his water work." I can't argue with that either.

It is hard to find a FAA inspector qualified in the Lake. It is almost certain that a rating ride will be with an examiner. It really shouldn't matter. If you can do the job, you deserve the rating.

Check your FAR's. There is a lot of maintenance the pilot is allowed. Also, others are a no-no, and a mechanic must do the maintenance and sign the log book. Use ACF50 on aluminum, but LPS3 on steel. You as the pilot are allowed to fog and lube your watercraft.

I find that, except in a couple of exceptional cases, four hours of flying in a day is about the limit for learning. If more time is spent, it is not nearly as productive. The learning curve drops way off after fatigue sets in.

On legality, the 250-270T must have an operating rudder trim tab controlled from the cockpit.

I have mentioned that there are differences in instructors. None of them are in it for the money. A wealthy flight instructor is an oxymoron. In that respect, they are all alike.

I don't like to see a student change instructors in his or her first ten hours in a Lake. Then I like to see him get one to two hours with another instructor. I like to see this done again at the 20-hour point. It is good for the student to get a possibly different slant on execution of water maneuvers. Also, another instructor may pick up a weak spot that needs work that the regular instructor missed. I like to see a 25-hour program as required by some insurance companies. I can keep a student busy and learning the whole 25 hours. With that amount of dual, the odds of the student busting his butt go way down. You'll never hear me say crash course.

I know of one case where a Lake flight instructor ran off with his student's wife. I felt sorry for the student. He had to change instructors in the middle of the course. (True story.)

Chapter 20: Glass and Swells

What's the biggest bugaboo in seaplane flying? You've got it. Glassy water practice is one thing. Real glassy is the real thing. You can practice all you want on water that is nearly glassy. But your first real honest-to-goodness glassy will make a believer out of you. You cannot make a step landing on glassy. To try is to invite disaster. It can be done if there is debris such as newspaper, twigs, bubbles, etc. floating on the surface. But then, this isn't glassy. In real glassy you cannot see the water surface. You may see the bottom of the lake or the reflection of clouds, giving the illusion that the surface is a couple of thousand feet deeper than it is. Glassy is when the surface is not visible. A step landing attempt on glassy water would leave you as helpless as a night land landing with no airport lights or airplane lights.

A worse case scenario is a forced landing into a glassy lake. Your odds might be better landing in the tree-tops. I know of a Twin Bee with an instructor on board, that leveled out at 200 feet above a glassy lake in training. They stalled and dove 200 feet. They thought they were on the surface. Another case was a Cessna seaplane pilot who was circling to land on glassy. He thought he was circling at 200 feet until he hooked a wing in the water and cartwheeled. They survived and he said it looked like he was 200 feet above the water.

Another pilot was shooting touch-and-goes on a river with a circuit between each landing. He came around and saw only the river bottom. He was convinced that the dam had been opened and the river had been emptied while he was in the pattern, so he made a go-around. That was his first experience with glassy water.

These war stories are told to instill in you the invisibility of glassy water. This water is no less hard and no less forgiving, just because you can't see it.

In real life, landing close to shore or moored boats or anything can give you a clue as to your altitude above the water. If the water in your landing area is glassy with patches of ripples, land a step landing into the ripples.

There will be times when glassy water landings are unavoidable. So you must become proficient in them. Takeoffs and landings on water should not be made after dark. If you get trapped, make a glassy water approach and landing, even if there are some waves. Do glassy water landings on water if it is raining and your depth perception is impaired.

So after all this gloom and doom, respect glassy water, but practice so you are safe on glassy water. Let's talk about the way they should be done. Glassy water landings can be done well flying instruments and not looking out. However, don't do it that way. Look out the windshield some, as there may be a swimmer, log, etc., in your landing area. But the basic setup is instrument flying.

There are a couple methods of making an approach for a glassy water landing. I will first describe the most used method. Like an ILS, a glassy water approach is by the numbers. The airplane is not just flown by feel and eyeballing the approach. The ILS will get the airplane in when things are tight. Flying by the numbers will also give a successful glassy water landing.

The manual suggests a 200-foot rate of descent. I teach a 100-foot rate of descent. If the descent should reach 300 feet per minute, the airplane will ricochet on the touchdown. After the bounce, the pilot won't know how high he is, as his airspeed starts to unwind.

If the descent is at the manual-recommended 200 FPM and the rate is accidentally allowed to slip to 300 FPM, a solid hit and bounce is guaranteed. But if 100 FPM is the target rate and it slips away another 100 FPM, no harm done. The 200 FPM will make good glassy water touchdowns. The 300 FPM is a no-no. There are several important points in a glassy water approach and landing. Just as with a land landing, a good approach generally creates a good landing. So the approach for a glassy water landing is paramount. The important points are the "last point of reference", the rate of descent, lowest possible altitude over the last point of reference, power setting and air speed. Now let's put them altogether.

The approach should be started one-half to one mile before the last point of reference. This is generally a shoreline but could be something different like an island or a moored boat.

The approach to the last point of reference should include descending to the minimum altitude over this point. This could be ten feet or lower over trees. (You come in that low over runway end lights often). If the last point is weeds and you approaching over flat land, it wouldn't hurt to tick the belly with the weeds.

One caution, don't land in the weeds. One training flight landed beside the weeds. The fuselage was in open water but a wing caught the weeds. The airplane water looped right now. Tickling the belly is OK, as long as the touchdown is in open water.

Speed is important. It can vary between 58 and 65 depending on the stability of the individual Lake and the ability of the pilot to maintain a target airspeed. If training or practice is simulated on a choppy day, use 70. Sixty is too close to stalling speed to fool with, if the air is not smooth and stable. If you can hold 70, you can hold 60 on a smooth day. So practice at a comfortable speed in choppy air.

At 60, you are flying with a slightly nose high position and counting on the engine to keep running. If it were to quit at this point, you would be in a heap of hurt. However, there are many other times you could have a similar problem, for instance, engine failure above the clouds, on takeoff or over a large city to name a couple. If the airplane is not slow and not slightly nose high, you will not get a safe glassy water landing. So again, if you are hanging on the prop (behind the power curve), it is a calculated risk, but the proper way to make a glassy approach.

All of the models of airplane have the same ballpark power setting for glassy water. Of course the RPM is high because you have done your flow pattern and checked the gear position (twice). So set the MAP on 16 inches (19 inches on the 270T). This is a good starting point. As the speed bleeds off to 60, allow the descent to start while maintaining 60. Now comes the practical application of slow flight. Control the rate of descent (target 100 FPM) with the throttle. Control the airspeed with attitude. If the airspeed should start to increase over 60, add a little back pressure. This will slow it down. If the airspeed should be fading below 60, ease the nose down ever so slightly. If the air is smooth, it is not hard to maintain 60 or whichever speed your airplane best does a glassy water approach and landing. Check the rate of descent. If the airplane has leveled off (VSI says 0), reduce the MAP by 1/2 inch and give the VSI and airplane time to stabilize. This is why

we start up to a mile away. It takes time to get properly established on speed and rate of descent. If the VSI now says 50 feet down, reduce another 1/2 inch to 15 inches on the MAP. If the VSI now settles down on 100 feet down, you've got it. That is you've got it, if the airspeed is still on 60. If it's not on 60, correct the nose angle. Use your trim tab. Don't wear out your arm. Remember, the proper way to trim is to run the trim lever (in small touches to the limit), until the pressure is relieved from your hand to the control wheel. Take your hand slightly away from the wheel. If the airplane stays steady, you are in trim for the maneuver.

By the same token if the VSI should show, say, 300 feet down as you begin the maneuver, add a half inch of MAP. Let things stabilize. If the VSI now shows 200 FPM down, add another 1/2 inch of MAP. This may give you 100 FPM down. If it gives you 0 or only 50 FPM down, ease off the power just a tad. In general, 1/2-inch increments on the MAP will give you the desired descent of 100 FPM, without overshooting the desired rate of descent.

If close to touchdown and the reading shows 200 FPM down, leave it alone. It is still going to be a good landing. Sometimes everything will be perfect on approach. You will see 100 FPM down, 60 on the IAS and then close to the surface (either unseen or pretend unseen) the VSI will go to 0. A ground cushion (pile up of air under the wings) will stop the descent in the denser air. Quickly check the airspeed. If it is starting to ease off, ease the nose down, just barely ease it. If the airspeed maintains its approach speed, wait it out. It won't fly at about 2 feet forever. The other choice is take off 1/2 inch of MAP. This choice may be needed if the landing area is getting short. The airplane will then sink through the ground cushion to the water. Sometimes the touchdown is so gentle only the water will be heard with TLC on the hull. Do not cut the throttle until you know the airplane is on the water to stay. The airplane may drift back up from the water. It can't be seen. The drift up might be 2 inches or 15 feet. You won't really know, if it's real glassy. Just maintain power and attitude and let the Lake re-land itself. On either the first touchdown, or in case of a drift up and re-land, allow the nose to ease down only a tad on the water. Do not make a positive down pressure. When the airplane is on the water to stay, cut the power.

Ground effect is the piling up of air under the wings just as snow piles up in front of a pushed snow shovel. Generally, the "thick" air gives more lift and the rate of decent slows or causes the airplane to level off.

Sometimes it causes the airflow under the horizontal stabilizer to change, or lift the tail. Ground effect can affect only the horizontal stabilizer. This, of course, changes the attitude of the airplane and as the nose drops a little, the rate of descent increases. To prevent hitting the water hard (in excess of 200 FPM), add back pressure to the wheel. On a check ride, if you flare because you can really see the water (glassy is only simulated), the check ride is failed. However, if the nose starts down (as seen on the horizon), back pressure on the wheel is allowed on a check ride and is really needed on real glassy. Attitude must be maintained especially close to the glassy water. Add enough elevator pressure, so that the attitude of the airplane is constant. This attitude should give the proper 100-200 FPM as established on final.

Remember, don't cut the power until the airplane is on the water to stay. If the airplane bounces or drifts off of the water just maintain attitude and power settings until the airplane again lands.

Any type of correction of a glassy bounce can be "upsetting". Only maintain attitude and approach power to obtain a successful recovery.

There is one other choice, as the nose is at a slight up attitude. A go-around can be made. Add one half throttle. Then, if the elevator (through feel in the control wheel) feels solid, gently go to full throttle and climb out. If full throttle changes the airplane attitude

to a nose down position, due to low airspeed and ineffective elevator, reduce the throttle to 1/2 power so as to prevent the high engine location from driving the nose down at reduced speed. Reduced speed reduces the effectiveness of the elevator. Half throttle stabilizes the aircraft attitude.

In demonstrating the glassy water landing for a rating ride, the water most likely will not be glassy. The maneuver will be simulated to show you have the fundamentals. If you do flare, you have not made a glassy water landing and will probably get a pink slip and sent back for more training. If it is choppy during the flight test and near the surface, the attitude held picks up a down draft and the airplane is going to hit too hard, then flare. Explain that you had to flare to protect the airplane. Ask to repeat the maneuver. The examiner may not require you to repeat if the approach was good up to that point. Or he may say all right, try it again. If it happens again, tell him that you believe the weather is too erratic to allow a proper glassy water touchdown but would he accept a description of what you would do if the air was smooth. Then let him make the decision.

Let us go back to the beginning of the glassy water approach for a moment. Start down from a mile or so before the shore if that is your last point of reference. Remember this gives you time to set up. Be set up about a city block before the shoreline. Be low over the shoreline.

If you are too high, cut the power and descend to what you believe is the visual glide slope (at 100 feet per minute) to just clear the last point of reference. Then put in 16 inches MAP. If you are too low, add power until on the visual glide slope (don't pick up speed). Then reduce to 16 inches MAP. Get it shook down a block out. After you have passed the last visual point of reference you will no longer be able to see the landing surface, due to glassy water, so no drastic changes are allowed. In real life on glassy, if you are not squared away, make a go-around and get set up before reaching the shore. A common mistake is not starting far enough away to get set up for the approach a block from the last point of reference. If using an island, you do not have to go over the island. Go by low beside it. Make sure there are no wires out to the island.

If you are too high over the last point of reference, you may overshoot the whole lake. At 60, you'll go about a mile in a minute. At 100 feet over the shore and at 100 feet per minute descent you will land one mile down the lake. If you are 200 feet high and the lake is 1 and 1/2 miles long, your 2-mile touchdown spot just won't cut it.

Now let's talk about how some instructors teach glassy water landings. Some prefer attitude only. The nose would be slightly high and a speed of all the way to 70. It would be an attitude approach only and the belief that the rate of descent will work out low with the proper attitude. Other instructors I have talked to, use a combination of numbers and attitude.

I believe using the numbers as I teach and as I've gone into detail in this chapter, will give a pilot the correct attitude.

Use whatever system works for you or that you have been taught. In my humble (?) opinion, I believe an ILS approach by the numbers works and also a glassy water approach by the numbers works. The choice is yours.

The glassy water takeoff is not near as critical as the landing, but let's look at a couple of points about it.

It feels good on the step in glassy. Not a ripple, smooth as glass, love it. On an underpowered (65 mph) light plane on floats it can keep them grounded (watered?). The so-called suction of the smooth water to the floats won't allow the floats to climb onto the step or if on the step, the floats may be unable to break free of a smooth surface. This problem can sometimes be solved by either taxiing in a circle and using the rough water of the wake to break the suction, or getting in behind a boat to get air between the floats and the otherwise smooth water.

The Lake started with a smooth hull. A fellow named Bradway decided that the skin was dish-panning a little between the ribs in the hull, so he designed a flat piece of metal for each side of the hull to strengthen it. He put a "V" (like angle iron) in the plate to make it strong. But the front end of the "V" was closed up.

Lake looked at a couple of his modifications. They liked them. They added a couple more slabs (but with narrower slabs of metal). They also improved the design by opening up the end of the "V". Now when the nose rose on a water take off, air passed through the "V" channel and bubbled at the step and helped prevent suction from holding the airplane on the water.

These are called hydro boosters, as the takeoff time on the water has been improved, particularly in glassy water.

Lakes have never been unable to get off of glassy water. Some small engine airplanes have this problem. But Lake's takeoff performance has been enhanced, even though there never was much of a problem.

The big difference that shows up is the size of a turn in an airplane with hydro boosters compared to a smooth hull bottomed airplane. The airplanes without the hydro boosters (strakes) tend to skid out of a water turn.

They are not as water manageable. Their turning arc on the step is much larger than the airplane with strakes.

If landing on glassy water in a winding river bed, there may not be room for a glassy water approach and touchdown. The wings must be level for any water touch-down or there likely will be damage to a sponson. A short straight stretch must be picked. Land a step landing close to shore. Preferably have the shore on the left side of the airplane for a good look. Use the grass or bank or trees in the water to judge your height.

You can probably get away with a safe step landing close to the bank, but even then judgment may be off by two feet, as the hull may touch an instant or two before expected. If a bend in the river is approaching, drop a wing after the hull is on the water and start the turn. Keep the nose high enough to prevent a water loop. A Lake is happy when the nose is higher than the horizon on the water and lower than the horizon in the air. You'll be happy if the Lake is happy.

Chapter 21: Emergencies

The possibilities of an emergency in a Lake can be large. The probabilities are very small. First of all, if you have an impact accident (generally not the airplane's fault), you are in the most rugged light plane built. You have a better shot at staying out of the Band-Aids than in any other light airplane.

Let's look at the worst possible emergency. This is an in flight fire. There is good news and bad news and good news. The good news is, you won't know it. It will probably be an engine fire and you can't see it. The bad news is the engine will run poorly or quit and you'll have to land short of your destination. Like, maybe right now. The good news is the fire is not in front of you so you'll be able to see on your forced landing. The people in the airplane should not be burned. The metal tail and controls should not be damaged enough to prevent controlling the airplane. If you decide on having an engine fire, you might as well have it in a Lake. Having the fire in back of you beats having it in your lap.

Now for the real good news. A fire in a Lake is an extreme rarity. It has happened, but you're about as likely to win the lottery as have this problem. Phil Adams says next time; he'd like to win the lottery.

One pilot flew but forgot to remove the snaps on the front canvas cover on his 200. He toasted his engine something wicked. Lake no longer sells this cover. If "cover removed" was added to a checklist, you should be able to use the cover I would think.

If the cabin should fill with smoke, turn off the master (battery) and alternator switch. You may have to hand pump the hydraulic but the engine will run fine and the smoke will quit.

If the alternator or generator should fail and you don't have an idiot light and haven't looked at the ammeter for awhile, the first indication you might notice is failure of the Loran, as you run on just the battery. This might cause you to look at the ammeter. This in turn might cause you to turn off all of the electric switches in the cabin.

Master warning lights (idiot lights) were not required until the 250's were built. If you have an older airplane, you might consider adding one. The macho argument that you'll just check the gauges does sound right manly, but being human, few of us watch gauges. A red light will tell you, now look at them. I recommend adding the idiot light, particularly for IFR operation.

If you have an electrical emergency, smoke in the cabin, high amperage reading, surging lights or instruments there is a procedure. Don't take time to "cross" yourself. Knock off the master switch and alternator. Do it first and quickly or you may get out the marshmallows as the smoke becomes fire.

The odds are that an electrical source started the problem. The sparkplugs are firing

from magneto impulses and the master switch off won't affect the plugs. With the master switch off, the only two items that are hot (direct off the battery) are the clock and the bilge pump. The pump can be turned off, but that is not likely where the problem is.

The next step is turn off every electrical switch in the airplane. Then the master and alternator switches can be turned on. Wait a few minutes. If the smoke does not reappear, the electrical switches can be turned on one at a time, with a couple of minutes between switches, to check for smoke and the amp gauge. If one of the switches produces problems, turn it off.

Just leave off the switch that causes the problem. If it is the hydraulic switch, you will have to hand pump for hydraulic pressure. If one of the radios caused the problem, you probably have redundancy. If it's panel lights, you should have a flashlight or two anyway if it's a night flight, etc. If the flashlight in your airplane sits for long periods without use, put one battery in backwards. The batteries will last longer. Put them in correctly before a night flight.

Now after all this, if it were me and it was a nice day, I wouldn't troubleshoot in the air at all. If I were on instruments, I would try to get the radios back. But in real life, if I can see the ground, I'd just fly to an airport with the master switch off. If the smoke was gone, why would you want it back in VFR weather just to know in the air where the problem is. So now you know how to troubleshoot, but if the weather is good, you may find it is better to proceed with the master switch off.

If the master or hydraulic switch is off as you fly along and you use your trim tab, the hydraulic pressure will begin to drop. If you lose all of the pressure, the trim will feather in the wind. It won't take much elevator pressure to hold the airplane level.

When you get ready to land, make sure all of the electric switches are off. Turn on the master switch. If there is no evidence of fire, turn on the electric hydraulic switch (it's really a circuit breaker). When there is hydraulic pressure, put down the gear. After the green light for the gear, put down the flaps. If there is no indication of fire, leave the master switch on and land and taxi on in.

In turning on the master switch, if there had been any indication of a problem, such as smoke or an erratic amp meter, turn off the master switch.

With the master switch off, to get the gear down and flaps down you will have to use the aux hyd hand pump. This puts you in the same position as having the electric hydraulic fail. If the airplane is whole, except the hyd pump switch won't stay on, or if it stays on but the pump won't put out any pressure, you will have to go to the armstrong method. If the gear or flaps are in a different position than their control levers, put the control lever to neutral. The trim lever is spring loaded to neutral. Pull out the aux hyd pump handle. It has a sharp clip hidden on the underside of the grasping part of the pump handle. Pull it out with your thumb and fingers on either side of the ball type grip. Don't wrap your hand around the handle unless you have a Band-Aid in your pocket. The manual indicates you should pump up full pressure before moving a gear or flap handle. I feel my antiquity between 700 and 900 pounds of pressure. There's no way hardly anybody but Schwarzenegger is going to get the full 1200 pounds per square inch of hydraulic pressure. Pump until you're pooped. Then put the gear handle down. If you are lucky, the gear may go all the way and show a green light (if the master switch is on). If you were real lucky, you wouldn't have had to pump at all. The hyd pressure will probably show the precharge (pumped up nitrogen) in the hydraulic accumulator. The precharge pressure should be 350 PSI. Now if there is no green light or no green light and the gear is obviously not all the way down, put the gear handle back in off (the half way position). Again pump the pressure up as much as practical. Now put the handle down again. This should do it. If it does not, put the gear handle back in neutral and try it again.

Don't leave the gear handle in the down position and pump. You may not get the gear

down all the way. If not, again put the handle in the off position. Most airplanes have a detent for off. Some don't, then feel for the flat spot or listen for the hyd fluid to stop bypassing. You don't stand as good a chance getting the green light pumping with the gear handle in the down position. But when the gear handle is in neutral, pressure built up, and then, gear handle put down, the bump of pressure may lock the gear down.

Hydraulic pressure holds the gear lock in a locked position. Precharge pressure may release the lock, but if the hydraulic pressure won't pump up, don't put the gear handle down. It could release the locks but the gear would only dangle without hydraulic pressure.

If you have the landing gear down and locked, it's flap time.

Now you can start over and do a little pumping for the flaps. Again, pump up the pressure with the flap handle in neutral. When the pressure is up, put the handle down. Flaps don't take as much fluid as the gear and you will probably get your white flaps down light on the first try. In that the trim may be used after getting the gear and flaps down, the pressure may drop off. We need pressure in the system to hold the gear in position. So pump the pressure back up if it gets low. Hand pumps can rob fluid from the brake system when moving gear and flaps. This will be replenished if the pressure is hand pumped up for landing. Then you should have brakes. If the brake pedals are dead (check in the air after hand pumping), you'll know as the brake pedals will press all the way down. Reach down and pull the pedals back up. This may recharge them. This whole procedure is time consuming, so don't wait for the traffic pattern. Get squared away early. If the hyd pressure is low on final, go around. Get the pressure up and then land.

If the hydraulic system needs a precharge (nitrogen) in the field and the mechanic is not familiar with Lakes, you can give him a hand. Bleed the hydraulic pressure to zero. Use the flap bypass and then flap handle up. Then have the mechanic charge the system to 350 PSI.

Next hydraulic problem. Suppose the pump cycles. That is, it comes on, pumps until the limit switch turns it off at about 1200 and the pressure drops fairly fast, to 700 or so, and the pump comes on again and this annoyance continues. There is probably one of three things happening. The trim control could be in the bypass position, allowing the pressure to continue to bleed off. Normally, the lever is held in the off position by a fore and aft set of springs. If your seat cushion has squished over, it may be holding the lever in the bypass position, or somebody has stepped on the lever and bent it over so it drags on its guide slot. If so, just bend it back so it is free in its slot. The other possibility is, good living has given you thunder thighs and the lever can't slide past your leg. But that would be a personal problem.

The second possibility to a cycling hyd pump is an internal leak. This is a maintenance repair. If the pump is running so often that you fear it will have a heart attack, turn it off. If the airplane gets out of trim, turn the switch back on, trim and turn it off again. It would be a shame to bum out a perfectly good pump. Be sure it's on again before landing. Do your flow pattern or checklist and land with the pump on.

The third reason a pump might cycle is you are pumping fluid overboard due to a leak. That would be a real good reason to turn the pump off.

You can troubleshoot this one if you want to. The leak is most likely in either the flap system or the landing gear system. Turn the hydraulic pump off. Put the gear handle off and the flap handle off. Off is the mid position. On most airplanes, there will be a detent at the off position. Now turn the hyd pump back on. If the pump starts cycling, forget it. Head for the water and make a no-flap landing. Or if you have pressure, put the gear down while you still have fluid (it still might be an internal leak in the master hyd cylinder). The pressure could cycle but no fluid lost. However, if we suspect the hyd fluid is leaking, get the landing gear down if you have 1200 pounds. Don't put the gear down at

700 pounds. This could leave you with a dangling gear and in purgatory. You're between two worlds. You're neither a seaplane nor a land plane. You do have one shot. The hand pump has a little fluid beyond the electric pump quantity. Try it, it can't hurt. But if putting the gear and flap handles off and turning the hyd pump on has stopped the cycling, we're on to something.

Put the gear handle up (the gear is still up). If the pump cycles, the leak is in the gear system. If it doesn't cycle, put the gear handle back to off and the flap handle up (the flaps are still up anyway). If the cycling starts, put the flap handle off. The leak is in the flap system. Make a no-flap landing. I teach at least one takeoff and landing with no flaps on both land and water. I don't want a student of mine to have his first one during an emergency. Remember, we don't raise the flaps until we have 80. If you are below 80 with the flaps up, you are too close to no flap stall speed. So on no flap landings, both land and water, use 90 for an approach speed and then bleed the airspeed off close to the surface. Don't stall higher than you're willing to fall. There is one choice that is pretty safe. If you have a hydraulic problem, you can always make a water landing flaps up. The airplane is flying, so don't turn a problem into something dangerous. Land so the mechanic doesn't have to drive so far. In winter, land on the hull in the snow if you don't trust the gear.

Here's one that might get your attention. You've just loosened your seat belt; you're on your knees facing the back seat getting a Coke out of the cooler and the rear spring on the trim control breaks. Who says flying isn't exciting? You now have a runaway trim and the airplane has a mind to make an outside loop. After you get off of the ceiling and grab the controls, pull the trim lever back and re-trim the airplane. This trim could go either way, depending on which spring broke under the floor boards. Now you have a tiger by the tail because you can't let go of the trim lever.

Have the person in the right seat hold the trim lever in the neutral position. Oh, you're solo today? Take a match book and jam it in the slot beside the trim lever to hold it from slipping. Oh, you've given up smoking? Well, use a checklist, or a sectional or a couple of folded one hundred dollar bills jammed into the trim lever slot, to hold the trim in the off position. Now you can drink your Coke.

If the airplane starts sinking, oh say, maybe it hit a submerged rock or a hard landing and shed a few rivets or whatever, get it in the air. If there is a good chance of structural damage, head for a beach or shallow water. The gear down may save settling too far in shallow water. Airborne, if the controls are intact, is the best choice.

One fellow flying in Canada put some holes in the belly. He took on too much water to get off. He then left his two fishing partners on shore and was able to get off solo. He flew to a seaplane base and sent a float plane back two hundred miles to pick up the two abandoned anglers.

A lot of emergencies are either brought on by human error or by turning a small malfunction into an emergency. For instance, one former Lake owner used to return to his lake home after work and after dark. After hanging three bent up sponsons in his garage from three separate landings, he took the pledge. A lot of his night landings were successful, but don't count on always getting away with it.

Over in the Mediterranean, a Lake owner lost an alternator. He landed in the sea and taxied up a rocky beach and then had to get a bulldozer to move more rocks. The airplane was damaged beaching it. Forty miles away was an airport. As long as it's VFR, a dead electrical system is nothing. Go to a runway.

Safety is invisible and the result of safety is that nothing happens.

The good book (POH) says if there is fuel in the aux tanks in the sponsons and the Lake has been on the water, the fuel in the aux's cannot be used until the tanks are sumped. So the law is, land on land, sump the aux tanks and then you can use that fuel.

As an aside, in eleven years of flying this airplane, I have never seen any lake water in these aux tanks. Possibly the only way it could get in is if the wing went under, until the fuel cap was submerged. I've never seen a sponson that far under. You have a greater chance of a mud dauber plugging up the scupper drain and some rain water then filling over the main tank gas cap. That one I know has happened.

I know of four cases of locked elevators that have occurred in flight. I'm sure it has happened to others. When the Lake sits outside in the rain, water can run down the engine cowling, pylon and on into the hull. Now the control rod to the elevator is under water. If the pilot says, I flew this airplane last and drained it and put the plugs back in, it should be OK, look out, it's colder at altitude.

In the first case a pilot found his elevator control was frozen on preflight. So he put it in a warm hangar and melted the ice. So far, so good. Then he took his airplane out and flew it. However, he didn't drain the airplane first. The belly again was an ice wagon and the elevators locked solid. He tried to come back using the trim tab. If you are short of the runway and add power the nose goes down. It happened in this case and all was lost. Before you get too critical, think of some of the dumb things you've done, but gotten away with. So remember that, "but for the grace of God".

The other case I know of had happier results. The gentleman, although unnamed, is well known to all Lake people. When his elevator froze up in the air, he managed to return to the airport using the trim control as an elevator. Unless the airplane has an electric trim (operated by the left thumb at a slow trim speed), the pilot is busier than a three-legged dog at a flea circus. That right arm has to just touch the throttle, tweak it again (changing the attitude) and then quickly re-trim.

In advanced training, I teach this emergency maneuver. If it hadn't already happened to some people, I wouldn't fool with it. It is not just ice that can cause a loss of elevator control. Broken linkage could do it. A jammed elevator could cause it. So the skeptic says, "How can that be?" Some years ago a DC8 freighter taking off at JFK picked up a piece of concrete from the wheels into the elevator where it joined the horizontal stabilizer. It settled in tight so the control wheel couldn't be moved forward, so the DC8 rotated to straight up and did a hammer head stall at 200 feet and went straight down. Freak accident? Of course. Likely to happen again? Probably not. Could you handle a locked elevator? Maybe. Would you like to practice one, so you're possible first real one has you prepared? (What do you mean, maybe?)

Let me tell you the way I train this exercise. First, I hold the control wheel on the column where it enters the instrument panel. I always get graphite on my hands, but it's for a good cause. The pilot has rudders and ailerons and trim control. Only the elevator is inoperative. If things got tight, the student can overpower my grip. But he would have to be quick. If a landing looks sour, my hand flies off of the control. We don't bend metal to prove a point.

The elevator failure is generally started at 2 or 3 thousand feet. The reason is, particularly the first time, it takes some work to establish the descent. The approach is very much like a glassy water approach. On the first couple of attempts, get the flaps down, establish 100 to 200 feet per minute rate of descent. This will keep the right arm flailing between the throttle and trim until stabilized. Shoot water landings the first couple of times and don't worry too much about the touchdown point. You can't flare, so pull off a tad of power on touchdown. This will raise the nose a little higher, as the airplane is behind the power curve. Ease the power off after touchdown and below flying speed. Don't jerk the power off. You don't want the nose to pop up and the Lake to become airborne.

Now, on a real freeze-up of the elevator, the lakes probably aren't open. A river might be.

For practice, put the gear down and see if you can hit a 5000 foot runway. If the

touchdown looks like nose wheel first, pull some power off to raise the nose.

If it happens in real life you might think about a 10,000 foot runway and make your aiming point about a third of the way down the runway.

There is another icing item to keep in mind. If the flight is water work and the air temperature is slightly above freezing, remember that a climb of as little as 1000 feet can drop the temperature 3 degrees or more. So after water work at 33 or 34 degrees and a climb to pattern altitude, the gear may be frozen in the up position. Dropping the gear right after takeoff from water will prevent it from freezing in the wings and the water will dump out of the wheels. If you haven't done this and the gear won't extend, go back to the lake and the water will probably melt the ice. If the gear will cycle in the water, gear up and take off. In the air, right after takeoff, drop the gear and proceed to the airport. Now comes the tricky part. If the brakes haven't frozen, you're a hero. If the brakes have frozen, it will be a short landing. If only one brake has frozen, you may have a new act for the next air show.

If you are concerned about getting the airplane back to the airport (the lake might freeze over during the night) and you are a slight risk taker, try this... Leave power on and touch the wheels ever so lightly on the runway. If the wheels turn, land. If one or both is frozen, head for the lake and let the airplane freeze in. Don't land with locked (frozen) brakes, if it can be avoided.

When it is around freezing, don't taxi through any puddles in any airplane, if they can be avoided. The splash could cause frozen brakes or even a gear could freeze in the well from just taxiway pools of water.

These war stories I bring up are in no way supposed to intimidate you. We discuss the hazards that can be found and the methods to make the whole operation safe. So with that in mind let us talk about forced landings. First of all, engines very seldom quit. In fact, the engine is more likely to lose partial power than complete power. This can get you closer to a safe landing spot than a complete failure will.

However, let us look at the complete engine failure scenario. Start with takeoff. If an engine is lost at a very low altitude (50-100 feet), all you can do is push the nose down to get close to the ground. Quickly pull back to land on the wheels or keel in a level attitude. This is too risky a maneuver to ever practice. Just get close to the ground before stalling. Next let us look at engine failure at about 200 feet. Your airspeed will be low, so the nose should be pushed down immediately and instinctively. If you have time, aim for your contact point but first the nose must go down or there will be no other choice. Fly as far into the crash as you can. Nose up some and hit at stall speed. Don't stop thinking. Aim between two objects and let the wings take the brunt of the impact. If the fuselage is slowed enough, this rugged airplane should help you survive.

As we get higher and experience an engine stoppage, the options improve. The nose is pushed down. Look for an airspeed of 85. The Lake lands best under power. Power is energy. If the power (engine) is gone, make up the energy with speed. A dead stick approach at 70 works fine until the flare is needed. Pull back on the wheel and the nose will come up. But kinetic energy for that high rate of descent will get you. At 70, the rate of descent won't change. The airplane hits like a ton of bricks.

DO NOT TURN BACK TO THE AIRPORT. It takes almost 1500 feet to turn 180 degrees. Therefore, a turn should not be much more than 30 degrees. Also, on a forced landing, if you can make it to a runway, aim one third of the way down the runway. The Lake has the glide angle of a dead cat, so you are not likely to overshoot. If you should overshoot, S-turn on final. Do not put out the gear and flaps until the lake or runway or farmer's field is carved in stone. The tendency in a Lake is to undershoot on a forced landing. Keep that nugget in your hip pocket, if it's ever your turn in the barrel and you have a forced landing. The old truth is you can't stretch a glide. Well, at least that is 90%

true. If on an engine stoppage, you see you can almost make it to a lake for your forced landing but not quite, try this.

Do not put out your flaps and gear, or this will really bring you in short. Fly at 80-85. If 85 will bring you into the trees, short of the lake, use 70 for a glide speed and clear the trees. You won't get a roundout at 70, but take the hard landing. Making the water beats the trees. Don't put the flaps down until over the water, or the touchdown on the water is more than assured. Land flaps up if flaps down is doubtful for making the water.

The glide stretch is to pull the prop control back all the way. This will give the airplane 100 feet per minute less descent and may make the difference in getting to a safe touchdown spot.

If a tree landing is all you get, leave the gear up and the flaps down. Do a rough water landing. Stall it out, on the treetops into the wind. If the touchdown area is hilly (wooded or not), land down hill. Decelerate slowly. Don't stop on a dime going uphill. Shed wings, etc., to take the impact in increments. If you land on a 4-lane highway, land with the traffic unless there isn't any on the other side. If a car impact is imminent, head for the grass in the median. Fly the airplane into the crash. Pick the best spot you can at the slowest ground speed, and use the airplane wings to take the impact shock. Of course, these are optimistic guidelines. When the time comes, do what you gotta do. Just don't land behind the little old lady that sees you in her rear mirror and locks up her brakes.

Most forced landings in light airplanes are a result of fuel starvation. We all cluck our tongues when it happens. However, unless we as individuals allow for a generous reserve in the tank on landing, each of us is vulnerable. The law calls for a 30-minute reserve when VFR. As far as I am concerned, I get twitchy when I have less than an hour in the tank. Thirty minutes in a 200 is only 5 gallons. If you are on a cross-country, what's wrong with landing 50 miles earlier for fuel? What if somebody has blown a tire on the runway and your destination is closed? I'd rather have an hour left than half-an-hour to look for another gas pump. You don't have to accept the FAA minimums. Make your own if they are greater. You'll snap less button holes in your shorts if you plan on an hour reserve.

There are three ways of determining how much fuel you have left. One is the fuel gauge itself. Another is a fuel totalizer, if you have one. The last is knowing your airplane and its fuel burn according to your watch. If any one of these three methods show you're getting within the sweaty-palm range of low fuel, disregard the other two and land. Even if any one of the methods make you land before you believe you are low on fuel, play it safe and land and check. Say it was a faulty fuel gauge. Even so, next time don't count it out. It may not be lying next time.

If you do make a forced landing and can land on a known hard surface, put the gear down. A highway or airport can be eligible but not much else. If landing dead-stick in a farmer's field, land gear up. You probably won't sustain any damage. If you don't hit anything, there is seldom any damage landing on the hull. If landing in the treetops, stall it in gear up. (Don't want to flip it, do we?) If landing on a hard surface gear up and no sponsions touch, you may have to paint a skid mark on the keel. Bottom line, almost every time, a forced landing in a Lake should be gear up. It's proven to be the cheapest damage control.

What if the nose gear won't come down? Recycle the gear. If it comes down now, you're OK. Have it looked at. What if the main gear won't come up, while the nose gear is stuck up?? Dive and do some hard pull-ups. Try pushing over the top (weightlessness) to release whatever is binding. Might work, might not. If the main gear will come up but the nose wheel won't come down, put it in the water. If it is winter, land at the maintenance base nose gear up. Have the emergency equipment out, but actually all you'll probably have is a couple of nose gear doors ground down a little. What if the gear won't come

down or you have no hyd pressure and don't dare to put the gear handle down? Land in the water in summer and on the snow in the winter. Lakes have taken off and landed in snow on the hull with no problem or damage. I've got the video to prove it.

Suppose you hit the starter and nothing happens. If the clock is running and the lights will work, etc, the battery must be OK. But if nothing happens, particularly on the Buccaneer, the starter solenoid is probably stuck. Some are located on the front of the engine. Open the cowl and tap only the starter solenoid. Most LA4-200s have the starter solenoid under the right wing on the inside of the fuselage. Four good size screw heads will show on the outside. Give this screw head area about three hard hits with your fist and say the appropriate incantations. Then try the starter again. I have had this system work. I'm glad I was on land when I had to do it. Not guaranteed, but give it a try.

The Lake can be hand-propped. I've seen a video of the operation. Sit by the pylon under the engine, wrap a leg or arm around the pylon brace and have someone knowledgeable in the cockpit. It is not easy but could make a difference with a dead battery on Lake Faraway. This is best done if you are big and under thirty years old.

If the starter Bendix won't engage the starter to the engine, sometimes it can be coaxed. On the EP and the 250, some rear cowling will have to be removed. On these two models with the back cowling opened and the 200 with the cowling intact, we can reach the starter Bendix. The starter gear can be pulled into the gear on the engine with a screwdriver or coat hanger. If it won't fully engage, wiggle the prop to encourage full engagement.

One pilot I know bumps the starter after every shutdown to engage the gears. This will leave the gears engaged if the Bendix gets lazy and it could help if a dead spot had developed on the starter motor. The propeller can now be hand-turned to move the starter off of the dead spot.

When you want the airplane to stop in a short distance on water, bury the tail. Wait until the airplane is below flying speed (50). We want to stop, not be airborne. Then pull back on the wheel. This will make for a fairly short run-out. In an emergency (i.e., rocks, shore, emerging swimmer) you may have to stop shorter using more drastic measures.

Turning sideways on the water is a maneuver reserved for advanced training. This method can actually stop the airplane within 200 feet or less of its touchdown point. This is exactly what a snow skier does to stop in short order. The speed again must be down to 50, or the wing on the outside of the turn can pick up flying speed and lift as the airplane turns.

The turn can be made in either direction. At 50, push on a rudder. Start a turn. But this time keep the wings level. The airplane can be turned up to 90 degrees of its track on the water. **KEEP THE WINGS LEVEL.** Don't do this if the waves are over 5 or 6 inches high, or the keel may dig into a wave and rotate the hull, dropping a wing. This would cause a sponson to hit hard.

The other word to the wise is keep the bow slightly high. A low nose can cause a water loop. This is guaranteed damage. We'll discuss a water loop and the cause later.

This maneuver is not taught by some instructors as there is an element of risk to it. The risk is if the wings are not kept level, you may shed a sponson.

I teach it on the theory that it might be better on a poorly done stop to lose a sponson, than clip a towhead just coming out of the water. I teach these by doing a maximum rate stop to show the airplane's capabilities. Then the student does three or four in each direction, starting with gentle turns and stops. Next ones are tightened up, shortening the stopping distance. When we finish, they are not real proficient but have an understanding in the event an emergency ever requires a maximum effort stop. I also advise a student that should they want to practice this rapid stop solo, that they start out gently, with turns that are not abrupt. A pilot should get a few out of his system before going for

the gold. I put this type of stop in the same category as simulated forced landings. On those problems the pilot's neck is out a little farther than normal. An engine could fail, a wire not be seen, a bird strike. Not a big risk, but more than normal. But forced landings must be practiced dual for training in the event of the real thing. Also, you can expect to see a forced landing on a flight test. So, also, I believe at least an understanding of the broadside stop should be attempted a few times, as it could make a difference someday.

I know an examiner that gives forced landings onto the water. If the applicant lands in the middle of the lake, he says, "Take the paddle. If you can paddle to shore, you've passed." Lesson learned, land close to shore. It's not as far to swim with broken bones if you screw up. There might be help from shore also.

Next "what if". What if the trim should stick? You could get a pretty stiff arm fighting it. Turn the hydraulic pump off until it's needed for landing. Bleed the pressure off of the system while in cruise, with either the flap or gear handle or trim lever in bypass. Bypass is a position between up and off or down and off. When the pressure is off of the trim tab, the tab should just trail. The airplane could possibly be a little out of trim, but certainly much more easily managed than having hyd pressure on a stuck trim.

The Lake is illegal to operate in icing conditions. If you get caught in icing, land. If that is not feasible, change altitude up or down, whichever direction you think might help. If you have an iced-over windshield, try melting off a spot with your hand to see to land (if the heater and defroster won't do it). If you get away with flying in some ice, you will still probably have damage where the propeller will sling ice pieces into the fuselage. Don't allow ice on your airplane. You will be around longer to have ice in your drink at happy hour.

The King auto pilot should take 15-19 seconds to move the trim from limit to limit (fore to aft). This is slower than the trim lever between the seats. Because it is electric, there is the possibility of a runaway trim. So, if the auto pilot trim operates too fast, more restrictors must be added to the system to keep the airplane manageable in the event of a runaway trim.

It doesn't hurt to carry a couple of quarts of your favorite oil along with you. An enroute airport may not carry your brand.

If the oil pressure should fluctuate, it often means low oil quantity. Land at an airport or on some water. Shut down and check the oil. If it's low, add some oil and continue to your destination, if the pressure has steadied. If the quantity is fine, you may need a filter change or more. You may have second thoughts about taking off.

If you are ever stuck and need to be rescued, you can get gas from the fuel drain to start a fire for signal or warmth.

The Lake is a fine RV. Pull out the rear seat. If it is a bench seat, don't ever fasten it down. A fastened seat belt will keep the seat in position with someone in it or not. You will pull it out often as it is then easier to load baggage. Fill in the rear foot wells with padding and it will sleep two, stretching out from the rear of the baggage area to the front seat.

When life hands you a lemon, make lemonade. As the Lake sleeps two, you just may not want to start that signal fire too soon.

Chapter 22: Common Mistakes

The shorter airplane is more prone to porpoising or skipping off of the water. However, either the long or short airplane can get into a high bounce or porpoise wild enough to clear your sinuses. This unplanned maneuver probably discourages more pilots from checking out on a hull than anything else. But, with an understanding of the causes and the corrective action there is no more to it than a first solo, and all pilots mastered that with training. A general rule could be when near the water (on takeoff or landing), do not allow the nose to drop below the horizon.

First let's look at porpoising. This is the airplane making touch after touch on the water. The pilot is not keeping it from going airborne after water contact. If these are just a series of skips a couple of feet high as with a skipping rock, it makes for good entertainment for those on shore. However, often each bounce gets higher and more critical. This is what we train to prevent.

I consider porpoising, as a rule, pilot induced. The pilot induces the porpoising in different ways. One is to land with an attitude between a rough water landing and a step landing. Another way is not correctly reading the water and allowing the touchdown on a higher wave than the other waves. Another mistake is not allowing the nose to settle on touchdown. The nose may even need to be eased down at this point. Back pressure on a water touch-down (as would be done on land) will easily start a porpoise.

A bounce is more likely the result of a swell or one wave higher than the rest. Either an unseen swell or a rogue wave can be an unwelcome surprise. So pick your touchdown spot with care.

The rate of descent on water landings should be very minimal. If the control wheel is eased back after touchdown as on a land landing, the airplane will climb. As the behind-the-curve-pilot realizes he is once again back in the air, he pushes the nose back down. The airspeed by now has lost a tic or two. The airplane touches the water firmly, and the upset pilot again pulls back to soften the touchdown. Because the airplane was a tad slower and fell in harder, he pulls back a little more firmly. This uneducated trick gets him a little more altitude than the first airborne expedition. This maneuver can easily be repeated especially if there is some engine power, until the airplane runs out of energy or the shape of the hull is reconfigured.

If the airplane is in the vicinity of V_{SO} and full power is applied while airborne, the airplane will tuck the nose down. Back pressure on the wheel can't prevent the nose from diving. Only power off can raise the nose during the airplane's very slow speed.

What should the pilot have done when the porpoise started? I'm glad you asked. The pilot made a mistake by adding a little back pressure on touchdown. That happens. The

big problem is compounding it by adding back pressure to the control wheel every time the airplane again touched the water. After a skip, the landing attitude should be reestablished. Then on touchdown allow the control wheel to ease slightly forward. That catches the porpoise early after landing.

Now let's talk about the porpoising that can develop on takeoff. This can happen because of wave action. A rogue wave may hit the hull. Erratic wind velocities may initiate it. Or the pilot playing the elevator and trying to out-figure the wave action may cause the porpoise. Hitting a wave with the nose too low can start a porpoise. Fix number one is to add back pressure. This is while still on the water at 20-50. Back pressure cures most ills. If it is overdone, the airplane will slow down even at full power. But no harm done. The porpoise cycle is broken. Now allow a little of the back pressure to be released. The airplane will again accelerate on to flying speed.

Fix number two. If the boats have kicked up too many waves and the porpoise continues to reoccur after applying back pressure, and then power, STOP. Find a more sheltered area. Don't force it until you bend something.

Porpoising while step taxiing or step turning is generally a result of letting the airplane speed get too slow. It also can be caused by letting the nose get either too high or too low. So find the sweet spot for step turns, and use the throttle changes to hang onto it. The sweet spot is like being exactly on the top of a large rubber ball.

Now for bounces. If on takeoff, a wave or swell throws the airplane up in the air with less than flying speed, it can make the hair stand up on the back of your neck. Most pilots would rather be anywhere else than at ten feet of altitude with 40 on the airspeed indicator. Full throttle will cause the nose to rotate to a strong down attitude. Pulling all the power off will cause the nose to come up, way up. There will be a pronounced tail-first landing. Then comes the slap-down of the hull. Let's look at a proper recovery. The hull should be leveled with the surface of the water while in the air on the bounce. This may require pulling the power off if the nose is already in a dive attitude. It will be the only way to prevent hitting the water in an extreme nose down attitude. This attitude is a result of leaving full power on too long into the bounce.

If you are caught in a low-speed bounce, go to half power, even if on a takeoff. This will allow you to control the airplane attitude. At this slow speed the airplane will be stalled out and start to fall. Two to four feet above the water, haul back on the wheel and tail the airplane into the water. Pulling the nose up will soften the impact. This spreads the touchdown shock along the hull. It also spreads out the impact time-wise by a couple of seconds, instead of hitting the whole bottom all at once.

If everything is copacetic, add power and continue the takeoff. The water will probably slow the airplane by 10 MPH on touchdown. If conditions are going to continue to endanger the takeoff, taxi over to the marina until things are better on the water.

Let's look at the bounce on landing. The same conditions as on takeoff can cause the bounce. (However, besides waves and swells, a cat's paw or misjudgment on landing altitude or attitude can cause a bounce on landing.) However, the bounce is generally at flying speed but just barely. Much gain of altitude can kill off the speed to below stalling speed, so get the nose back level on a bounce. Don't gain any more altitude than can be helped. As you learned from training, go to one-half throttle. Instinct on land planes has been to go to full throttle for a bad bounce. That can make the headlines if there is full throttle added to a Lake bounce. The nose will aim down right smartly if the airspeed is low. Low is just above the critical range for a full throttle at or below stalling speed. Correct application of half throttle might be from 65 to 40 indicated airspeed on a bounce.

On a bounced landing that is high enough, add one-half throttle. Your brain will compute extremely fast at that point and decide whether to turn the bounce back into a landing, fly a block or two and get reorganized and then land or make a go-around. The

brain at the hesitation point of half-throttle can determine if more power can be safely applied for a go-around. That means the airspeed is high enough that full power won't rotate the nose attitude. A good solid feel on the elevator means full throttle won't aim the nose down beyond elevator control. If the elevator control is weak and mushy or quite far back, DO NOT GO BEYOND HALF-THROTTLE.

Small bounces do not require any throttle adjustments. So now for the training. Water bounces can be mean. This is one of the most demanding airplanes you will ever fly. Training should cure the risk and thereby enhance the fun.

For starters, I discuss with a student pilot the small two-foot bounce just before we do it. On a small bounce, the student just eases the nose down and then adds a slight flare. Don't change the throttle. After the discussion the student sets up for a step landing. At about two feet I grab the wheel and force the airplane onto the water prematurely. I then pull back on the wheel just hard enough to bounce two feet. At that point I let go of the wheel and the student simply turns it into a good step landing. If done well, about three of these two-foot bounces will be practiced.

Next, after a discussion so there are no surprises while learning the maneuver, the student sets up for another step landing. Again, at a couple of feet I push the nose down, touch the water and pull back on the wheel until we have about five or six feet of altitude on a simulated bounce. Depending on the airspeed as I let go of the wheel, the student goes to one-half throttle or maintains the landing power as deemed necessary. If the airspeed is solid, there is no need of added power. If close to stall, go to one-half throttle. Now quickly, where to go from there. Land? Go around? Safe to add more power? Not if too slow. Decide at the top of the bounce at half-throttle.

After a few of those, we can try a ten-foot bounce and work it out the same way. I can guarantee half-throttle will be needed on that one.

This is not hard on the airplane. I only push it on to the water from a couple of feet. The simulated bounce is all in the pull-back on the control wheel. If I were to push it in hard to make the bounce, the propellers that were not Q-tipped would be kissing the turtle back. But this simulated bounce does not touch the water hard.

After we have run a series of these preplanned bounce recoveries, I leave it alone for a couple of hours of other training. The next ones that show up will be surprises, to make sure that the half-throttle will come automatically on recovery.

This exercise can be invaluable in the years ahead. It can be the reaction that can keep you whole.

Let me lead into another technique on a wing drop on these bounces. Fifty years ago, one of the stalls that was taught was the rudder exercise stall. This maneuver had the student pilot pull the wheel all the way back to induce a stall. The nose would be 45° to 60° high. When the stall occurred, the wheel was held back. As the nose fell, the airplane would start to drop a wing. The exercise was to keep the wings level with rudder action only, no aileron. The learning gig was kick the high wing. That is, if the right wing came up, use right rudder. Then the left wing would probably come up, and left rudder was required. The wheel still is held all the way back while the pilot is walking the rudders. The nose will go below the horizon, and as some flying speed is attained, the nose will rise to the horizon. Only then will the back pressure to the elevator be eased off.

The object was to teach wing leveling below flying speed. We know that right rudder is needed in a climb because of torque. Conversely, left rudder is needed in a descent for lack of torque to make up for the cruise trim built into the airplane.

If a Lake pilot uses too much power and no rudder in a water bounce recovery attempt, the left wing will go down. Most Lake porpoise accidents show the left wing partially separated, as the nose and left wing hit the water at the same time.

The rudder exercise stall shows that right rudder (high wing) might of at least leveled

the wings.

So if the airplane ever does get away from you on a water landing, at least keep your wings level by kicking the high wing. Either have an old-time instructor show you the rudder exercise stall. Or if you try it solo, have at least 3000 feet. If the maneuver (at altitude) gets wild, just release the back pressure and you'll have a docile airplane again.

There is another sneaky thing I pull. On takeoff, about two to four MPH below lift-off, I yell abort! Abort! Keep it on the water. Two out of three pull the throttle back and shoot up into the air. We then discuss what happened. When the throttle is retarded, the nose comes up. At close to lift-off speed the airplane now climbs off of the water. A throttle cut at that speed requires a forward pressure on the wheel, to keep the airplane from being airborne with no power.

This situation can occur when a takeoff is started toward a shoreline. At the time, the pilot discovers he's too close to make it over the trees and aborts. The force he must apply is a little forward pressure on the wheel, or he will be airborne with no power and about to go into the firewood business.

So the bottom line for this chapter is back pressure is a fair cure-all when things go wrong, except for late takeoff aborts or hitting a boat wake faster than 40. Then think, hold it on the water. Stop by burying the tail or a broadside. The other important item is go to half-throttle on a bounce recovery. These are all valuable flying techniques to make you feel comfortable, because you can take care of yourself.

The most common mistakes a student makes when learning to fly a Lake are listed here:

Not checking the mirror for the landing gear position before landing is common.

Another is that on take off a student often allows the airplane bow to lower a little (hear the water on the nose gear doors?), as the speed increases and the high thrust line becomes more apparent. The nose should be gradually raised on takeoff until the airplane flies. Just keep easing in back pressure.

Because the Lake is aerodynamically dirty it is noticeable if the nose is not eased down when power is reduced as in the traffic pattern, leaving cruise altitude etc. Unless there is a reason to reduce the airspeed, the nose must start down on power reduction to maintain the present speed.

Another common error is not maintaining altitude in a land traffic pattern until the proper descent point opposite the intended landing point. I believe this happens because of almost non-existent traffic patterns for water work. Then the pattern disciplined at airports slips away on return to an airport.

The next common error, and one of the toughest maneuvers to learn to do correctly, is step turns. Because there is no set airspeed showing and no set RPM setting, the whole maneuver must be done by feel and appearance. The turn cannot be too tight, or the airplane will become uncontrollable as it skids. The turn cannot be at too high an air-speed as the airplane, or at least the outboard wing, will gain flying speed. The nose cannot get too low, or the airplane may water loop. The most common error is allowing the speed to drop off. The airplane will gradually lose the step position and settle tail low.

Let us get an understanding of a water loop. If you do one, it will cost money. First let us get to the mechanics of a ground loop to help our understanding. A conventional land plane, that is a tail dragger, has the center of gravity (the balance point of the aircraft weight) between the tail wheel and the main gear. It has to be so, to hold the tail down. That is, there is more weight behind the main gear than in front of the main gear. For many years, most airplanes were tail draggers. Upon landing, the airplane had to track a straight line. If it did not, the center of gravity (CG) would try to go straight as the airplane showed a slight turn. This caused the tail to start moving around the pivot point (main gear) until the airplane turned 90 to 180 degrees. The wing on the outside of this

circular movement picked up speed and started to fly. The wing on the inside of the turn lost forward speed and dragged on the ground as the outside wing continued to increase speed and lift. A ground loop often dragged a wing tip and occasionally tore off the landing gear, due to the side forces.

Then came a great boon to student pilots and even to more experienced pilots. The manufacturers started producing tricycle landing gears. They put the third wheel on the front of the airplane. This time the CG was designed in front of the pivot point (main gear). It had to be so, to hold the nose wheel down. There was a slight penalty. The nose gear was heavier and had more drag (slight airspeed loss). But the days of ground looping were all but gone.

Now the CG was in front of the pivot point. Any deviation of the nose from straight ahead was pulled back to straight ahead. The dynamics of the good old CG are still trying to lead the pivot point. The CG tried to do this on the tail draggers. When it succeeded, a ground loop occurred.

Hang in there, we're getting closer to the water loop.

The Lake, of course, on land is a tricycle gear airplane, and the pivot point is at the main gear. There is no tendency to ground loop on land. On the water the pivot point on the hull is at about the main gear location. So the CG is ahead of the pivot point, unless the nose is forced down. If the nose is lowered, the pivot point (center of buoyancy) is now ahead of the CG. Only if the airplane tracks straight and true will the CG not have a chance to wrap around and get ahead of the pivot point. Allowing or forcing the nose low in any phase of maneuvering (as long as the airplane is moving) will cause a water loop, if the CG does not stay exactly behind the pivot point.

So, a step turn that has a nose drop and moves the pivot point forward is a likely candidate for a water loop. A water loop happens so fast, there isn't time to swear. This generally results in a slap-down of a wing and fancy wrinkles in the sponson. These only damage the airplane. You won't get hurt on a water loop on a step turn. You should be healthy enough to make an alibi or blame the airplane or gusty wind. The blame can go as far as your imagination will carry it. Fact of the matter is the nose was too low. Step turns need back pressure and more power, just as steep turns in the air do. Keep the nose up. If you start to porpoise, keep the nose up. A little back pressure is in order, both to break the porpoise and to prevent a nose-low water loop expense.

Now let's talk about the real no-no. A water loop on landing may keep you out of the air for sometime. It takes awhile to reinstall sponsons.

A nose-low attitude after touch down (or landing nose first) will cause a rapid, forceful water loop. The wings may take turns touching the water, as the lifting forces on the wing and centrifugal forces on the airplane vie for possession of the airplane. The wings will take turns hitting the water. Then it's, "Look Ma, no sponsons." They both get swept off in the same direction. One goes inboard and the other goes outboard.

A boat wake or a wave higher than the others (a rogue wave) may be encountered on either takeoff or landing. You as the pilot may have been doing everything correctly. If the wave fits the contour of the bow of your airplane, in effect the pivot point (flotation center) for the airplane moves way forward. When the nose is low, any deviation from straight ahead you make can cause a water loop, right now, at any speed, up to and including lift off speed.

Another trigger can be that the wave is encountered at an angle. This will cause the nose to slew to the side slightly. With the CG behind the now-moved-forward pivot point and a side load, a water loop is almost inevitable. What can you do? IF you're into it, you're in the same position as the fellow that fell off of the Empire State building. As he passed the seventeenth floor, he said, "So good so far." But there wasn't much he could do about it. He had to figure out what to do before he played around on the edge. You are

in the same situation. Do something before the unstoppable water loop starts.

If you see a high wave or boat wake coming, abort! Go into the situation at slow speed. If the problem develops rapidly, get the nose up so that the pivot point stays rearward. There now comes a fine line. A boat wake will try to throw you into the air as though coming off a ski slide when the airplane is above 35-40. You may not have enough air speed to fly. So the amount of nose up means enough so that the flotation point (pivot point) will stay rearward of the CG. But do not have the nose so high that you will help the catapult effect to gain any more altitude (at below flying speed). Possibly it will be nose up as you strike the wave and push forward as you start to pass over the wave.

The magic word is STOP, if you see a situation that can develop. Pull the power off. Cross the boat wake and go right back to power-up. The other warning is, don't drop the nose too far after touchdown. The nose must come down a tad after a glassy or step landing, but too much and the pivot point will be ahead of the CG. Now that I've given your adrenaline a boost, have a nice day.

I'd like to mention a few other common mistakes made on Lakes that continue to reoccur:

Not allowing the bow to settle on the water on contact of the hull on a step landing

Not doing a flow pattern and starting a takeoff in the water 'after coming off of a beach with the gear down

Landing gear down on water and gear up on land

Failing to abort when the situation is deteriorating

Aborting at rotation speed on the water and not holding the airplane on the water

Paying attention to a popped canopy instead of the takeoff

Applying power too slowly for a water takeoff

Wheel not all the way back before adding power for a water takeoff

Not checking all the hull plugs on preflight

Sloppy land traffic pattern after water work

Not checking for boat or aircraft traffic before making a turn in the air, on the water, or on a taxiway

Nose low turns on the water

Getting too slow in step turns.

Chapter 23: River Flying

Well, now that you have a fair handle on the uniqueness and ways of the Lake, let's see what can be done with it. We have talked about flying off of lakes, airports, using it for just plain transportation like a plain brown paper wrapped airplane. We've even picked up the fact that if we sniff a little oxygen, we can pick up some speed at 20,000 feet.

Even though this airplane can be used as an ambulance, for sightseeing, ferrying island passengers, as a patrol plane and many other commercial uses, its best quality is it's a fun airplane.

The most flying fun is probably on the rivers. The fact that this airplane can go to rivers seldom seen by man and the fish have to be hit with the paddle to keep them out of the airplane is outstanding. All rivers have to be looked at from low altitude to check conditions. If the area is wooded, electric lines will show in slashed areas in the trees, and you will know where the wires cross the river. Be aware of shallow spots, rocks, and remember the outside of a river bend is the deep part.

In checking the river, note location of boats and canoes. They move. Be careful coming around the bend while step taxiing. Somebody may have put out from shore since you checked the area. Fast taxiing on a winding river is truly exhilarating. It's like doing it with a speedboat, but your 38-foot wingspan may take up most of the river. Go to slow speed, around any boats on the river. Avoid confrontations. Seaplane pilots are in the same position as teenagers. They are automatically in the wrong.

If you have a tight fit heading under a draw bridge, blow a police whistle three times to have the bridge raised. Been there, done that, too.

Rivers often give a pilot access to downtown parking. The larger problem is finding a safe place to park. Be aware of the boat wakes that can show up after the Lake is tied up.

Parking and walking in the wilds, remember you may be trespassing in the home of snakes and alligators.

If the lakes are too rough for water work due to wind, a river might be smoother. This is especially true if the river is in a small valley, and the wind does not disturb the water. The warning here is that although the water surface is smooth, the air can be quite turbulent on approach and a little extra speed might be in order on final.

Even takeoffs can be exciting if a gust lifts the airplane off prematurely or smacks an airplane back onto the smooth water after takeoff.

So smooth water in a protected area is no guarantee of smooth air close to the surface. Y'all be kerful now, ya hear?

To reiterate, when landing in a winding river, do not land in a curve if it means you have to land in a banked attitude. Pick a straight stretch or where the river bend is wide

enough for a wings level landing. Once the hull is on the water there is no problem with dropping a wing and going into an immediate turn on the water, as in going around a turn in the river.

While wind can cause docking problems, so can river current. Either wind or current can drag an anchor. The little fold-up anchors that will fit into the Lake bow compartment aren't much to write home about. Unless they are caught under a rock, they won't hold a wind-blown airplane. If anchoring is important, carry a large anchor in baggage for the times you need it. The small fold-up anchor will hold in a lake when the breeze is light, but be sure you're not dragging it in a moving river. Remember, the clip from the anchor line to the U-shaped holder is only to keep from losing the line. Anchor or tie up from the cleats on the bow. When anchoring, there should be 10 feet of line for every foot of water. The anchor will more likely hold with this ten to one angle of pull.

Most rivers have their deepest sections above a dam. Farther upstream, the water can be mighty thin and rocky. Almost all rivers in the states are now a series of dams. A lot of rivers have mud banks, and that makes for good parking. Carry a towel under the seat. You can't fly a Lake over a period of time without having to wade on occasion. Good eyes are an asset to a pilot, and webbed feet are an asset to a seaplane pilot. Don't fly barefoot. The rudders hurt your feet, and you may not be able to push hard when you need to. At least wear flip-flops.

On rivers and lakes there are boating idiots. If they try to race your Lake, abort. These boat drivers all have the same maniacal grin on their faces. They don't look ahead where they are going. They look wild eyed and stare into your face as they stay just off of your wing. They stay even with you or race just a little ahead to show they're winning the race. Invariably, they drift toward the wing. They get closer and have forgotten you have a wing sticking out toward them. Abort, sit there until they go away. Their pass from the institution will expire, and they'll have to leave the water soon.

In Canada, four young men started a water takeoff in a 250. A speedboat with two people in it passed them and honked a tight turn right in front of them. The 250 hit their high wake, flipped up and then dove in. The airplane sank, and all four men swam to the surface. The boat came back to the swimmers. The boat driver said to the other person in his boat, "I'm not going to get mixed up in this stuff." They left, not even knowing if there were broken arms or worse. The ones in the water were unable to get the boat number or a description. They all survived, but with no thanks to the boaters that caused the accident. If somebody wants to play games with you in your Lake, ABORT!

Chapter 24: Beaching and Docking

You've learned to fly and use your Lake on the water safely. Now for the part that gives you the freedom and utility that a land plane pilot does not have. This airplane can be parked on beaches, river banks, ramps, docks and buoys. What a rush. Let's look at swimming float rafts first. Why a raft? It may be crowded at the dock. The wind may be shifting. It's safer. Just get a ride in a boat to shore. Docking points must always be approached into the wind (if there is a wind). The big thing is give yourself plenty of room and time. It is the same principal as allowing extra room for a land traffic pattern, if you are in an airplane that is new to you. Don't build in a factor where everything is rushed.

Approach the raft at idle. This is at about 550 RPM. Land planes idle at 650 RPM, but seaplanes are set to idle at 550 RPM for water work to be handled as slow as possible. If there is a need to go even slower, put the ignition switch on one mag. If using one mag just before takeoff, don't forget to go to both for takeoff. Although, as you become accustomed to your own airplane, you will probably recognize the loss of one mag by sound or instrument power setting. Remember to check your MAP and RPM gauge when full power is applied on takeoff on water, as you do on a land takeoff. Don't taxi for too long a time on one mag if you can help it, as the set of plugs that are not firing can fowl.

When docking, if by chance you have made a misjudgment and are likely to hit the raft or a dock, the airplane can be slowed down, right now, by dropping the gear. At even a very slow speed, dropping the landing gear can cut the forward speed in half. The gear can be dropped up to 35 without causing damage. But I wouldn't do it at much over plow taxi speed unless I was really scared. Florida Marine Patrol throws the gear down right after touchdown to catch the bad guys. But if there is any stretched metal, the taxpayers will cover it.

As you are slowly taxiing toward the raft, turn off the radios (less drain on the battery at idle). Take your seat belt off. If things go wrong you may prefer to jump in and save the airplane from a previously unseen problem. Laundries work cheaper than sheet metal mechanics.

Have the left canopy open. Put the water rudder down. Make sure the paddle is easy to pull out. Loosen the friction lock on the mixture control. When you want to cut the engine, you don't want to lose time on loosening the friction lock. This can make the difference of a smooth maneuver or a rushed action and nose bumping. The key to a good raft docking is shutting down slightly early. If you are too busy for battery switch off, get the "clean-up" after being tied to the raft. Don't try to make it come out even, such as when the airplane runs out of forward momentum, just as the raft is reached. Shut down the engine so as to be just a little short of the raft. If the mixture control should bind up

and it won't shut off when you need it, turn the magneto switch off. Don't power into the raft or dock and cause damage with the engine running. Paddle and control the speed. Close to the raft, get on the bow and paddle. Get the line out of the bow locker. The line may or may not have the anchor on it. At the preflight, the line in the bow locker should have been checked, to make sure it was attached to the airplane. Also it should be stored to be easily removed and not tangled. Drifting toward a raft is no time to play with rope puzzles. The line should be fastened to a cleat. Step from the bow to the raft. If the Lake is drifting in too fast, you can sit on the bow and use your legs for bumpers, to slow the nose touch. A raft will give on its anchor and your legs, probably, are not endangered. On a pier, let the knees bend. Don't break a leg to protect the airplane.

When stepping from the bow to the raft, a backward push on the bow may prevent the bow from touching the raft. The airplane has a rubber pier bumper, but why take a chance of having a mark on it, if you can prevent it. Now for the "be carefals". Be careful where you step. Ducks and seagulls roost on rafts often and don't clean up after themselves. There's nothing like slipping and falling in duck doodoo to enliven a cocktail conversation. The other "be careful" is make your first step near the middle of the raft. Close to the edge on a raft, with minimum flotation, can cause tipping. Be sure you take the line with you as you get on the raft or you will have to swim back to the airplane. I have had a couple of students throw the line into the water, just as they stepped onto the raft. They had their hands full, street clothes, not that stable a raft, first time, etc. A slight mental lapse and a humorous outcome. The paddle was still on the nose so I could paddle back to the raft. Solo they would have had no choice but to get wet. At least they got that boo-boo out of their system and were wiser pilots.

If the raft is close to shore and the wind is from the water, there may not be enough room to approach the raft. In fact, even if you were successful in approaching the raft downwind and jumped on the raft and worked the airplane around to the downwind side, you'd have a problem with the airplane departing the raft. Plan ahead. It might be better to park elsewhere.

To leave the raft, you untie the line, push the airplane back (downwind) as you board the bow. The line must be stowed and the bow locker fastened closed. If downwind, in close to the rocks, you'll probably wrinkle your tail feathers. Don't use the raft, if the room is unsafe between the raft and shore, with an onshore breeze.

When the airplane is drifting away from the raft, use the paddle so the bow turns away from the raft. The airplane must be aimed toward open water. The wing can't overlap the raft. When the engine is started, the airplane at start-out taxi speed will go only straight ahead, no matter how much rudder is applied. If the airplane is started while aimed toward shore in any degree, the plane won't turn, you will be on the shore. Only after some headway speed is developed will the airplane slowly turn. No braking of a wheel, as on land. If after all of this you get lazy and try to taxi out without having a clear shot and find yourself headed for trouble, cut the mixture.

In docking at a pier, you must be straight into the wind. Docking is done in the same manner as docking on a raft. One difference is the dock is immovable. Watch the legs on docking. The good news is the pier won't tip. Next, if the wind is quartering, it will blow the tail downwind, and a wing can pick up a ding. Docking on a dock won't require a boat to take you in. Keep an eye on the airplane, if it is tied and held away from the dock by the bow, and the tail is aimed downwind. The wind can change and so can the shape of your leading edge.

When the current is going one way in the river and the wind is blowing the other, the question is, dock into the wind or into the current? There is no guarantee that the current under the pier is the same as just off the end. But it's the best guess you have, so parallel the docking location off the end of the pier, and find out at idle speed if the airplane will

move forward or drift backwards. If it eases forward you probably have forces (wind or current) in command moving the airplane the wrong way. Turn the Lake around and aim the opposite direction. If the airplane now drifts backwards, you are now aimed the right way to dock. Move over and do a normal docking into the force (the stronger of the wind and current effect).

If the wind is into the end of the pier, don't dock there. Your risk of doing damage is too high to make it worth the chance. You must dock straight into the wind. This can be into the end or side of the dock. Anything other than securing the airplane straight into the wind will allow weathercocking and a damaged wing or leading edge.

When paddling in, sometimes if the wind is strong, you may misjudge the distance and can't quite paddle the last couple of feet to the dock. Docks (piers) are often built with a half-inch gap between each board. Put the paddle edgewise in the crack and twist. This will allow you to pull the airplane the rest of the way into the dock. Stay alert, close to rocks and shore, for drifting. The tail and wing tip are vulnerable. If it's shallow and you're losing it, leave your wallet in the airplane and jump out and protect the airplane. Don't fly in your Sunday best. You cannot fly barefoot. That's a pain. Some wear flip-flops so they can wade and still handle the rudder pedals. I pride myself on keeping my feet dry, but about once a year, I go wading. Hopefully, that is done barefooted.

If the wind is calm, pumping the rudder pedals will fishtail and move the airplane. This is something to be remembered under certain conditions. This is called sculling.

When approaching a ramp, go through the same routine as when approaching a dock. Turn off the radio, loosen the friction lock on the mixture control, take off the seat belt, open the canopy and make sure the paddle is free in case it is needed. Put the gear down, unless you are just making a pass close to the ramp to make sure it's safe. When putting the gear handle down, check for the green light. You can see the mains, but the nose gear is underwater.

The thing to watch on ramping is to be sure the wood or pavement goes far enough underwater so that the wheels will roll up on the ramp. If the front of any of the wheels hit the edge of the ramp, you will probably have damage. If in doubt, find a spot (sand beach perhaps) and beach, gear up. Walk over to the ramp and check it out or walk in the water and put a stick in at the end of the ramp to see how deep it is. Be careful, ramps are slippery at the water's edge. If there is a strong crosswind at the ramp, safety may require no ramping at that time.

Next problem, make sure the wings will clear docks, trees, etc. The main gear is 11 feet 3 inches wide. Make sure the ramp is wider than that. A ramp that was good one week may have had the lake lowered and be dangerous the next week.

Ramps are generally built for launching boats and may be quite steep. Hold the control wheel back as you approach the ramp. As the nose wheel touches the ramp, you will have to do two things at once. Add a lot of power and raise the water rudder. It might help to have a good copilot for the water rudder. Add the power first if in a crosswind. This is to maintain directional control with the water rudder until the wheels have a good purchase. If the wind is on the nose or tail or if there is little wind, raise the water rudder a little distance before reaching the ramp. Then your right hand will be free for the throttle. Don't add the power until the nose wheel touches or you will lower the nose wheel some (high thrust line engine). That may be enough to catch the lip of the ramp and do harm. Having the water rudder down leaving the water for the beach, or beach for the water, runs the risk of bending it.

It will take a lot of power to climb a steep ramp. Have enough speed on the ramp so as to not bog down. If the airplane stops, you may not have enough power to start the airplane rolling uphill again. So keep enough speed to maintain momentum, but not enough to lose control, until you come on the level where the power can be reduced.

On the level, at the top of the ramp, if there is too little room to make a power turn, shut down, get out and turn the airplane by lifting the nose. Park out of the way. Don't block boaters that want to use the ramp for their trailer.

There is another pitfall, if you will pardon the expression. Some power boaters back their trailers into the water on the sand beyond the ramp, if it's shallow. Then they power their boats onto their trailer. This can blow the sand away, forming a pit that will be four feet across and two or three feet deep, filled with jagged rocks. Look over any ramp you are not familiar with. Your nose wheel will appreciate it.

Leaving the ramp area can be exciting, too. Close the canopies before entering the water. Use the brakes and go down the ramp slowly. One Lake salesman, in a business suit, taxied down the ramp smartly in a 200 and the canopy was open on his side. The nose wheel dropped off of the ramp deeply. The water poured in like he and the potential buyer were in a bathtub, before the nose popped up. I don't know if the customer made a purchase, but the salesman did throw a lot of cold water on the deal.

I've never seen the brakes lose any of their effectiveness, due to being soaked with the gear extended in the water. So use them and make a slow reentry to the water from the ramp.

The 250-270T being so much longer, often has a tail strike, if the ramp is a little steep. The nose is farther ahead of the main gear than the 200 so it starts to float before very much of the airplane is in the water. As the nose comes up and pivots on the main gear the tail will touch. The long airplane came through production with a small rollerskate size wheel to roll on the ramp. These wheels can be added on to the 200 also, as they too can get a tail strike, if the ramp is steep enough.

A mag check can be performed on shore, if there is nothing to be damaged by the prop wash. Then only do it if there has been an engine shutdown.

Once on the water, lock up the mixture control, turn on the radios and when the airplane is floating, raise the gear. Put on the seat belt and do a flow pattern or checklist. When the airplane is floating, both sponsons will be well on the water. If one or more wheels are rolling on bottom, one or both sponsons may be out of the water.

If you forget to raise the landing gear after taxiing into the water, you won't be the first one. As you add takeoff power, the nose wheel, as the airplane moves forward, will pull the nose down. Water will climb up on the bow. The next reaction is you recognize you forgot the gear up handle. You flip it up and the mains retract. The nose wheel can't move forward to retract against the water while being pushed at full throttle. The next clue is all of that green water on the windshield. Not having a submarine rating, you pull off the power to idle as you should have at the first clue. The nose will pop up to the surface, the nose wheel will retract and if you're steadied down, go ahead with the takeoff.

Rolling up on a beach is started out in the same manner as ramping. The beach may be steep or nearly flat. Use the proper power as needed. Put the gear down in water that is deep enough or the gear won't make it all the way.

Again check for the green light. When the wheels run on bottom, raise the water rudder so that it does not strike and bend. A slight bend could allow you to force it up but gravity wouldn't let it down while taxiing through a lot of expensive mahoganies later at the yacht club. Do not proceed too slowly approaching the beach. Wave action often leaves the finer sand (and soft sand) ten to twenty feet from shore. It's easy to get stuck, if too slow. Treat it like six inches of snow. Don't let it stop or you'll have to get it unstuck. If the beach is steep, enter the beach on a 30 degree angle. This way the airplane won't have the steepness and won't fight as much gravity all at once.

Taxi up on the beach. If it's soft sand, again keep it moving. The beach will most likely have some slope to it. Continue to taxi until you have made a turn and are aimed downhill. The airplane often won't move from a stopped position if aimed uphill in sand. It

generally will move, if aimed downhill and gravity will help the propeller. Anytime it takes a lot of power on sand, hold the wheel back so the nose wheel won't dig in. Watch out for prop wash. Sandblasting people could get your lights punched out.

If stuck, but not too deep in the sand or in snow, add a lot of power and walk the rudders. That means, use the rudder pedals to swish the tail back and forth. This trick sometimes frees one wheel at a time and then the whole airplane moves. Another trick in loose dry sand, is to pour water in a path the wheels will use. This can firm up the sand.

In the summertime, swimming beaches are generally only available on cold days or early in the morning or close to sunset. If there are floats holding up a swimming rope, but no swimmers or life guards, I don't waste the beach. Raise the water rudder to cross the rope and drop the gear just as the gear is clear of the rope. So far I've never had a problem using a public beach, as long as there were no swimmers or sun bathers to bother. If you have a problem, don't show them this book.

Again, do a mag check on land after a shutdown, if the area behind the prop is clear. If stopped uphill, the airplane can become stuck or if too close to the water's edge, it can happen. Getting unstuck is part of the training. On land, use the paddle as a shovel to clear out in front of a bogged down wheel. If a board has washed up on shore, taxi on it, after digging a trench to set it in. If one pilot adds a lot of power and another pushes on the wing tip, often some progress can be made. However, be careful, a lot of push on the wing tip can cause the nose wheel to move sideways out of the dug trench, into the soft sand. With a lot of push and full throttle, the nose strut can be bent. This can be prevented by having a person pushing on each wing tip while using power. The trench will need to be angled to allow for the side motion of the nose wheel unless the airplane can be pushed from both wing tips at once. All of this can happen if the airplane is allowed to slow down and get stuck before it is aimed back downhill.

If stuck in snow or sand, sometimes waving the rudder (first one, then the other can sometimes get one wheel at a time rolling and then both of them as momentum is gained. Remember to keep the control wheel back, so the high thrust line won't bury the nose wheel.

The next place that can stick the airplane is in shallow water. This one will require wading. Shut the engine down. Put the gear handle up. Get out of the airplane. All three gears probably are still in the down position. Stand with your back to the side of the nose.

Bend over and bump the side of the nose with your fanny, two or three times. This will move the airplane sideways enough to collapse a landing gear. Go to the other side of the nose and do the same thing. Now both of the mains have retracted. Only the nose gear is extended. DO NOT put your hands in the nose well to lift it. Otherwise, you'll never play the piano again. The nose gear operates very fast and the nose gear door will bite you. The nose must be lifted by putting your hand on either side of the nose, higher than the nose gear doors. This is awkward but the only way it can be lifted. The nose gear will now retract. If the airplane is aimed toward the beach, push on a wing tip and aim the nose out, away from shore. The airplane is half afloat and will pivot on the skeg in sand. Although the airplane draws about two feet of water, powering out can be done in as little as one foot of water. Then start the engine. With a little extra power, the airplane will taxi into deeper water. One pilot, alone in Canada, got stuck a quarter mile from the lake. He retracted the gear and taxied on the belly back to the lake in the mud.

If you decide to go onto an unfamiliar beach, look it over from the air first. Look for rocks, sunken logs and the best way to approach the beach. Then land and taxi close and swing by, looking it over. Either anchor in shallow water and wade to look it over, or if the water is clear and you can see well enough, taxi out to deeper water and drop the gear. Then taxi up and explore your own treasure island.

There is another method that can be used if the shoreline has a nice beach (clear for

the wing), but the water drops deep just close to shore. This works best for the 200 with its wing lifting torque. Aim at the shore at about a 30 degree track. The left wing tip will reach shore first. Just before the bow is going to touch bottom, kick right rudder and hit the throttle for one or two seconds and then all the way back. Pull up the water rudder next. This blast will put the fuselage parallel to shore and raise the wing and sponson, then let the sponson down on shore. Cut the engine so the airplane stops. You now have a gangplank to walk to shore. The tie down is also above the sand and can be reached easily. To taxi out, add a little burst of power and again, the wing will lift and the hold on the airplane will be gone. Holding right rudder, as you give this burst, will head the airplane out to open water.

The airplane can be parked on a very small piece of beach by only putting one wheel up. Use the same pre-beaching drill, as when taxiing way up on a beach. This time we'll use a beach that is only two or three feet of sand above the water. Approach the beach at about a 45 degree angle or less. Pull up parallel to the beach, with the shore wheel just on the sand by a couple of feet. If you are really good, you'll park with a foot of water between the airplane and the sand. Do this by a restaurant. When you come back from coffee, you will walk in the sand to reach the airplane. You have a patch of water to wash off one foot, put it on the step, wash the sand from the sole of the other shoe and climb in. You won't have to clean any sand out of the airplane later. Let's assume you have parked the airplane with the left side next to shore. This is easiest with the brakes on the left and the best look for spotting the airplane. Let the right seat person in first, then he will have to crawl over the left seat, but it beats going wading.

Next, when it is advisable to leave the gear up going into the beach, pull the airplane up onto shore a foot or two after the weight of the people are out of the airplane. Then tie the airplane to something or use the anchor, with a fluke buried up on shore.

Leaving, push the airplane back far enough to just jump the water onto the nose (2 or 3 feet of water from shore). To leave and push back into the river can be exciting, especially if the wind is pushing the tail one way and the current is trying to turn the airplane the other. I have never figured out when paddling backwards into the river and trying to turn, by holding the rudder, should the water rudder be up or down. It does vary depending on whether the current or the wind has the most effect. If the airplane tail won't go the right way, I retract the water rudder. The nose has to be aimed up or down stream before the engine is started or the airplane will be back on shore.

Next beaching adventure is having the airplane parked, gear up, close to trees or a building and a wind is liable to blow the tail around and cause a wing strike. It can be stabilized. Put the gear handle down. The gear won't go all the way in shallow water. Wave action or wind will sometimes rock the airplane, so that one of the gears may extend completely after a while. It doesn't matter if it does. The nose gear, however, should be fully extended. There is a bolt in the nose gear that can be bent, if there is a side load stress on the nose gear while only partially extended. So either push the airplane back a little, if that will allow the nose gear to move forward and fully extend, or lift the nose and allow the nose gear to completely extend. Even though the airplane is pinned so it won't rotate a wing into an obstruction, it should be tied to something.

When leaving, raise the gear handle. If any gear is stuck in the full down position, move the airplane sideways a tad by pushing on the side of the bow, and the gear will fold and retract.

If handling the airplane alone, assuming the airplane is partially on bottom, but not too heavy (partially floating), push the nose sideways. This will bring a wing close to shore. Grab the wing and pivot it until the tail comes in reach. Leave the wing tip and tail over the shore. Climb on the wing. If your feet are sandy, crawl. If wearing flip flops, wade to the cockpit. The airplane is aimed toward open water. Crank the engine, get into open

water, belt yourself in and then take your time and get set up for taxiing and takeoff.

Here are a couple of tips. If you don't want to carry an anchor, carry a mesh bag. It can be filled with rocks. Now your anchor can be as big as you want. Have a hide-a-key in your wallet or hidden on the airplane. If leaving a dock area and you are afraid your engine won't start, tie a 50-pound fish line from the tail tie down to the dock so you won't end up way down river with a stubborn engine. If it starts while tied up, a little power will break the line.

There are many beaches waiting for you out there. If these methods don't fit, improvise. There are many ways to skin a cat. There are even more ways to beach and dock your airplane than cat skinning. Take care of your bird and don't park it if you're uncomfortable. Uncomfortable will be your biggest go or no-go factor.

Chapter 25: Final Approach

This book is not the final word. It is to be used as a supplement to the manual. This is a how-to book. Now that we have spent pages of time on how to, what have we got? Is this just a how-to book for aiding an expensive hobby? I think not. What other small club can invite you to share the unique pleasure and ego boosting experiences you can have as a Lake Flyer? The versatility of fishing, overnighting in a remote cabin, swimming in the Caribbean, going snow skiing and general transportation year round is nearly impossible without this magic carpet.

The thoughts you have just read will open vistas unknown by average mortal men and women. Worldwide, so few of our fellow humans have a chance of even riding in an airplane. The highest percentage of air travelers live in America. Yet the United States only has 260 million of the billions of people on the earth. But of these people in the U.S. that have flown, only a small group are pilots. Of the group that are pilots, few have a seaplane rating. To be a pilot capable of flying from both land and water puts you in a very exclusive group. Of all of God's children, the exclusive qualification of being a seaplane pilot makes you forever something special. You not only can fly on and off the water, but you feel as though you can walk on water also.

Who else can make the life and death decisions as to whether a certain body of water is safe to land on. All pilots make the decision as to whether the weather, the airplane, or their piloting ability is up to snuff for a safe operation. Yes, a seaplane pilot does all of that and more. Understanding the dynamics of water operation on and from the air, taxiing around in wind and currents with a boat, with the engine out of the water and big wings, it's outstanding. Where else can you give away all of your altitude and by ability, skim on to the water and still be on a real high?

With your seaplane rating, you can go safely to places where no man has ever gone before you. With your seaplane rating, you can catch and eat fish that would have otherwise succumbed to old age. The opportunity may never come, but the ability to aid your fellow man in a manner that can only be handled by a seaplane is always there.

The joy that can be shared, as you watch a child's face, as she lands on the water for the first time is unbelievable. Don't forget to keep a cushion in the baggage. Let that child see it all. The child could even be sixty years old, if it were a first time water landing.

There is something that can be done to convince a spouse that owning an amphibian is better than putting all of the family resources into retirement. Just name the airplane after her and paint her name on the bow. I am sure Queen Mary was proud of her name-sake.

Straight float people are proud of their hardships. They also believe only wimps land

amphibians on land for food, gas, maintenance and overnight shelter. Let them go about their sport with one hand tied behind them. Use an amphibian and use all of the assets you have.

As a pilot of one of the most unique aircraft in production, some of the uniqueness has rubbed off on you. Beside the accomplishment, flying the Lake is the most fun you can have with your pants on.

Glossary

A

Abort: To discontinue, to interrupt.

Accumulator Precharge: In the Lake hydraulic system a cushion of nitrogen is added to the hydraulic cylinder. Hydraulic fluid is non-compressible. The system must have a cushion to protect it from hard sudden pressures. 350 PSI of Nitrogen is pumped into the accumulator side of the piston in the hydraulic cylinder.

AD's: Airworthiness Directives. Mandatory corrections from the FAA, to make changes on an existing aircraft or part.

Aerofab: The company that manufactures the Lake Aircraft.

Amphibians: Anything that is at home on land and in water such as frogs, alligators, turtles, plus our flying Lake. (Just another water fowl.)

Aux: Auxiliary (Pump or tank on a Lake.)

B

Battery Bus: A metal bar hooked directly to the battery. This allows the bilge pump and clock to be connected directly to electrical power without having to be disconnected by the master switch.

Bat Wings: Large wing fillets between the trailing edge of the wing and the fuselage. Triangular in shape and close to three feet on each edge of the triangle.

Bilge Pump: Pump in the lowest portion of the hull (at the skeg) on the Lake. Will turn on automatically if more than ten gallons of water is in the hull. It can be turned on manually and pump water out of the hull if there is more than two gallons in the hull.

Bleed: To seep. In the case of the Lake hydraulic system, the bleed position (between the off position and a pressure position) will allow the hydraulic system to drop; that is, to bleed off pressure.

Boot Drain: A rubber accordion piece surrounds a control rod, where the rod leaves a water-tight compartment. If this boot fills with water, it is vented overboard at a boot drain.

Breakaway: Only three bolts hold the sponson onto the wing. Also, the fuel line from the

aux tank is frangible. On an impact it is better to shed a sponson than a wing. Thus, the sponsons are designed to break away.

C

CAA: Civil Aeronautics Agency, forerunner to the FAA.

Canopy: Door - Windshield combination that opens for entry into the aircraft.

Cantilever: To project with no external support. In the case of the Lake, the strutless wing.

Carburetor Heat: The heat that is inducted to the carburetor to prevent ice from forming.

Cat's Paw: The pattern on the water showing an increase of wind motion in gusts. On land these gusts show on wheat fields. On water the patterns are darker than the surrounding water and generally move across the surface.

CB: Circuit Breaker.

CG: Center of Gravity.

Chines: Spray rails, deflectors for keeping bow spray out of the propeller.

Copacetic: Entirely satisfactory.

Crab: The angle an airplane has in relation to the course it is making over the surface due to a crosswind, or cross controlling of the airplane flight controls.

CYA: Cover your anatomy?

D

DEA: Drug Enforcement Agency.

Dead Stick: Flying with a complete engine failure.

Detent: Notch or flat spot.

Displacement: To displace water with a hull. In the Lake aircraft, when the airplane is at rest or at idle power (see plow taxi).

E

EGT: Exhaust Gas Temperature. A reading to help determine the condition and power from an engine.

F

Fetch: The distance the wind travels on the water, resulting in the increasing size of waves.

FPM: Feet Per Minute, as in rate of descent or rate of climb.

Fuel Tanks: Lakes can have three kinds of fuel tanks. The rubber bladder 40 gallon tank is the main tank in all Lakes. The auxillary tanks are smaller than the sponsons but are in most sponsons. They are individual tanks that look like a fuel can. The 250 and EP Series Lakes have wet wings. In this case, the skin of the wing itself forms the fuel tank.

G

Gigged: To punish or punishment.

Glare Shield: The portion of the dash that protrudes to block the reflection of the lighted instruments on the windshield. A part that barely shows on the older versions of Lakes.

GPH: Gallons Per Hour.

Gunnel: Sides of a boat. In the case of the Lake this is the cockpit sidewall.

H

HP: Horsepower.

Hull Plugs: Drain plugs for removing water from the hull and sponsons on the Lake.

Hyd: Hydraulic.

Hydro Boosters: (Strakes) Hollow, V-shaped ridges on the bottom of the hull. They are open to the ram air in the front and the exiting air at the step decreases water tension and enhances takeoff performance.

I

Idiot Light: An individual instrument warning light or a master warning light that says "check the instruments, sir". A warning light that alerts the pilot when something is wrong. Very helpful in high workload situations.

L

Lake Faraway: Harry Shannon's favorite lake. It is so far from any mechanic that Harry gets a week's vacation in travel time when he goes to repair a sick airplane.

M

Mags: Magnetos. Engine driven devices that supply electrical energy to the splark plugs independent from the battery.

MAP: Manifold Pressure.

N

Nav: Navigation.

NORAD: No Radio.

Normally Aspirated: An engine that has surrounding air mixed with fuel for burning. An engine that is not supercharged or turbocharged.

O

Oleo: A shock absorber, generally used in the landing gear. The main components are nitrogen and hydraulic fluid under compression by a piston in a cylinder.

P

Parallax: The apparent displacement of an object observed. For example, when looking at an aircraft instrument when not directly behind the instrument, the reading will not be accurate until the eyes, needle and instrument face are aligned.

Plow: The position of the hull on the water after accelerating from displacement, until reaching the step attitude.

POH: Pilot's Operating Handbook.

Prime: To add fuel to a carburetor or fuel injector to aid in engine start. In a carburetor engine this is accomplished with a primer pump (cylinder and plunger). In a fuel injected engine this is accomplished by turning on the electric fuel pump while the mixture is selected rich.

Prop: Propeller.

Prop Cycle: To move the propeller control from high to low and back to high setting. This is done before takeoff to circulate warm engine oil into the propeller governor and to check that the propeller can be controlled.

PSI: Pounds per Square Inch.

Pylon: A projecting member or supporting member. The portion of the Lake that separates the engine from the fuselage.

Q

Quantity Sender Mechanism: Unit in fuel tank that sends the reading to the fuel gauge.

R

Ray Jay: Name of company that manufactures turbochargers.

Rogue Wave: A wave that is higher than the other waves surrounding it.

Roundout: Position on approach that is between the steady descent and touchdown. The point where rate of descent is slowed by raising the nose of the aircraft.

S

Scupper: Cup-shaped area surrounding the fuel filler to contain any fuel spillage that occurs during refueling.

Shimmy: An object that shakes instead of remaining steady. A nosewheel can "shimmy" if it vibrates from side to side instead of rolling smoothly along a given path.

Skeg: Last piece of the keel, located at the step of the hull.

Sponson: A stabilizing flotation unit. On the Lake aircraft it is the float under each wing.

Spray Rails: See Chines.

Standard Day: 59 degrees Fahrenheit or 15 degrees Celcius, with a barometric pressure of 29.92 inches or 1013 millibars at sea level.

Strut: A supporting member. On some airplanes a wing strut will support a wing. On the Lake a strut is the part of the landing gear between the wheel and wing. Also, the engine is supported by struts of bars or flying wires.

Supercharger: Producing a high pressure intake of air to increase engine power by utilizing a wheel with vanes, geared directly to the engine.

T

T: (270T) Turbo-charged.

Three Point: To land with all three points of the landing gear simultaneously on land. This is the preferred way for a conventional light airplane to land in light winds. It is a poor way to land a tricycle landing gear airplane.

TIT: Turbine Inlet Temperature. This is a temperature shown on turbine engines and is used for proper leaning and limiting heat in the engines.

Turbo-Charger: Producing a high pressure intake of air to increase engine power by utilizing a wheel with vanes (pump), powered by the engine's exhaust.

TX: Transponder.

W

Wastegate: A valve that opens on a predetermined pressure setting in a turbo-charger system. This prevents harmful excessive pressure from damaging a turbo-charged engine. On the 270T this wastegate is set to relieve pressure at 38 inches.

Weathercock: To turn into the wind. A cock on a weathervane will do it, due to the shape and balance and so will an airplane on the water.

Wing Root: Portion of the wing that joins to the fuselage.